



**EXPLANATION**

**Primary soil sample site**  
Location and number of primary sites from which soil samples were obtained for laboratory analyses. (See table 2). Samples were collected with a six-inch-diameter soil auger. General characteristics are summarized in table 1.

**Secondary soil sample site**  
Location and number of secondary soil sample sites. Samples were collected with a one-inch-diameter long-core sampler. For general characteristics see table 2.

**Primary observation well**  
Numerator is altitude of water table in October 1955. Denominator shows measured range in altitude of water table during 1955-56.

**Secondary observation well**  
Numerator is altitude of water table in October 1955. Denominator shows estimated range in altitude of water table during 1955-56 based on measurements from 1955 to 1956 and comparison with primary observation-well records.

**Domestic or farm well**  
Denominator, where given, shows estimated range in altitude of water table during 1955. Contour interval 10 feet. Relative position of water table in October 1955 is shown in hachures (Figure 1).

**Water-table contour**  
Number above altitude of water table in feet above mean low tide in October 1955. Contour interval 10 feet. Relative position of water table in October 1955 is shown in hachures (Figure 1).

**Perennial stream**  
Bottom of stream channel almost always below water table.

**Intermittent stream**  
Bottom of stream channel above water table part of the time and below water table part of the time.

**Surficial alluvial mantle, Pleistocene age.**  
**Recent alluvial deposit.**  
**Marine tidal marsh.**  
**Urban area.**  
**Swamp deposit.**

**SOIL SYMBOLS**  
The map symbols used in this report to designate the various types of soils are a modification of the system used in the engineering soil survey of New Jersey (Boggs, 1955). The first part of the symbol is a letter, or group of letters, which identifies the parent material according to the classification system adopted by the Highway Research Board (Allen and others, 1945) and used with some modifications by the Delaware State Highway Department (see table 2). A two-digit number indicates that two soil types are present within the same soil profile; for example, the symbol AM24 implies that both A-2 and A-4 soils are present in the same soil profile, but usually in different horizons. Two different soil symbols may be combined by a diagonal bar (AM24/4). A diagonal bar indicates that two soil types (AM24 and AM4) are present within the same area, but not necessarily within the same profile. The two soils are so finely interspersed that they cannot be mapped separately.

**REFERENCES**  
Allen, Harold, and others, 1945, Report of committee on classification of materials for subgrade and granular type roads: Highway Research Board, 6th Ann. Mtg., Oklahoma City, 1945, Highway Research Board Proc., v. 25, p. 377-388, Washington.  
Lunder, D. E., 1950, A system for designating map-units on engineering soil-maps in soil exploration and mapping: Highway Research Board Bull. 28, p. 17-35, Washington.  
Rogers, F. C., 1955, Engineering soil survey of New Jersey, Report No. 1, Rutgers Univ. Eng. Research Bull. 15, 114 p., New Brunswick, N. J.

**TABLE 1.—Explanation of letter symbols**

Symbol	Explanation
AM	Surficial alluvial mantle, Pleistocene age.
AR	Recent alluvial deposit.
MTM	Marine tidal marsh.
U	Urban area.
Z	Swamp deposit.

**TABLE 2.—Soil classification**

General classification	Granular materials (35 percent or less passing a No. 200 sieve)							Silt-clay materials (more than 35 percent passing a No. 200 sieve)								
	A-1		A-3		A-2		A-4		A-5		A-6		A-7		A-8	
Group classification	a	b	4	5	6	7	8	9	10	11	12	13	14	15	16	
Sieve analysis																
Percent passing																
No. 10 sieve	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	
No. 20 sieve	50 max	50 max	55 min	55 max	55 max	55 max	55 max	36 min	36 min	36 min	36 min	36 min	36 min	36 min	36 min	
No. 40 sieve	15 max	15 max	10 max	10 max	10 max	10 max	10 max	10 max	10 max	10 max						
No. 60 sieve	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	5 max	
Characteristics of fraction passing No. 40 sieve																
Liquid limit	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	
Plasticity index	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Group index	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
General subgrade rating																
Material																

Plasticity index of A-7.5 subgroup is equal to or less than the liquid limit minus 30.  
Plasticity index of A-7.6 subgroup is greater than the liquid limit minus 30.  
Group index is calculated according to the following formula:  
Group index =  $\frac{0.0075(L - 40)(U - 20)}{100}$   
in which:  
L = That portion of the percentage passing No. 200 sieve greater than 35 percent and not exceeding 75 percent, expressed as a positive whole number (1 to 40).  
U = That portion of the percentage passing No. 200 sieve greater than 15 percent and not exceeding 60 percent, expressed as a positive whole number (1 to 40).  
G = That portion of the numerical liquid limit greater than 20 and not exceeding 40, expressed as a positive whole number (1 to 20).  
P = That portion of the numerical plasticity index greater than 10 and not exceeding 40, expressed as a positive whole number (1 to 20).

**TABLE 3.—Results of laboratory analyses of soil samples**

Mechanical analysis

Sample No.	Depth of interval sampled (feet)	Liquid limit: NL, nonliquid					Moisture-density		H. R. B. Classification <sup>1</sup>	Map Symbol
		% in. (4.75 mm)	No. 10 (0.60 mm)	No. 20 (0.85 mm)	No. 40 (0.425 mm)	No. 60 (0.25 mm)	Maximum density (lbs per cu ft)	Optimum moisture (percent by weight)		
118	0-16	96.6	88.6	81.0	69.2	35	129	9	A-4 (9)	AM14
	16-32	84.5	82.0	52.1	32.4	15.6	134	8	A-4 (8)	AM14
	32-48	100	99.9	88.2	62.9	41	126	10	A-4 (10)	AM4
	48-64	100	99.5	88.6	78.8	40.0	135	8	A-4 (8)	AM4
	64-80	100	99.2	88.2	62.9	40.0	129	10	A-4 (10)	AM24
	80-96	100	96.9	82.3	68.5	32.4	135	8	A-4 (8)	AM4
	96-112	100	96.6	82.3	68.5	32.4	135	8	A-4 (8)	AM4
	112-128	100	96.9	82.3	68.5	32.4	135	8	A-4 (8)	AM4
	128-144	100	96.6	82.3	68.5	32.4	135	8	A-4 (8)	AM4
	144-160	99.7	97.3	85.5	54.1	34.0	132	8	A-4 (8)	AM12
	160-176	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	176-192	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	192-208	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	208-224	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	224-240	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	240-256	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	256-272	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	272-288	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	288-304	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	304-320	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	320-336	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	336-352	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	352-368	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	368-384	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	384-400	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	400-416	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	416-432	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	432-448	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	448-464	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	464-480	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	480-496	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	496-512	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	512-528	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	528-544	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	544-560	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	560-576	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	576-592	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	592-608	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	608-624	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	624-640	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	640-656	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	656-672	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	672-688	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	688-704	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	704-720	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	720-736	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	736-752	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	752-768	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	768-784	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	784-800	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	800-816	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	816-832	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	832-848	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	848-864	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	864-880	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	880-896	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	896-912	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	912-928	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	928-944	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	944-960	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	960-976	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	976-992	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12
	992-1008	100	98.2	90.0	43.3	14.0	129	8	A-4 (8)	AM12

**TABLE 4.—Characteristics of the engineering soil types in the Wyoming quadrangle.**

Soil type	Description	Origin	Engineering properties				Suitable compaction equipment
			In place	Disturbed <sup>2</sup>	Suitability as embankment material	Compaction characteristics	
			Suitability as a subgrade <sup>3</sup>	Suitability as a wearing surface <sup>4</sup>	Suitability as embankment material	Compaction characteristics	
AM12	Nonplastic to slightly plastic, gravelly and sandy soil.	Fluvial deposits of Pleistocene age.	Excellent	Good if surface is A-1. Excellent to good, depending on binder, if surface is A-2.	Excellent	Excellent	Rubber-tired equipment.
AM14	Nonplastic to slightly plastic, gravelly and silty soil.	Fluvial deposits of Pleistocene age.	Excellent if material left after grading is predominantly A-1. Fair if material left after grading is predominantly A-4.	Good if surface is A-1. Poor if surface is A-2.	Excellent if predominant material is A-1. Fair if predominant material is A-4.	Excellent if predominant material is A-1. Fair if predominant material is A-4.	Rubber-tired equipment.
AM2	Nonplastic to slightly plastic sandy soil.	Fluvial deposits of Pleistocene age.	Good	Excellent to good depending on binder present.	Good	Good	Rubber-tired equipment.
AM3	Nonplastic, generally poorly graded sandy soil.	Fluvial deposits of Pleistocene age.	Good to fair.	Excellent to good depending on binder present, if surface is A-2. Fair if surface is A-3.	Good if predominant material is A-2. Fair if predominant material is A-3.	Good if predominant material is A-2. Fair if predominant material is A-3.	Rubber-tired equipment for soil which is predominantly A-2. Vibratory equipment for soil which is predominantly A-3.
AM4	Nonplastic to slightly plastic, sandy and silty soil.	Fluvial deposits of Pleistocene age.	Good if material left after grading is predominantly A-2. Poor if material left after grading is predominantly A-4.	Excellent to good depending on binder present, if surface is A-2. Fair to poor if surface is A-4.	Good if predominant material is A-2. Fair if predominant material is A-4.	Good if predominant material is A-2. Fair if predominant material is A-4.	Rubber-tired equipment.
AM6	Nonplastic to highly plastic, sandy and clayey soil.	Fluvial deposits of Pleistocene age.	Good if material left after grading is predominantly A-2. Poor if material left after grading is predominantly A-4.	Good if surface is A-2. Poor if surface is A-4. Very poor if surface is A-6 or poorly drained A-2.	Fair if predominant material is A-2. Very poor if predominant material is A-6.	Fair if predominant material is A-2. Very poor if predominant material is A-6.	Rubber-tired equipment for soil which is predominantly A-2. Sheeps-foot rollers for soil which is predominantly A-6.
AM4	Nonplastic to slightly plastic, sandy (poorly graded) and silty soil.	Fluvial deposits of Pleistocene age.	Fair	Fair if surface is A-3. Fair to poor if surface is A-4.	Fair. Good if A-3 and A-4 are combined as a well graded mixture. Poor if predominant material is A-3. Fair if predominant material is A-4.	Fair. Good if A-3 and A-4 are combined as a well graded mixture. Poor if predominant material is A-3. Fair if predominant material is A-4.	Vibratory equipment for soil which is predominantly A-3. Rubber-tired equipment for soil which is predominantly A-4.
AM4	Slightly plastic, silty and clayey soil.	Fluvial and possibly alluvial deposits of Pleistocene age.	Fair to poor.	Fair to poor.	Fair to poor.	Fair to poor.	Rubber-tired equipment.
AM6	Slightly plastic to highly plastic, silty and clayey soil.	Fluvial, alluvial, and lacustrine deposits of Pleistocene age.	Poor if material left after grading is predominantly A-4. Very poor if material left after grading is predominantly A-6.	Poor if surface is A-4. Very poor if surface is A-6.	Poor if predominant material is A-4. Very poor if predominant material is A-6.	Poor	Sheeps-foot rollers.
AR	Alluvial gravel, sand, silt, and clay.	Alluvium of Recent age.	Variable	Variable	Variable	Variable	Variable.
MTM	Soil rich in organic material and subject to inundation by high tides. No definite profile.	Marine tidal marsh deposits.	Variable	Variable	Variable	Variable	Variable.
U	Urban areas where soil has been altered extensively by man.	Undetermined	Variable	Variable	Variable	Variable	Variable.
Z	Soil rich in organic material and frequently poorly drained. May be underlain at shallow depths by gravel, sand, or clay.	Swamp deposits of Recent age.	Variable	Variable	Variable	Variable	Variable.

<sup>1</sup> Two different soil types may be combined into a single map