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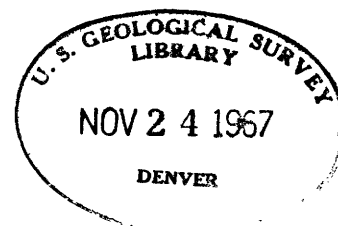
UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GEOLOGY, SOIL, AND CLIMATE
AT SPECIFIC POINTS THROUGHOUT THE WORLD*

VOLUME II
EUROPE, U. S. S. R., AND SOUTHWEST ASIA

by

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This report is preliminary
and has not been edited for
conformity with Geological
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NOV 29 1967

1. The first part of the report is a summary of the work done during the year.

2. The second part is a detailed account of the work done during the year.

3. The third part is a summary of the work done during the year.

4. The fourth part is a detailed account of the work done during the year.

5. The fifth part is a summary of the work done during the year.

6. The sixth part is a detailed account of the work done during the year.

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8. The eighth part is a summary of the work done during the year.

9. The ninth part is a detailed account of the work done during the year.

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11. The eleventh part is a summary of the work done during the year.

12. The twelfth part is a summary of the work done during the year.

13. The thirteenth part is a summary of the work done during the year.

14. The fourteenth part is a summary of the work done during the year.

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Geology, Soil, and Climate
at Specific Points throughout the World

INTRODUCTION

This study of 202 sites throughout the world provides data on rock and soil to a depth of 100 feet and on climatic conditions. It is designed for use in predicting depth of penetration that might result from re-entry impact of an aerospace radioisotope power supply capsule. The study, in four volumes, was prepared on behalf of the Reactor Development and Technology Division of the U. S. Atomic Energy Commission by the Military Geology Branch, U. S. Geological Survey in cooperation with the World Soil Geography Unit, U. S. Soil Conservation Service.

The data on soil and rock have been assembled mainly from the geologic literature and records of well borings in each country, supplemented and modified by relatively detailed data from soil reports especially for the upper 3 to 10 feet of material. The geologic data have been converted where applicable to equivalent soil terms.

Color designation for each layer depicted in the columnar description conforms to standards and terminology used by the U. S. Department of Agriculture as given in the Soil Survey Manual of the Department of Agriculture, published in 1951. Color indicates possible presence of certain compounds and tells something about the internal drainage. For example, grayish colors with mottling indicate poor or impeded drainage, whereas reddish colors usually are associated with well-drained soils and imply the presence of unhydrated iron oxides. Black to dark-brown colors in the surface layer are generally associated with fairly high organic content.

Each soil layer or horizon has also been classified according to the Unified Soil Classification System originally developed for the Corps of Engineers and published in their Technical Memorandum no. 3-357, in 1953. The Unified Soil Classification System identifies soils according to the textural and plasticity characteristics, and groups them according to their performances as engineering construction materials. With texture given, reasonable estimates or inferences can be made of many properties of a soil such as water-holding capacity, bearing capacity, and density.

Other soil properties have been described wherever reasonable estimates could be made. Some of these descriptions pertain to soil structure and consistency, content of roots, concretions, chemical reaction, and indurated layers such as laterite and caliche. Terminology used is generally consistent with that in the Soil Survey Manual.

Judgments concerning soil moisture, soil permeability, level of water table, and predominant vegetation have also been made for each site. Moisture classes applied are wet, moist, and dry. The soil is described

as being dry when the pore space is essentially free of water; wet when the pore space is almost or completely filled with water; moist when the moisture content is intermediate between those of the dry and wet stages. An estimate as to the depth of seasonal freezing is also included, where applicable.

Soil permeability as used in this report, relates to the quality of the soil that allows it to transmit water. Terms used for rating permeability are:

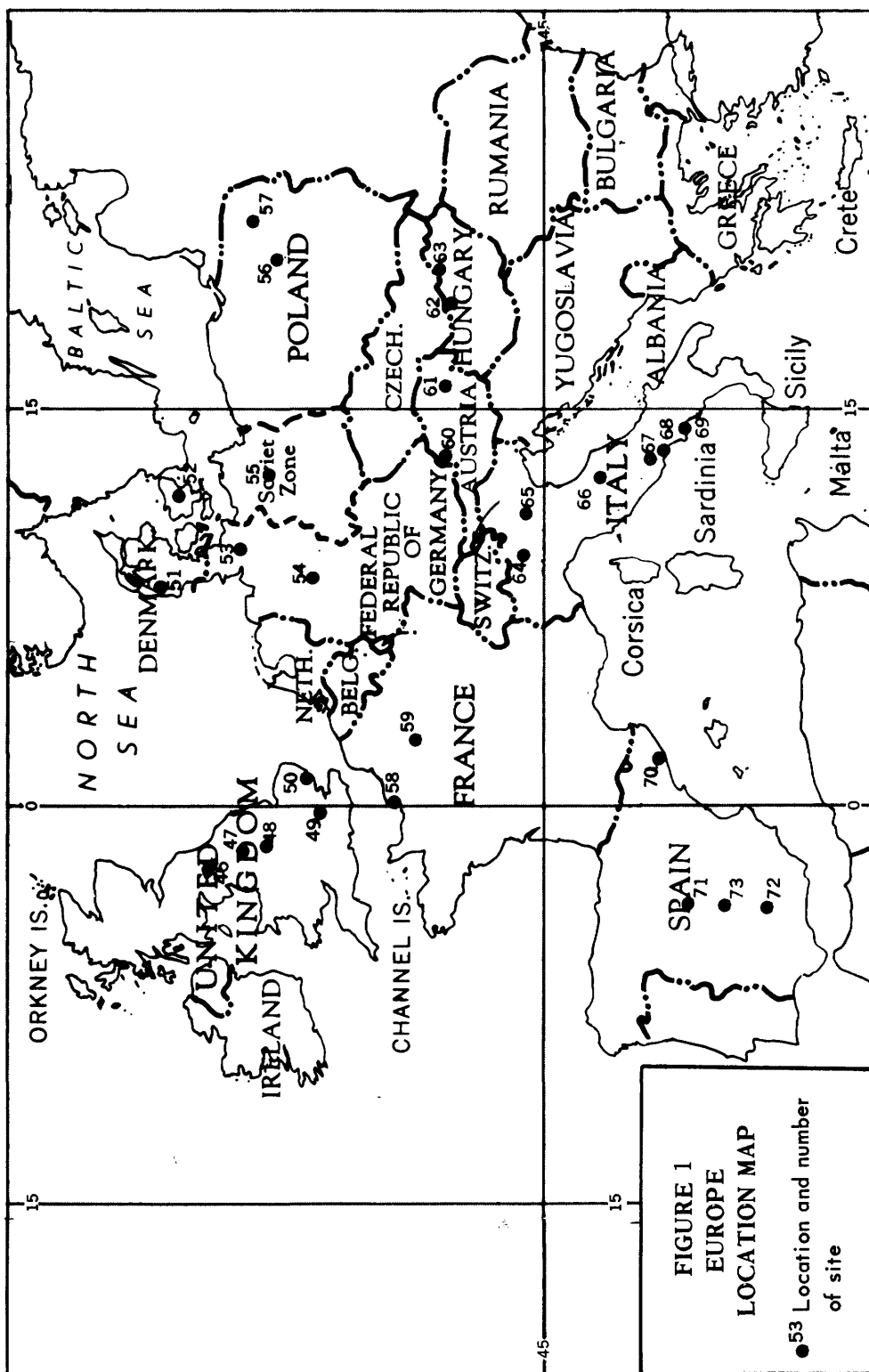
<u>Rating term</u>	<u>Rates in inches/hour</u>
Very slow	<0.05
Slow	0.05 - 0.20
Moderately slow	0.20 - 0.80
Moderate	0.80 - 2.50
Moderately rapid	2.50 - 5.00
Rapid	5.00 - 10.00
Very rapid	>10.00

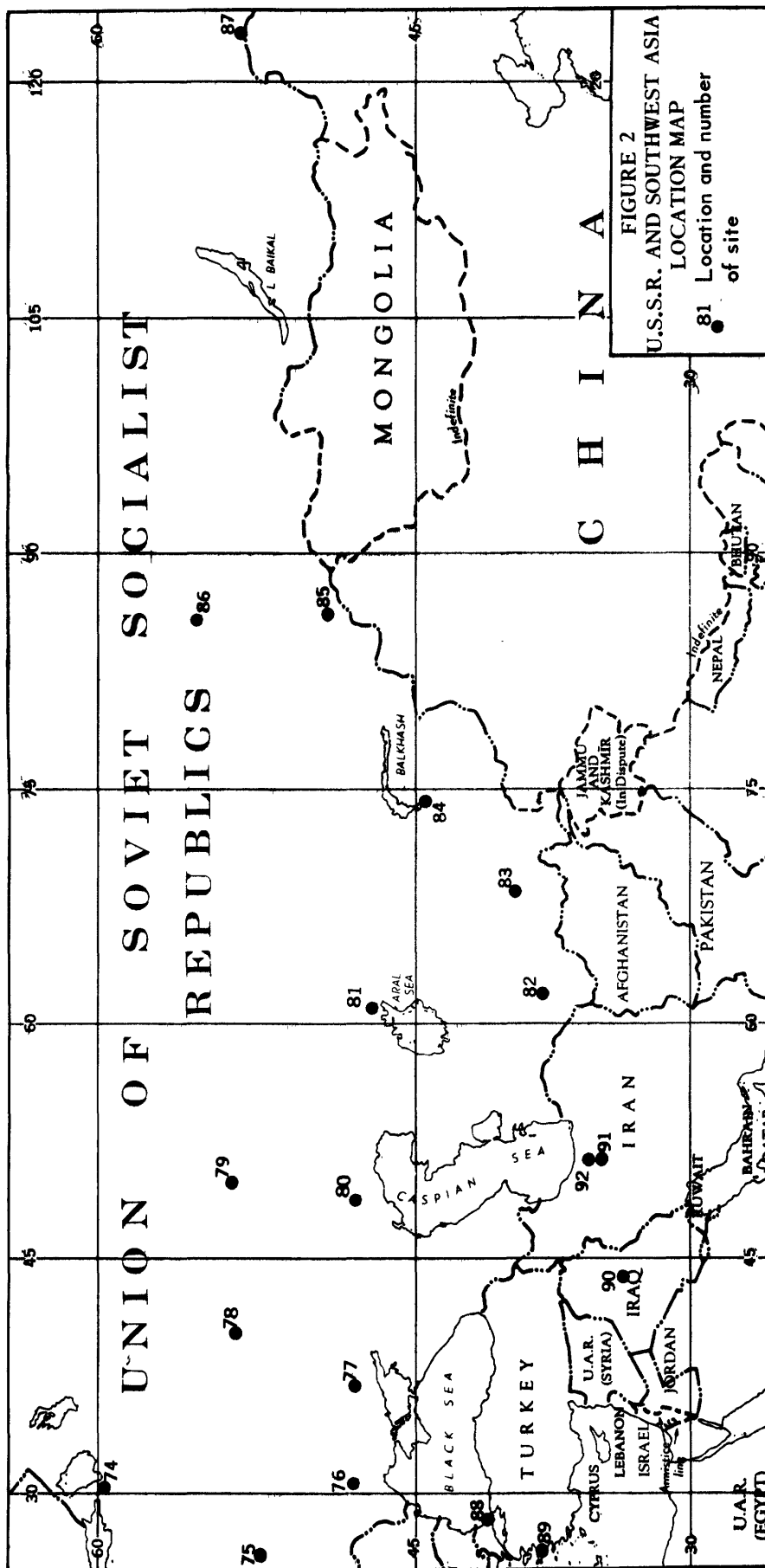
Statements on vegetation relate to the predominant vegetation at the site or in the vicinity. Since many of the sites are in urban environments or in areas subject to urban development, the ground may at present or in the future be occupied by structures or covered by pavement.

Water table levels have been taken from published sources or, where such data are not available, estimated on the basis of topography, climate, geologic materials, and other features of the physical environment of the site.

Climatic data have been obtained from published meteorological observations of stations at or near the specific site. Where nearby stations are lacking, regional data have been used.

The 47 sites described in Volume II are shown on 2 location maps, Figures 1 and 2.





SITE 46

Europe

England

Manchester

Location -- Lat 53°30'N.; long 2°13'W., on the grounds of the mental hospital at Prestwich on the north side of Manchester.

Geologic-Geographic Setting -- Site is at the north edge of a densely populated urban-industrial complex on a gently undulating thick glacial plain that slopes less than 3 percent southwestward toward the sea. Northwest of the site there are thick deposits of glacial clays and sands dissected by entrenched streams and rivers that produce a relatively high plateau deeply dissected at the margin. Glacial drift varies in thickness from almost nothing in deep valleys to more than 200 ft; this overlies heavily faulted sandstones and shales of late Paleozoic and early Mesozoic age. Elevation at the site is approximately 360 ft above sea level. About 9 miles northwest and 7 miles east of the city the plain merges with the foothills of the Pennine Mountains and elevations rise rapidly to over 1,000 ft. In area outside built-up sections, vegetation is mostly pasture grass; there are very few trees, except in parks and along roads.

Water Table -- Water table is probably about 20 ft below the surface and probably does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil is moist most of year; upper few inches frozen Jan., Feb., and part of Mar. Soil permeability has an overall rating of moderate.

Climate (based on stations at Liverpool and Sealand) --

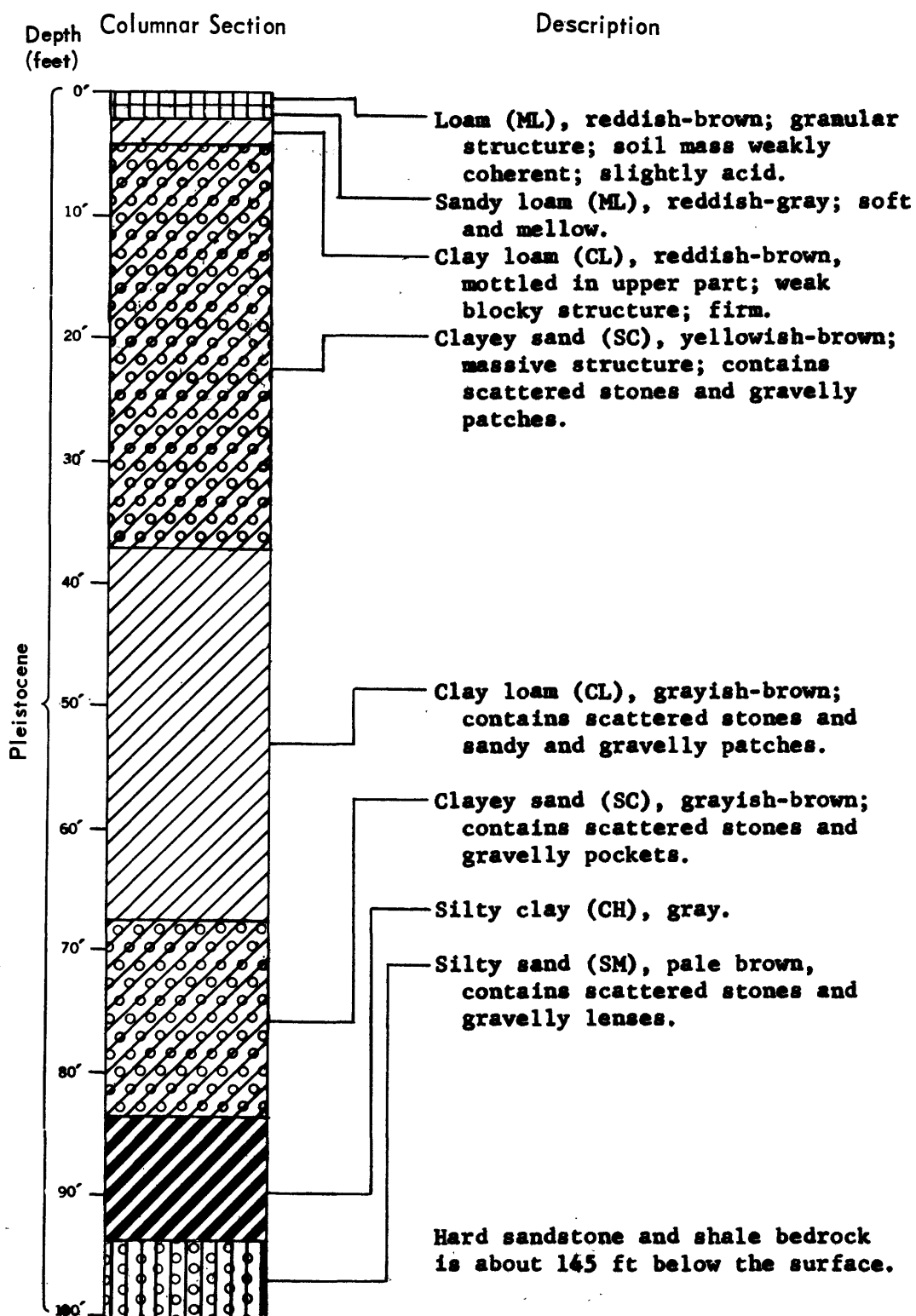
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	45	37	2.1	86	79
Feb.	44	36	1.7	86	73
Mar.	47	37	1.9	88	67
Apr.	51	41	1.6	85	64
May	58	46	1.9	84	65
June	63	51	2.2	81	65
July	65	54	2.6	83	67
Aug.	65	54	3.1	87	68
Sept.	61	51	2.4	90	68
Oct.	55	46	3.3	88	72
Nov.	48	40	2.5	88	78
Dec.	45	38	2.6	87	80
Ann.	54	44	27.9	86	70

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources ,--

- March, M. C., 1918, The superficial geology of Manchester: Manchester Lit. and Philos. Soc. Mem. and Proc., v. 62, no. 11.
- Smith, A. M., 1929, The soils of Lancashire and Cheshire: A preliminary study: Min. of Agriculture Jour., v. 36, no. 4.
- Tonks, L. H., and others, 1931, The geology of Manchester and the south-east Lancashire Coalfield, explanation of sheet 85: Geol. Survey of Great Britain Mem.

SITE 46



SITE 47

Europe

England

Whirley Grove

Location -- Lat 53°15'N.; long 2°08'W., the site is 450 yd south-southwest of Oak Villa, Macclesfield in the county of Cheshire.

Geologic-Geographic Setting -- Gently rolling farmland, planted in pasture. Situated on thick glacial deposits mostly ground moraine, over a complexly faulted series of Permian-Triassic bedrock. Slopes are moderate and the average ranges from 3 to 5 percent over a wide area; there are no dominating topographic rises. Elevation is about 575 ft above sea level.

Water Table -- Water table is about 40 ft below the surface and usually does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil is moist most of year; in winter and early spring, it is wet much of the time; during summer and fall, upper 2 ft periodically dry. Soil permeability is moderately rapid, overall.

Climate (based on station at Liverpool) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	45	37	2.1	86	79
Feb.	44	36	1.7	86	73
Mar.	47	37	1.9	88	67
Apr.	51	41	1.6	85	64
May	58	46	1.9	84	65
June	63	51	2.2	81	65
July	65	54	2.6	83	67
Aug.	65	54	3.1	87	68
Sept.	61	51	2.4	90	68
Oct.	55	46	3.3	88	72
Nov.	48	40	2.5	88	78
Dec.	45	38	2.6	87	80
Ann.	54	44	27.9	86	70

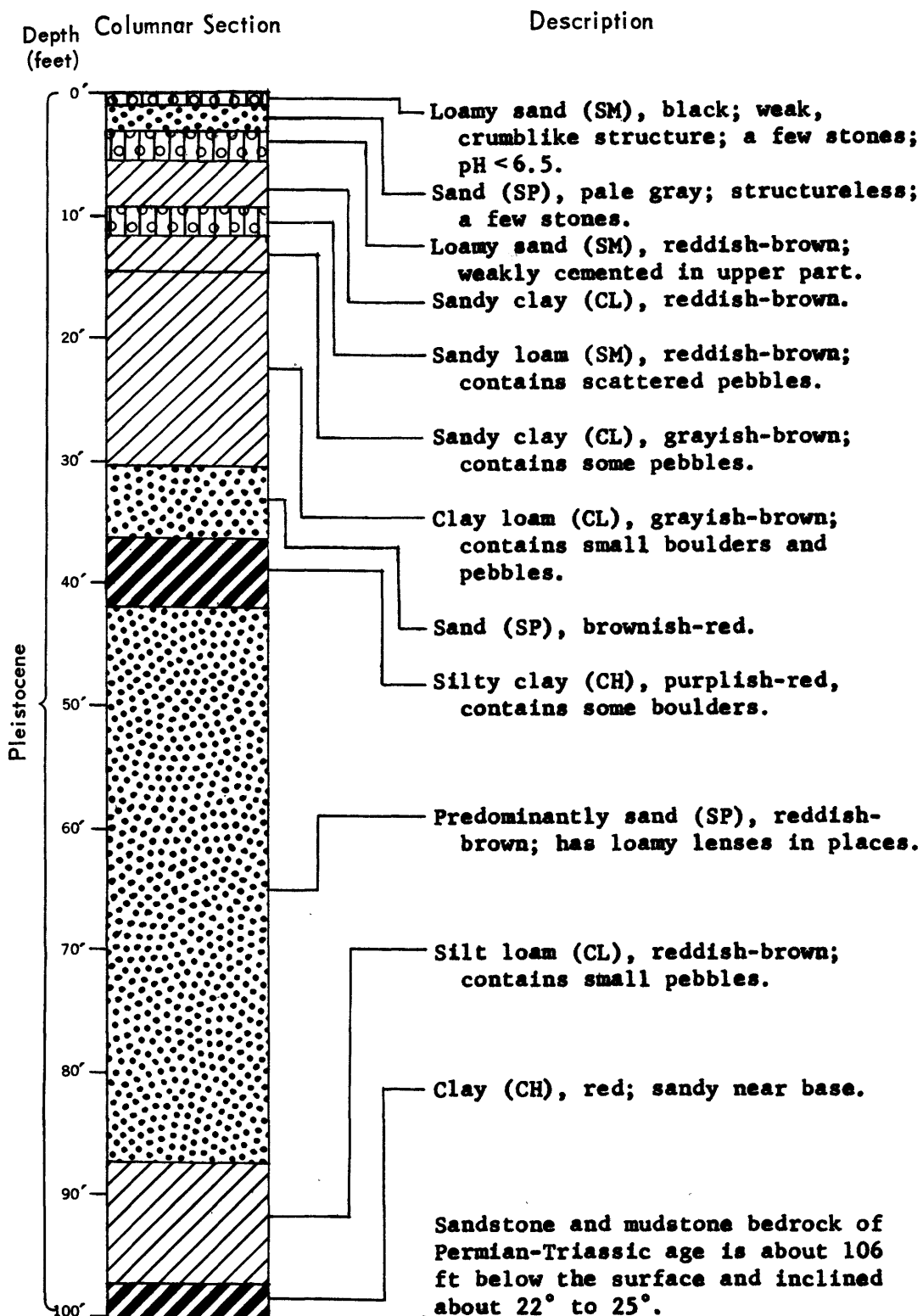
*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Smith, A., 1929, The soils of Lancashire and Cheshire: A preliminary study: Min. of Agriculture Jour., v. 36, no. 4.

Taylor, B. J., and others, 1963, Geology of the country around Stockport and Knutsford: Geol. Survey of Great Britain Mem.

SITE 47



SITE 48

Europe

England

Birmingham

Location -- Lat 52°28'N.; long 1°55'W., Nchelle gasworks, near Devon Street in the central part of Birmingham.

Geologic-Geographic Setting -- A densely built-up urban-industrial complex situated on a low undulating area known as the Midland Plateau. Glacial drift, probably ground moraine, overlies generally flat-lying sandstone, which is much faulted. Slopes are low and average less than 5 percent over a wide area. Elevation is 529 ft above sea level. Vegetation in the city mostly landscaping, grass, trees, and shrubs; outside the city mainly cereals and grass, but also many fruit trees.

Water Table -- Water table is about 10 ft below the surface and does not fluctuate much seasonally. Sandstone contains much water and is an important source of water.

Soil Moisture and Permeability -- Soil generally moist throughout year; upper 2 or 3 ft frequently wet in winter and spring; upper 1 or 2 ft periodically dry during summer and fall. Soil permeability is moderate in upper 2 to 3 ft, moderately slow below.

Climate (based on station at Birmingham) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 7 a.m. 1 p.m.	
Jan.	42	34	2.0	89	82
Feb.	44	34	1.7	90	76
Mar.	48	36	1.9	90	66
Apr.	53	39	1.7	87	61
May	60	44	2.2	83	60
June	65	50	2.3	89	61
July	68	53	2.3	85	60
Aug.	67	52	2.7	87	63
Sept.	63	49	1.8	90	67
Oct.	54	44	2.8	91	73
Nov.	48	39	2.4	90	78
Dec.	43	35	2.7	89	82
Ann.	54	42	26.5	88	69

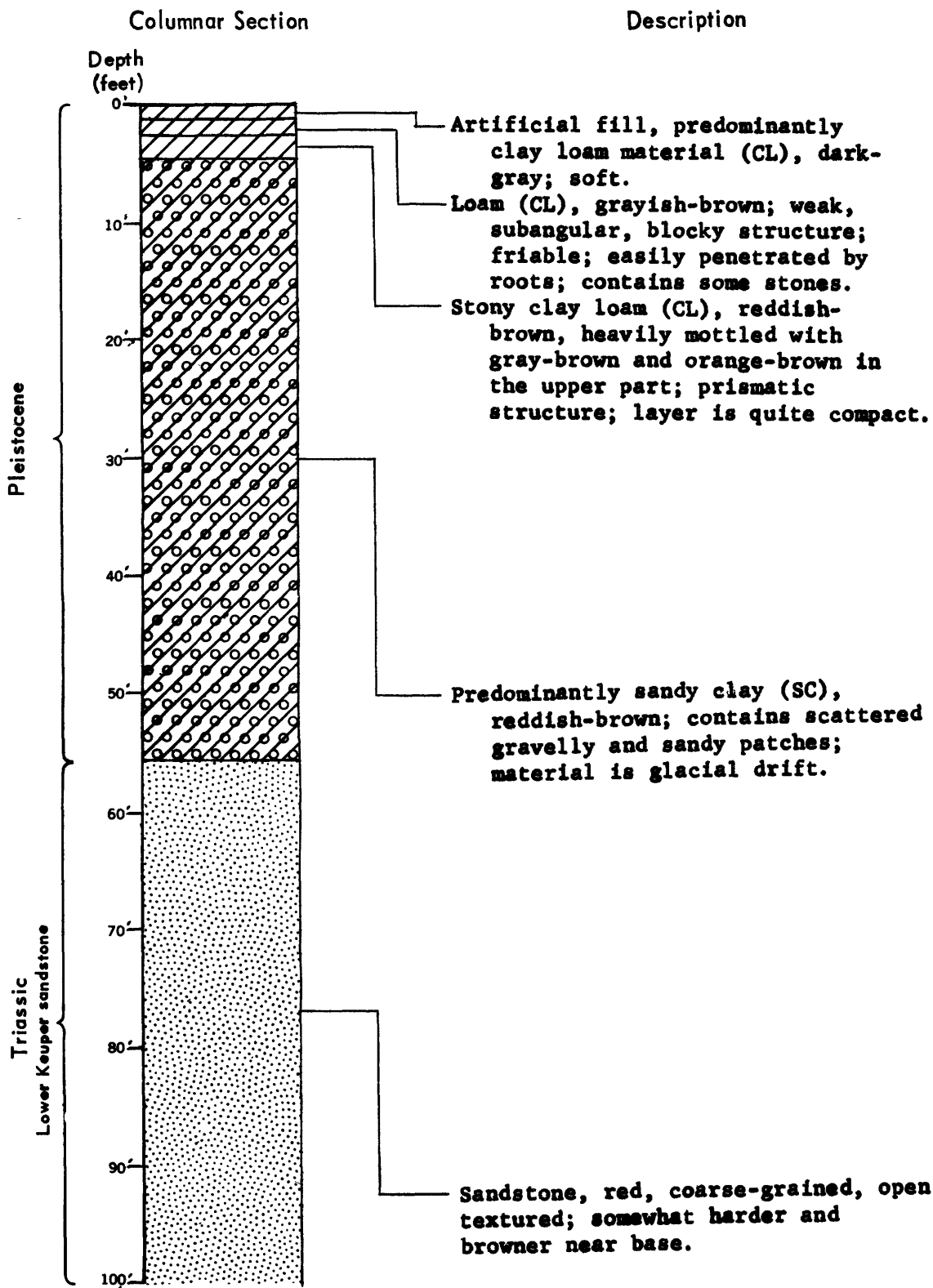
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Eastwood, T., and others, 1925, The geology of the country around Birmingham, explanation of one-inch sheet 168: Geol. Survey of Great Britain.

Mackney, D., and Burnham, C. P., 1964, The soils of the West Midlands: Harpenden, Soil Survey of Great Britain Bull., no. 2.

SITE 48



SITE 49

Europe

England

London

Location -- Lat 51°30'N.; long 0°08'W., Shell Building in block bounded by Chickeley Street, Charing Cross viaduct, York Road, and Belvedere Road, just north of the Thames River in downtown London.

Geologic-Geographic Setting -- A large densely populated urban area with numerous tall buildings and associated urban features located on the level flood plain of the Thames River in an area that was once part of the riverside marshes. Situated in the London basin formed by a downfold in chalk bedrock that underlies London. The downfold is floored with sands and clays the thickest of which is the marine-deposited London blue clay, an impervious, sticky, water-holding deposit overlain by thinner and more recent alluvial deposits. Slopes are low, less than 3 percent over a wide area. Elevation is about 13 ft above sea level.

Water Table -- Water table is about 15 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Above water table moist all the time. Soil permeability moderately slow in upper 20 ft or so; rapid in the gravelly layer; slow in London blue clay.

Climate (based on stations at London and Oxford) --

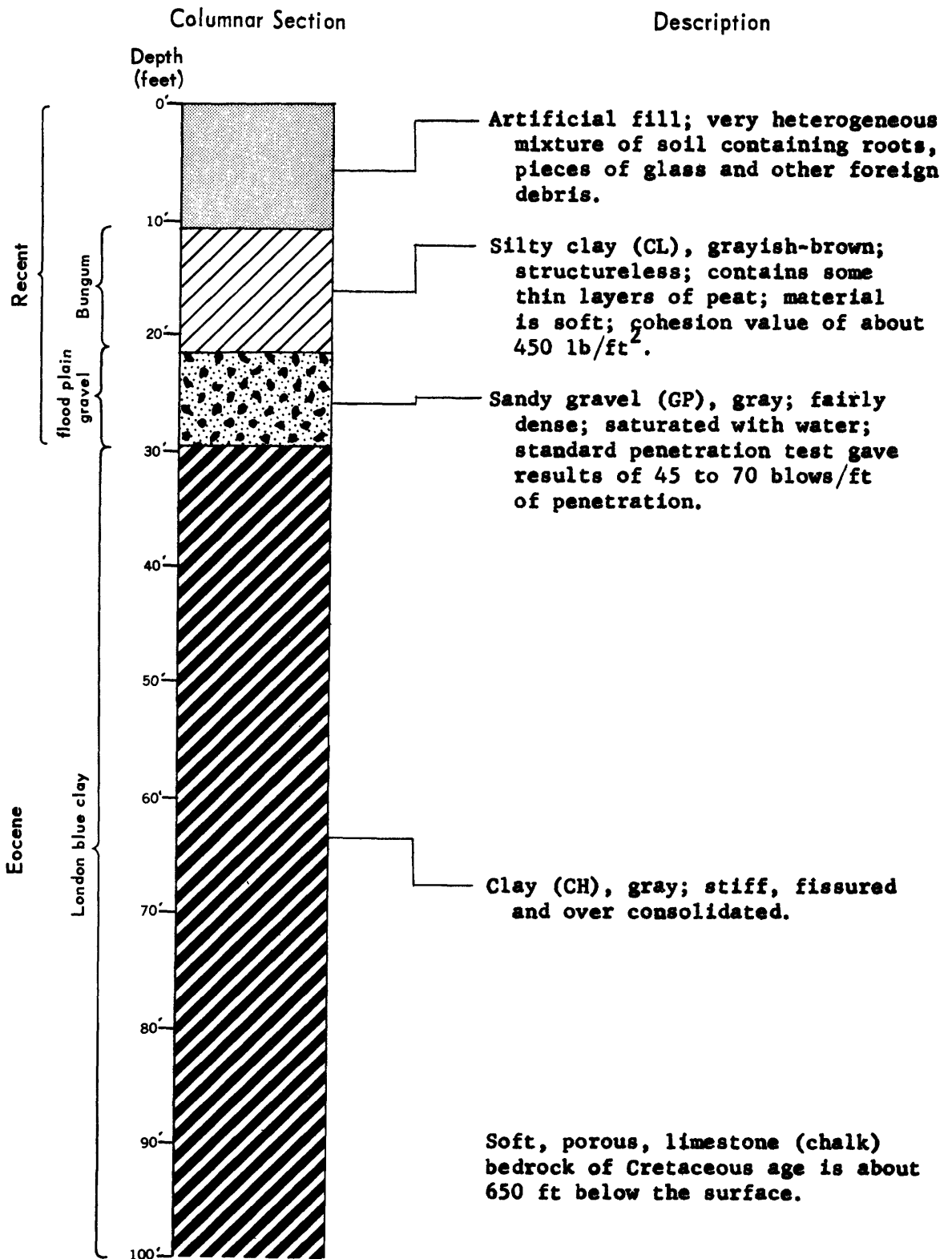
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	45	36	1.8	89	82
Feb.	46	36	1.5	90	76
Mar.	50	37	1.7	90	66
Apr.	54	40	1.5	87	61
May	63	46	1.7	83	60
June	68	51	2.1	89	61
July	71	55	2.2	85	60
Aug.	70	54	2.2	87	63
Sept.	65	50	1.9	90	67
Oct.	58	44	2.7	91	73
Nov.	49	39	2.2	90	78
Dec.	46	37	2.3	89	82
Ann.	57	44	23.8	88	69

*Mean daily maximum, **mean daily minimum, ***mean monthly, + mean daily.

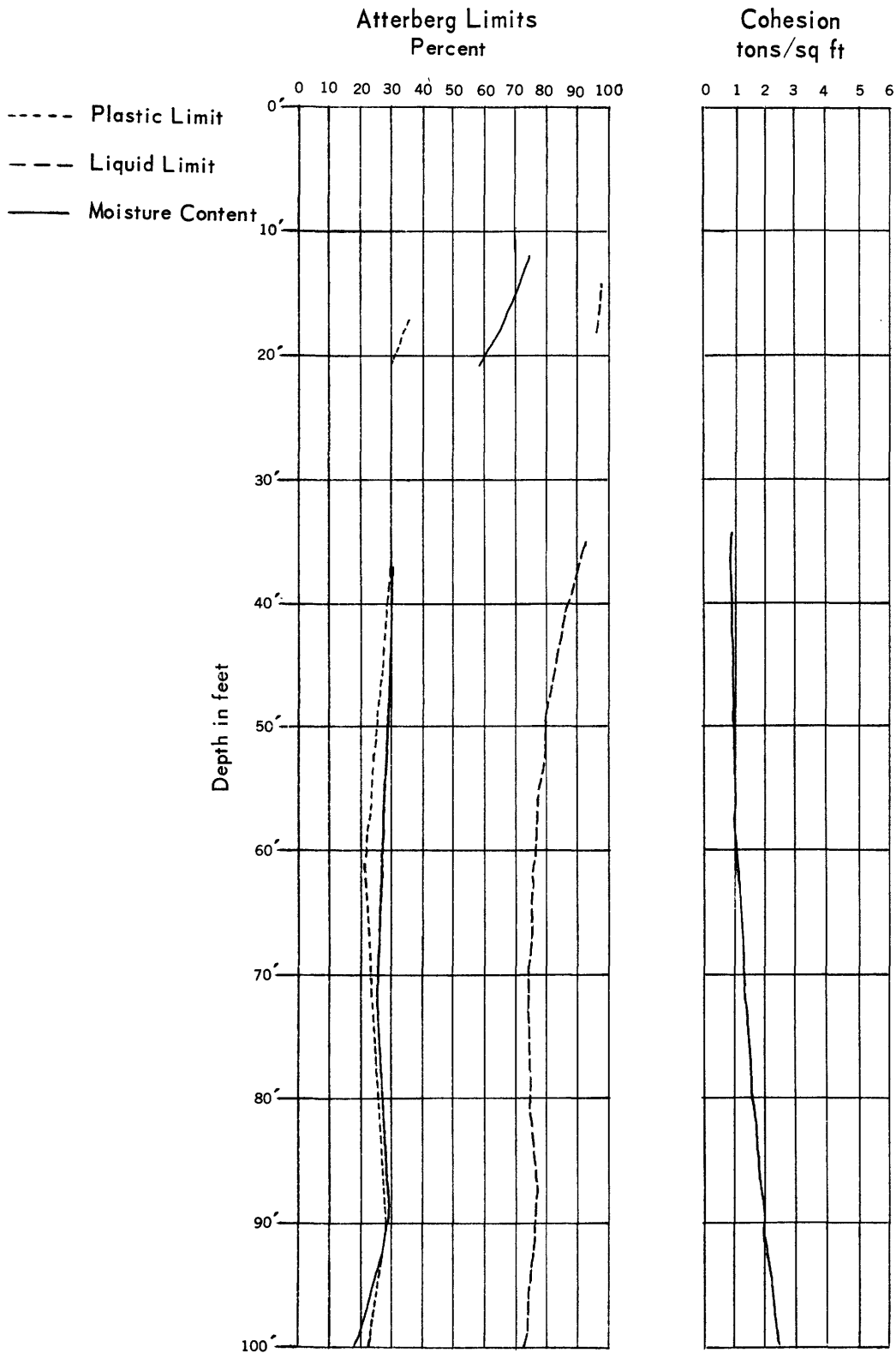
Principal Sources --

Williams, G. M. J., 1957, Design of the foundations of the Shell Building, London: Internat. Conf. on Soil Mech. and Found. Eng., 4th, London 1957, Proc., v. I, p. 457-461.

SITE 49



SITE 49



SITE 50

Europe

England

Shellhaven

Location -- Lat 51°31'N.; long 0°30'E.; about 260 ft inland from the north bank of the Thames estuary, about 6 miles northeast of Tilbury.

Geologic-Geographic Setting -- Situated in alluvial clays on the level flood plain of the lower Thames estuary, in marshy area along the north bank. The clays are about 45 ft thick and are normally consolidated except in the upper 10 to 12 ft where they have been subjected to drying and are overconsolidated. An analysis of a representative sample of the clay fraction in the Recent sediments show a predominance of illite, with some kaolinite and no montmorillonite. Slopes are low and average less than 3 percent over a wide area. Elevation is 6 ft above sea level.

Water Table -- Water table is about 3 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil is predominantly saturated throughout year. Soil permeability in upper 2 ft is moderately rapid; below 2 ft overall rating is slow.

Climate (based on station at Shellhaven) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)
Jan.	45	36	1.4	n.a.
Feb.	46	36	1.2	n.a.
Mar.	50	37	1.3	n.a.
Apr.	54	40	1.2	n.a.
May	63	46	1.3	n.a.
June	68	51	1.8	n.a.
July	71	55	1.8	n.a.
Aug.	70	54	1.8	n.a.
Sept.	65	50	1.7	n.a.
Oct.	58	44	2.4	n.a.
Nov.	49	39	2.1	n.a.
Dec.	46	37	1.8	n.a.
Ann.	57	44	19.8	n.a.

*Mean daily maximum, **mean daily minimum, ***mean monthly,
n.a. - data not available.

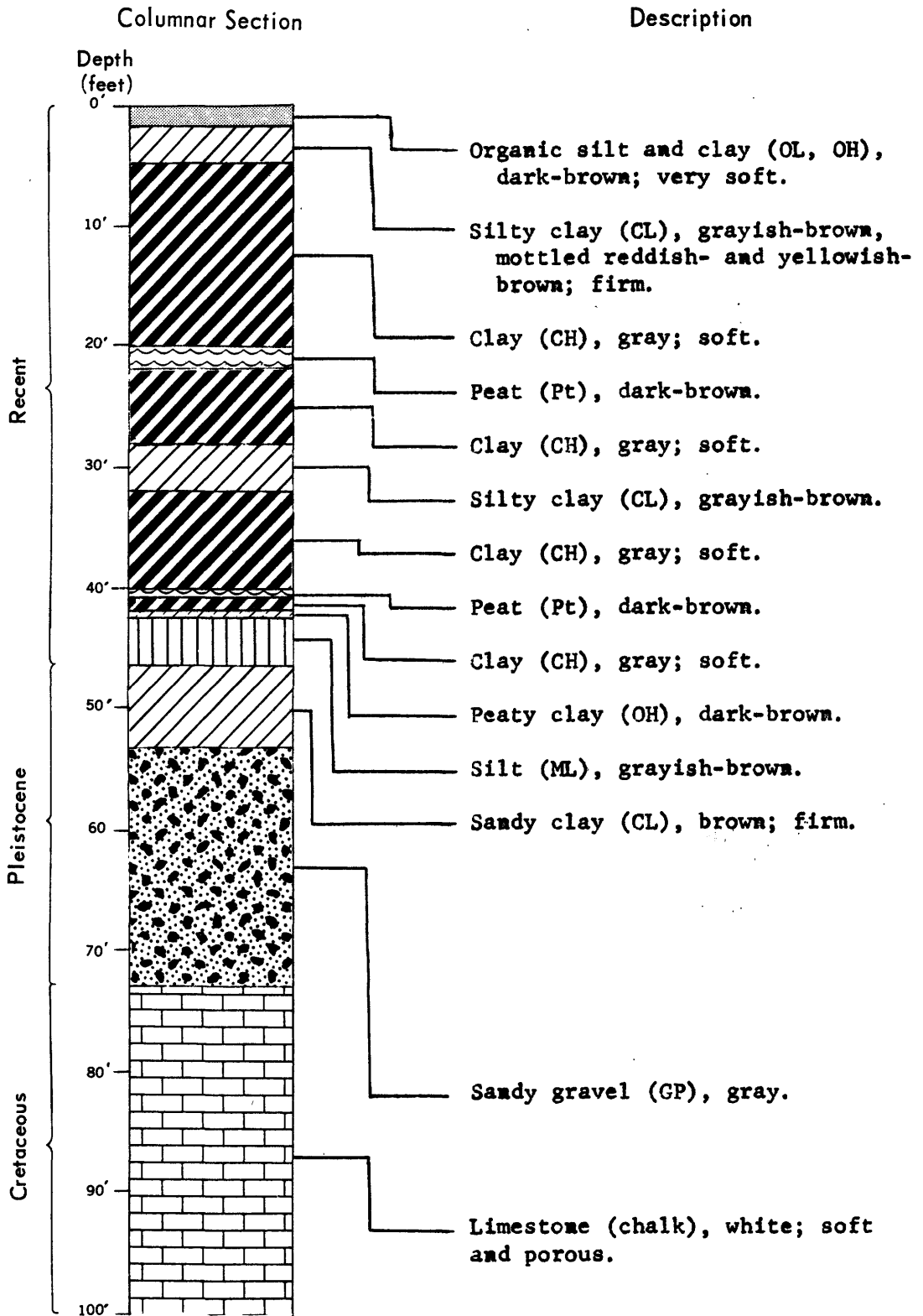
Physical Properties (in average values) --

<u>Depth (ft)</u>	<u>Water Content</u>	<u>Liquid Limit</u>	<u>Plastic Limit</u>	<u>Density lb/ft³</u>
0-5	59	106	30	103
5-12	92	115	30	93
12-20	90	115	30	93
20-22	350	550	300	65
22-28	80	105	30	96
28-32	46	54	23	112
32-40	63	82	27	102
40-41	165	not tested		72
41-43	58	88	29	104
43-44	95	147	47	89
44-47	26	38	17	125
47-53	25	36	16	126
53-73	19	nonplastic		135

Principal Sources --

Skempton, A. W., and Henkel, D. J., 1953, The post-glacial clays of the Thames estuary at Tilbury and Shellhaven: Conf. on Soil Mech. and Found. Eng., 3d, Switzerland 1953, Proc., v. 1, p. 302-308.

SITE 50



SITE 51

Europe

Denmark

Forballum

Location -- Lat 53°06'N.; long 8°43'E., in the small village of Forballum near Døstrup, about 23 km north-northwest of Tønder near the west coast of Jutland Peninsula.

Geologic-Geographic Setting -- Situated near the banks of the Brede River on a very gently undulating glacial outwash plain, planted mainly in pasture grasses and cereals. The plain is low lying, poorly drained, and uniform in appearance with numerous marshes, many of which have been artificially drained. The glacial deposits, more than 200 ft thick, overlies flat-lying clay and sand of Miocene age. Slopes average less than 3 percent over a wide area and elevation at the site is 15 ft above sea level.

Water Table -- Water table is rather shallow, 3 to 4 ft below the surface, and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil is generally moist late spring through late fall; upper 1 ft occasionally dry during this period; in winter and early spring, soil generally wet but upper 6 inches to 1 ft periodically frozen especially in Jan., Feb., and early Mar. Soil permeability is moderately rapid.

Climate (based on stations at Fanø, Vesterhavsbad, Tønder, and Skrydstrup) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	36	30	1.9	92	89
Feb.	36	29	1.6	91	85
Mar.	40	32	2.0	94	79
Apr.	48	37	1.7	93	70
May	58	45	2.0	88	66
June	64	51	1.9	88	69
July	67	55	3.2	89	69
Aug.	66	55	4.3	94	71
Sept.	61	50	2.8	95	70
Oct.	53	44	3.4	95	83
Nov.	44	36	2.3	93	87
Dec.	39	32	2.7	93	90
Ann.	51	41	28.8	92	77

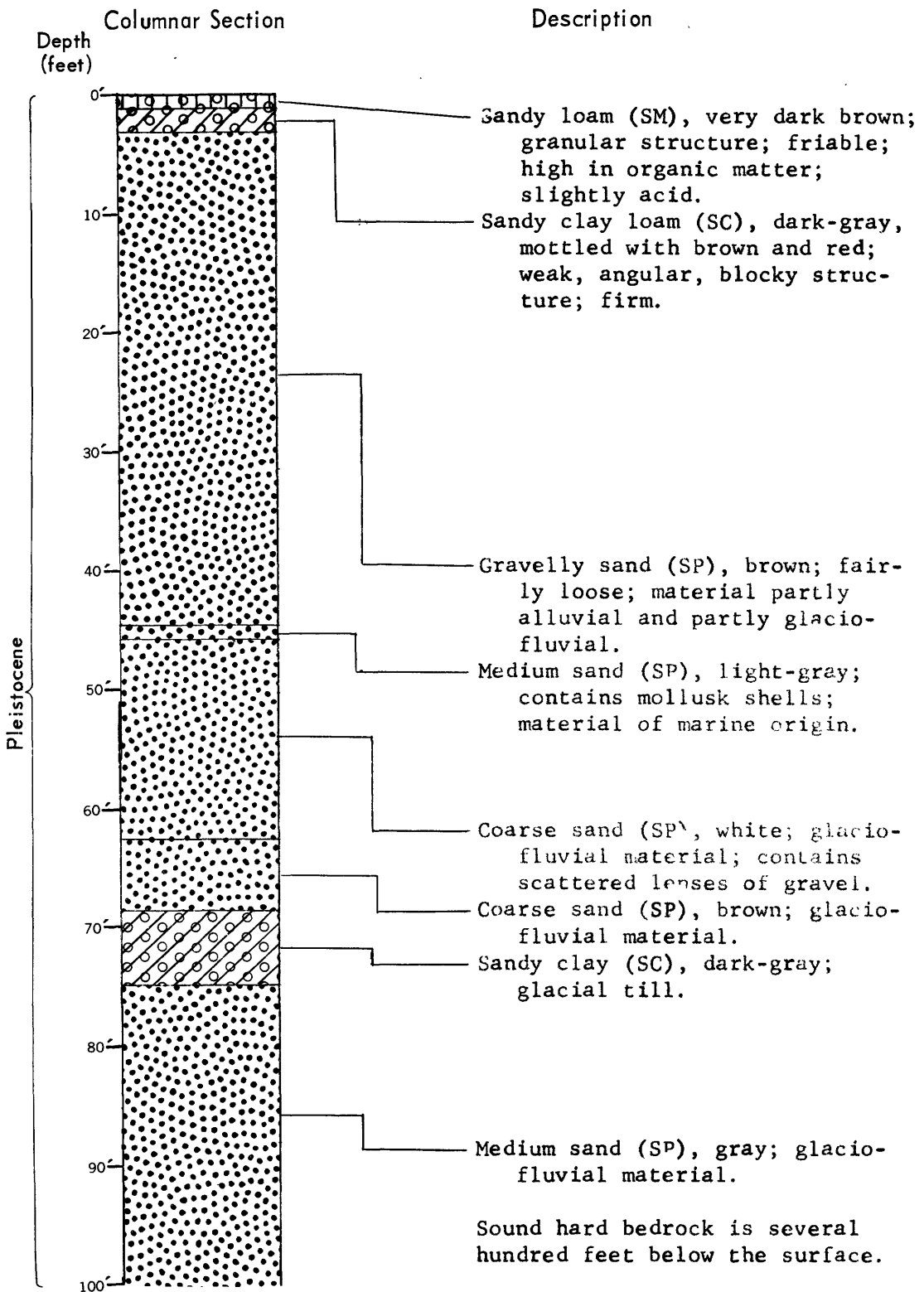
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Bornebusch, C. H., and Milthers, K., 1935, Soil map of Denmark:
Danmarks Geologiske Undersøgelse Series 3, no. 24.

Nordmann, V., 1913, Boringer gennem marint Diluvium i det sydvestlige
Jylland og nordvestlige Slesvig: Dansk Geologisk Forening
Meddelelser, v. 4, no. 2, p. 183-201.

SITE 51



SITE 52

Europe

Denmark

Copenhagen

Location -- Lat 55°41'N.; long 12°35'E., at the plastics factory in the industrial part of Copenhagen, on the east coast of Sjaelland Island, at the southern end of the sound between the Kattegat and the Baltic Sea.

Geologic-Geographic Setting -- A densely populated urban-industrial port city, the nucleus of which is on low level ground between the sea and a series of small, angular, fresh-water lakes. The older parts of town have narrow winding streets, but in the newer sections, streets are wide and straight. City is on a flat, glacial till plain that overlies flat-lying limestone of Cretaceous age. Slopes are less than 3 percent over a wide area and the elevation at the site is about 36 ft above sea level.

Water Table -- Water table is about 24 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil is moist most of year; from Nov. through Apr. soil occasionally wet for lengthy periods; upper 6 to 12 inches frozen for brief spells, Jan. through Mar. Soil permeability is moderate.

Climate (based on station at Copenhagen) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	7 p.m.
Jan.	35	28	1.5	88	86
Feb.	36	27	1.3	89	86
Mar.	40	30	1.4	87	80
Apr.	50	36	1.5	87	74
May	61	44	1.5	81	68
June	69	51	1.9	80	67
July	72	54	2.3	82	69
Aug.	69	53	2.8	87	74
Sept.	63	48	2.0	89	78
Oct.	53	42	1.9	89	84
Nov.	43	35	1.8	88	86
Dec.	38	31	2.0	89	88
Ann.	52	40	21.9	86	78

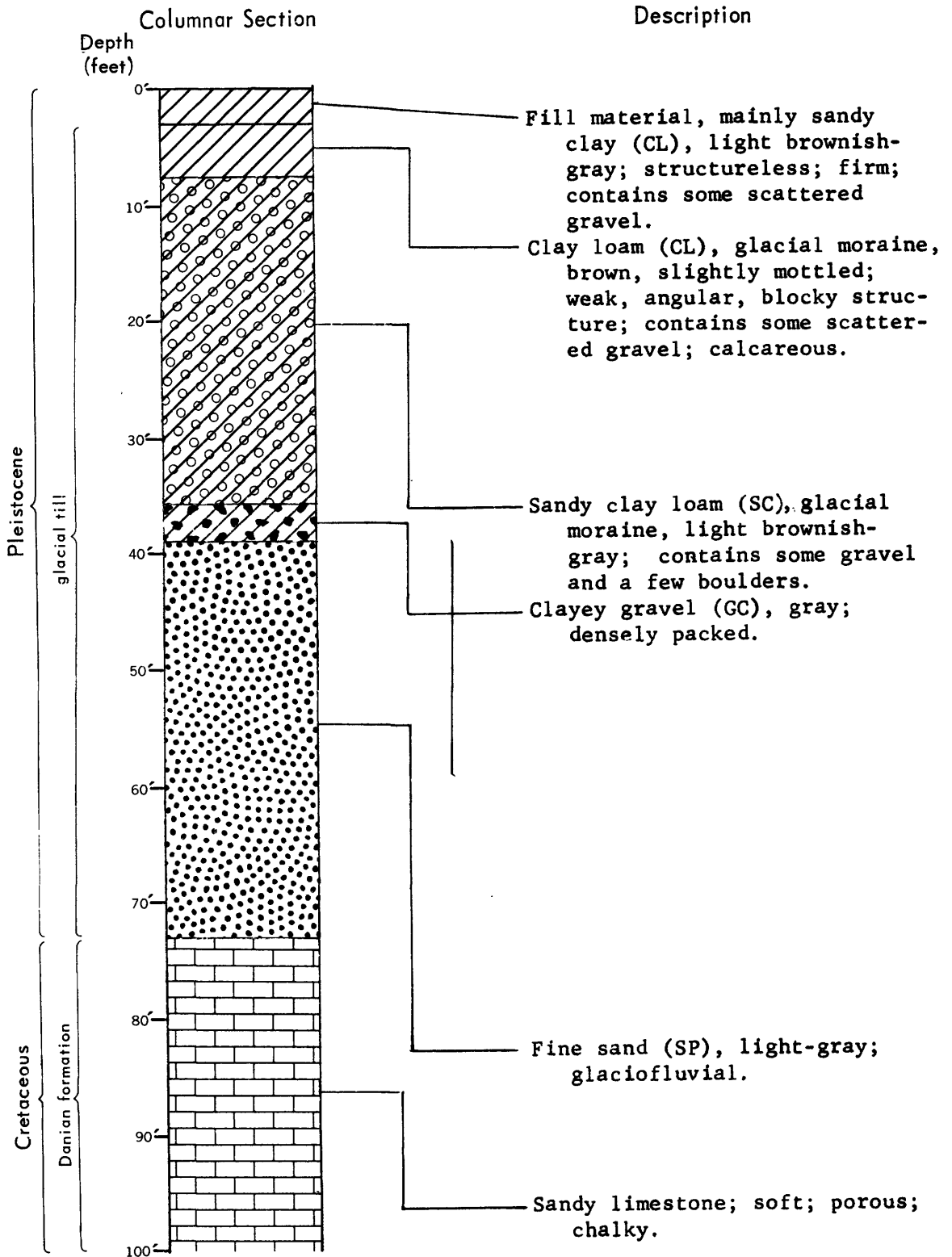
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Bornebusch, C. H., and Milthers, K., 1935, Soil map of Denmark: Danmarks Geologiske Undersøgelse Series 3, no. 24.

Sorgenfrei, T., and Berthelsen, O., 1954, Geology and water well boring: Danmarks Geologiske Undersøgelse Series 3, no. 31.

SITE 52



SITE 53

Europe

Germany

Hamburg

Location -- Lat 53°35'N.; long 10°00'E.; north of the Elbe River on Hasselbrook Strasse.

Geologic-Geographic Setting -- A large urban-industrial port city built on both sides of the Elbe River about 60 miles inland from the North Sea. Situated on low, flat, poorly drained ground on the North German Plain. Thick alluvial and glacial deposits overlie bedrock which is several hundred feet below the surface. The alluvium is soft and weak, highly plastic, and easily remolded. Piles for large structures must go through the alluvium to the more competent glacial material for adequate bearing strength. Slopes average less than 3 percent over a wide area. Elevation at the site is about 20 ft above sea level. The land surrounding the city is mainly forested tracts, meadows, and cultivated tracts planted to small grain and forage crops.

Water Table -- Water table is 6 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Area is poorly drained and soils are generally moist and frequently wet, especially in spring. Soil permeability above the water table is moderately rapid overall.

Climate (based on station at Hamburg) --

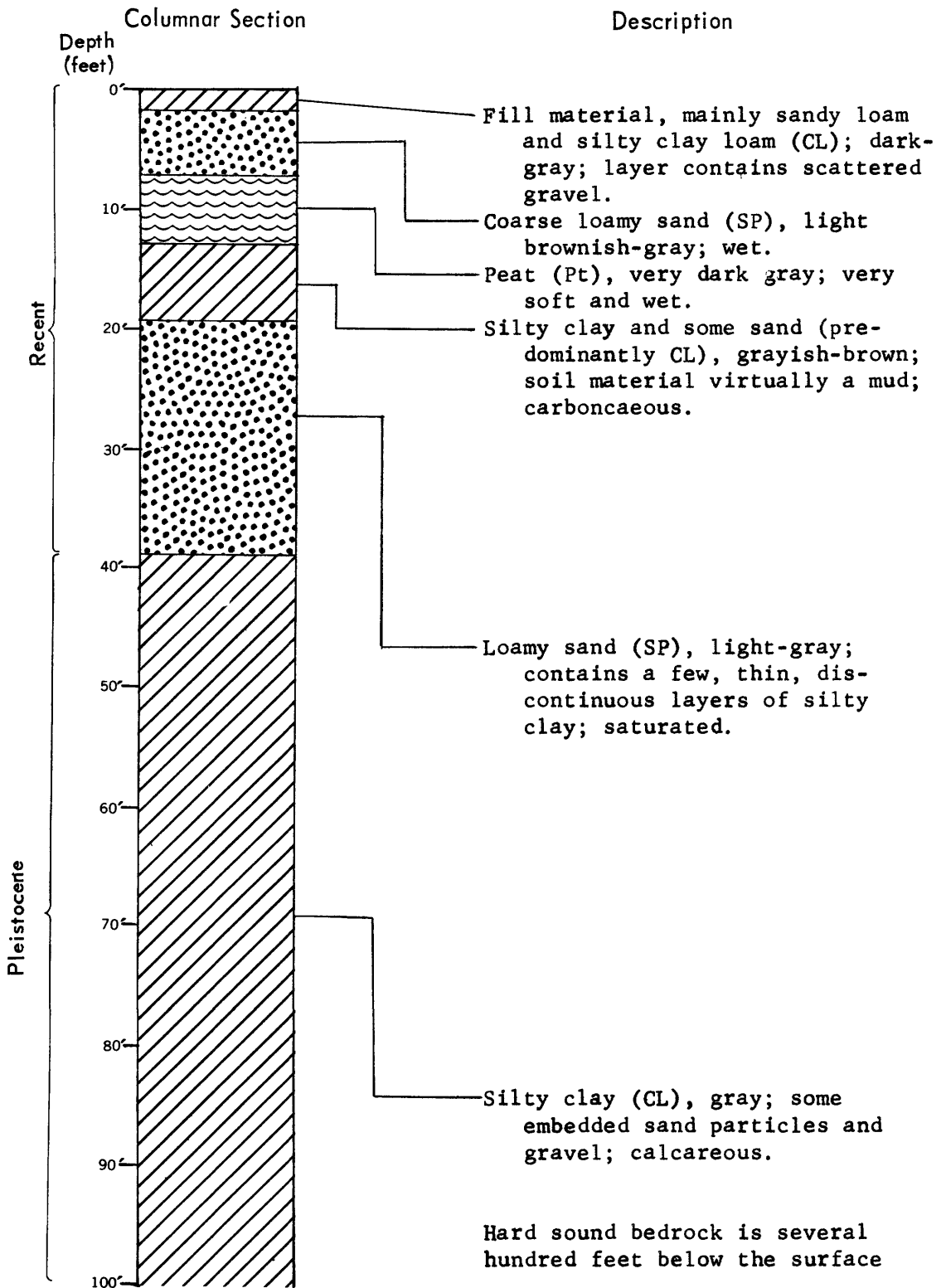
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	36	29	2.3	89
Feb.	38	30	1.9	86
Mar.	44	34	1.9	81
Apr.	52	39	2.0	72
May	61	47	2.1	68
June	66	53	2.6	70
July	69	56	3.3	73
Aug.	68	55	3.4	77
Sept.	63	51	2.4	79
Oct.	53	44	2.6	84
Nov.	44	36	2.1	88
Dec.	38	32	2.4	90
Ann.	53	42	29.0	80

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Keilhack, H. K., 1906, Ergebnisse von Bohrungen: Mitteilungen aus dem Bohrarchiv der Königl. Geol. Landesanstalt und Bergakademie, Jahrbuch für 1904, v. 25, no. 4.

SITE 53



SITE 54

Europe

Germany

Nassenerfurth

Location -- Lat 51°01'N.; long 9°15'E.; a little northeast of Nassenerfurth and about 27 miles southeast of Kassel.

Geologic-Geographic Setting -- Rolling to hilly farmland and pasture where nearby hills rise more than 700 ft above the surrounding terrain. On the west edge of a downfaulted block of soft Tertiary sediments that overlies fractured red Lower Triassic Bunter sandstone at a depth of about 150 ft below the surface. The rocks are generally flat-lying but have a slight dip to the east. Slopes are moderate, generally from 3 to 5 percent in the vicinity of the site, but considerably more in the nearby hills. Elevation is about 620 ft above sea level. Vegetation at the site is meadow grass. On the surrounding uplands, it is mainly cropland for small grains and potatoes, pastures, and woodland tracts.

Water Table -- Water table is about 9 ft below the surface but the level fluctuates and may drop as much as 6 ft during drier parts of the year.

Soil Moisture and Permeability -- Moist most of year, but wet below about 5 or 6 ft; during spring entire soil is wet; in Dec., Jan., and Feb., soil frozen in the surficial several inches. Soil permeability in upper 1 ft is moderate; in loam and clay layers moderately slow; and in sandy and gravelly layers moderately rapid.

Climate (based on station at Marburg) --

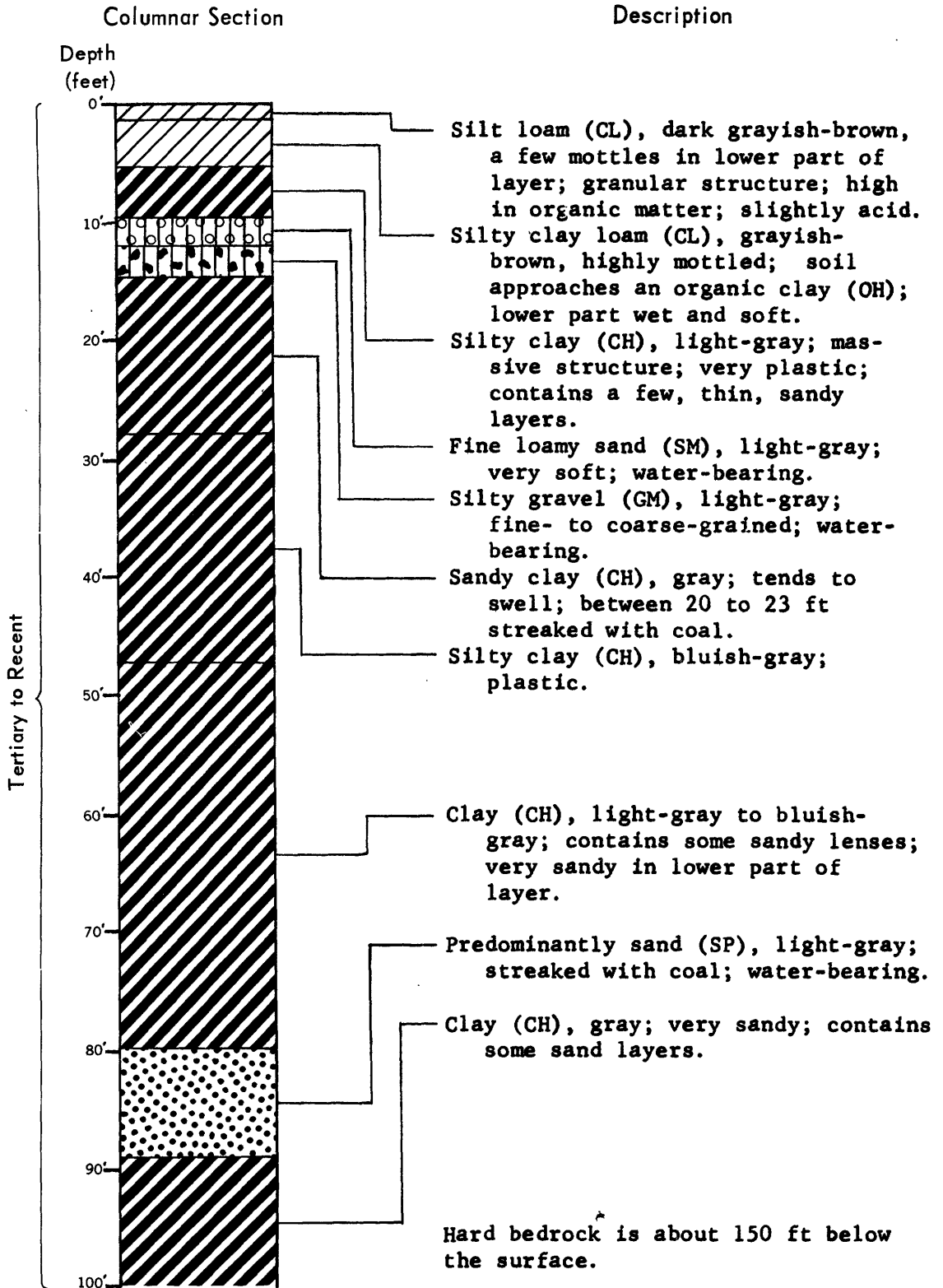
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	35	26	2.0	88
Feb.	39	28	1.6	85
Mar.	46	32	1.7	78
Apr.	54	37	1.7	72
May	64	44	2.0	70
June	69	49	2.3	72
July	72	53	2.7	74
Aug.	70	51	2.5	77
Sept.	64	47	1.9	81
Oct.	53	40	2.4	86
Nov.	42	33	2.0	89
Dec.	37	29	2.3	90
Ann.	54	39	25.1	80

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Johannsen, Alfred, 1950, Die geologischen Grundlagen der wasserversorgung am Ostrand des Rheinischen Gebirges im Raume von Marburg-Frankenberg-Borken: Hess Landesamt für Bodenforschung, Abhandlungen, no. 1.

SITE 54



SITE 55

Europe

Germany

Berlin

Location -- Lat 52°31'N.; long 13°24'E., on Teilestrasse near the Teltow Canal, south of Tempelhof Airfield in southeastern part of West Berlin.

Geologic-Geographic Setting -- A densely populated urban-industrial complex at the junction of the Havel and Spree Rivers. Situated in about the center of the flat to undulating North German Plain, a thick glacial till sheet overlying soft sands and clays of Tertiary age. Slopes average less than 3 percent over a wide area. Elevation is 144 ft above sea level and the nearest topographic rise is the Kreuzberg, about 15 miles north of the site, a hill which rises to about 200 ft above sea level. Vegetation mainly consists of a few tracts of woods, grasses that are mowed, and shrubbery. Area in the vicinity of the site is occupied by buildings, streets, and parking lots.

Water Table -- Water table at the site is about 45 ft below the surface and does not fluctuate much seasonally. Water table varies throughout the city and is much shallower in some areas.

Soil Moisture and Permeability -- Soil generally moist during summer and fall; soil mostly wet in winter and spring; surface 1 or 2 ft may be periodically dry, particularly in summer; upper 8 to 12 inches frozen in winter, especially in Jan. and Feb. Soil permeability is moderately rapid, except moderately slow in sandy clay and silty clay layers.

Climate (based on stations at Berlin and Potsdam) --

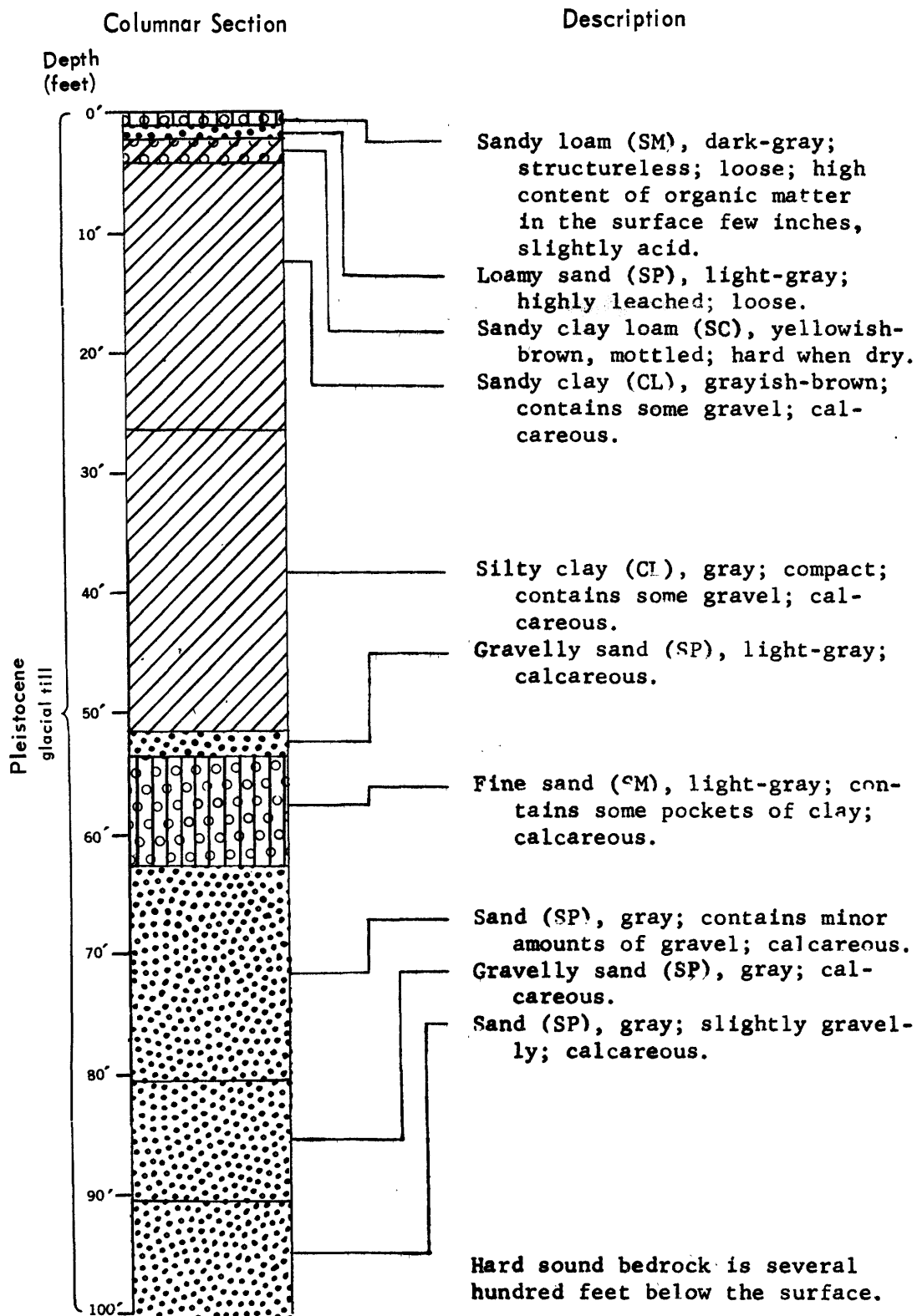
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 1 p.m.
Jan.	36	28	1.7	83
Feb.	39	29	1.4	78
Mar.	46	33	1.6	64
Apr.	56	40	1.5	56
May	67	48	1.9	52
June	72	54	2.4	58
July	75	58	3.1	61
Aug.	73	56	2.3	62
Sept.	66	51	1.7	62
Oct.	55	43	1.8	73
Nov.	44	36	1.7	83
Dec.	38	31	1.9	86
Ann.	56	42	23.0	68

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Assmann, B. Von P., 1957, Der geologische Aufbau der Gegend von Berlin:
Berlin, Herausgegeben Vom Senator für Bau- und Wohnungswesen.

SITE 55



SITE 56

Europe

Poland

Warsaw

Location -- Lat 52°15'N.; long 21°00'E., at the intersection of Mlynarska and Wolska Streets in the west-central part of Warsaw.

Geologic-Geographic Setting -- An urban-industrial complex on both banks of the Vistula River but chiefly on a terrace about 100 ft above the west bank of the river. The river has gently dissected nearby level cultivated plain in east-central Poland composed principally of thick interglacial lacustrine deposits that overlie several hundred feet of unconsolidated and semiconsolidated late Tertiary deposits. Slopes average less than 3 percent over a wide area with no notable topographic prominences for many miles in all directions. Elevation of site is about 330 ft above sea level.

Water Table -- Water table is about 18 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil generally moist but in spring the surface soil becomes wet; during Dec., Jan., and Feb., soil is frozen to depth of several inches. Soil permeability is moderate throughout profile.

Climate (based on station at Warsaw) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	30	21	1.3	83
Feb.	32	23	1.1	79
Mar.	41	28	1.3	71
Apr.	54	38	1.6	61
May	67	48	1.9	55
June	72	53	2.5	57
July	75	56	3.0	58
Aug.	73	55	2.4	59
Sept.	65	48	1.7	64
Oct.	54	41	1.2	73
Nov.	40	32	1.5	83
Dec.	32	25	1.4	86
Ann.	53	39	21.3	69

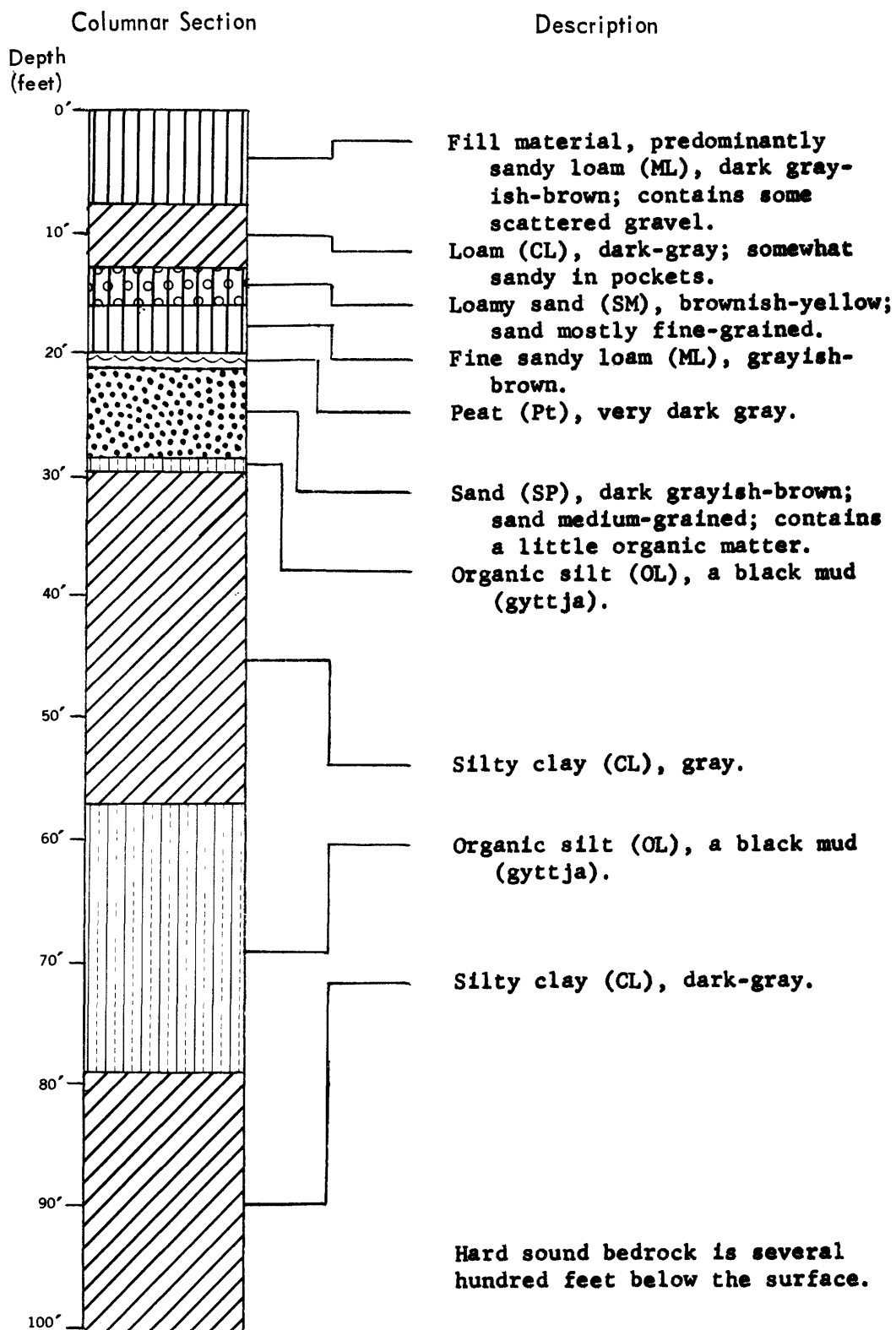
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Musierowicz, A., 1965, Specialized Soil Science: Warsaw, Poland, Sci. Pub. Foreign Coop. Center.

Borowko-Dłuzakowa, 1960, Dwa nowe profile interglacjalne z Warszawy w swietle badan paleobotanicznych: Poland, Inst. Geol. Biuletyn 150, Quaternary Researches in Poland, v. 9.

SITE 56



SITE 57

Europe

Poland

Sokolka

Location -- Lat 53°27'N.; long 23°37'E.; 6 miles southeast of Sokolka and about 24 miles northeast of Bialystok.

Geologic-Geographic Setting -- Farmland, on an extensive undulating plain with scattered low rolling hills, planted principally to rye, oats, potatoes, or flax, and where not cultivated is heavily forested. Glacial deposits about 600 ft thick, overlie thick sequences of unconsolidated and semi-consolidated Tertiary sediments. Slopes are less than 5 percent in most places. Elevation at the site is about 675 ft above sea level.

Water Table -- Water table is generally about 10 ft below the surface but the level rises closer to the surface during spring because of thawing and associated flooding.

Soil Moisture and Permeability -- Moist most of time but in spring, especially late Mar. and Apr., soil wet; in Dec., Jan., and Feb., soils frozen to depth of several inches. Soil permeability, if not saturated, is moderately rapid.

Climate (based on stations at Białystok and Warsaw) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 1 p.m.
Jan.	28	23	1.1	83
Feb.	31	18	1.3	79
Mar.	42	23	1.0	71
Apr.	54	34	1.7	61
May	63	47	2.0	55
June	72	51	3.3	57
July	72	56	3.4	58
Aug.	71	54	2.8	59
Sept.	65	47	1.7	64
Oct.	54	40	1.3	73
Nov.	41	30	1.5	83
Dec.	30	26	1.4	86
Ann.	50	36	22.5	69

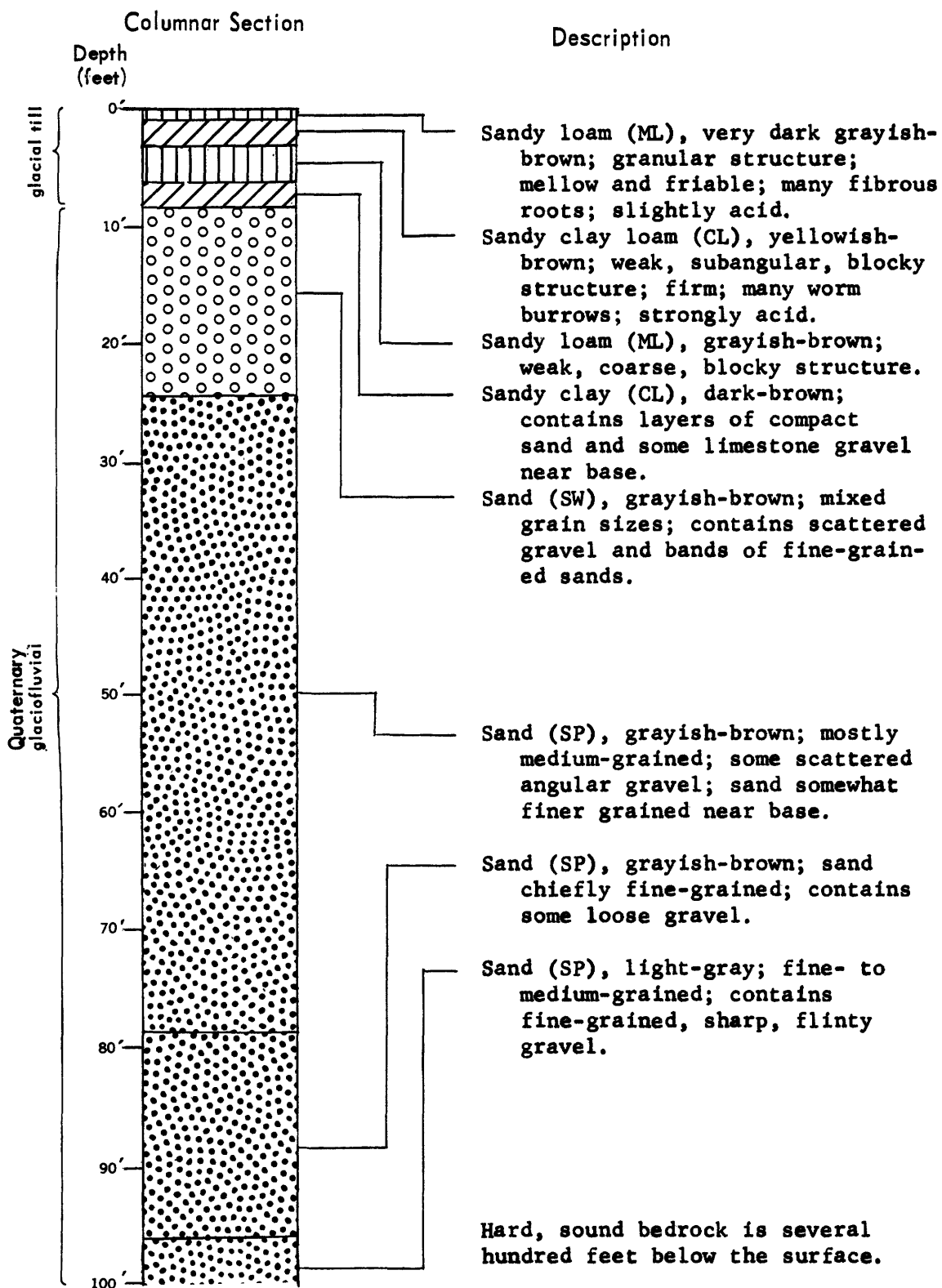
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Musierowicz, A., 1965, Specialized Soil Science: Warsaw, Poland, Sci. Pub. Foreign Coop. Center.

Nowicki, A., 1965, Czwartorzęd okolic Sokółki: Poland, Inst. Geol. Biuletyn 187, Quaternary Researches in Poland, v. 11.

SITE 57



SITE 58

Europe

France

Le Havre

Location -- Lat 49°30'N.; long 0°08'E., on the north side of the Seine estuary in the petroleum storage section of the port area of Le Havre.

Geologic-Geographic Setting -- A large modern port on the flat alluvial flood plain of the lower Seine River. Situated on deep alluvium over flat-lying beds of marl and limestone of Jurassic age. At the site and vicinity ground is very flat but to the north a 300-foot cliff trends eastward through the town. Plateau north of the cliff is a rolling up-land with short deeply entrenched streams. Elevation at the site is about 4 ft above sea level. There is little vegetation in the city, but outside the land is planted in wheat, barley, and vegetables.

Water Table -- Water table is just below the surface and is controlled by the level of the estuary. Water levels vary widely in the area; in the southern and eastern parts of the city levels are shallow, but in the northern section above the cliff, levels are much deeper.

Soil Moisture and Permeability -- Above the water table soil is predominantly moist all year; occasionally wet, especially in spring; soil seldom frozen or completely dry. Soil permeability is moderate.

Climate (based on station at Le Havre) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	45	37	2.7	85
Feb.	47	37	2.4	81
Mar.	52	39	2.5	78
Apr.	58	43	2.4	77
May	65	48	2.4	76
June	70	53	2.4	76
July	73	56	2.5	76
Aug.	73	56	2.7	76
Sept.	69	53	2.3	81
Oct.	61	47	3.3	79
Nov.	51	42	3.9	84
Dec.	47	39	3.6	85
Ann.	59	46	33.0	79

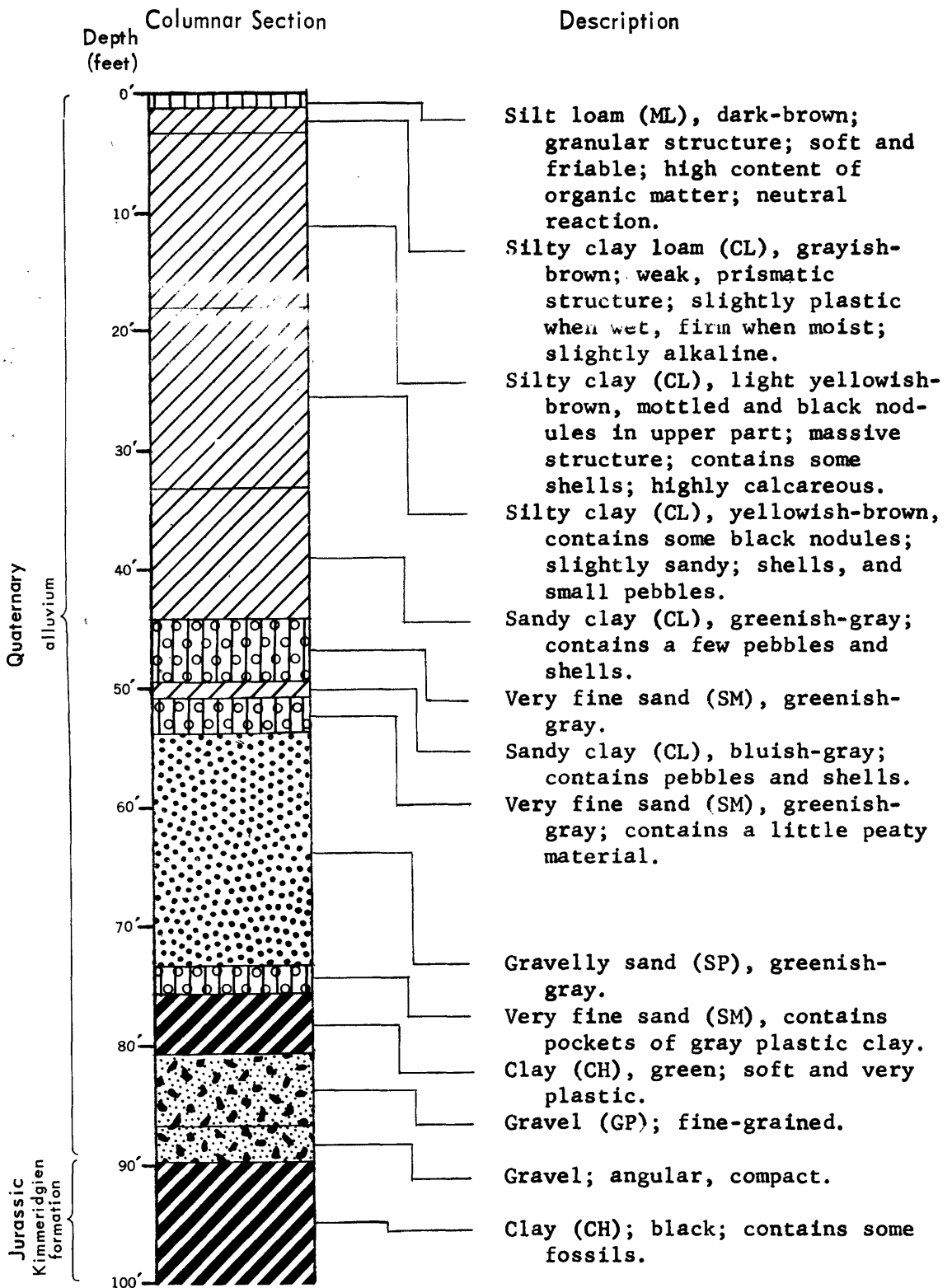
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Guyader, M. J., 1955, Note sur des sondages récents: Soc. Geol. de Normandie et des amis du Muséum du Havre Bull., v. 45.

Oudin, A., Aubert, G., and Duchaufour, P., 1951, Notice jointe à la carte des sols de France (Quart N. - O.): France, Inspecteur Général des Eaux et Forêts.

SITE 58



SITE 59

Europe

France

Paris

Location -- Lat 48°52'N.; long 2°20'E., on the right bank of the Seine River, on Rue de la Roquette between Place de la Bastille and Voltaire Boulevard.

Geologic-Geographic Setting -- City is on an undulating plain with scattered hills some of which, on the north side of town, rise to more than 400 ft above sea level. Site is on the flood plain of the Seine River which flows through the center of a densely populated urban-industrial complex. Rocks underlying the city are generally flat lying and form part of the Paris structural basin. With the exception of scattered hills, slopes are generally low to moderate and average less than 10 percent over a wide area. Elevation at the site is 115 ft above sea level. Cereal grains and sugar beets are grown on the alluvial plain outside the city.

Water Table -- Water table is about 18 ft below the surface, but is affected by the Seine River which rises and falls seasonally.

Soil Moisture and Permeability -- Soil is wet most of time in winter and spring, but upper 4 inches frozen periodically during winter; in summer and fall soil prevailing moist, but upper 2 to 4 ft periodically dry. Soil permeability is moderate in loamy horizons; moderately rapid in sandy horizons.

Climate (based on station at Paris) --

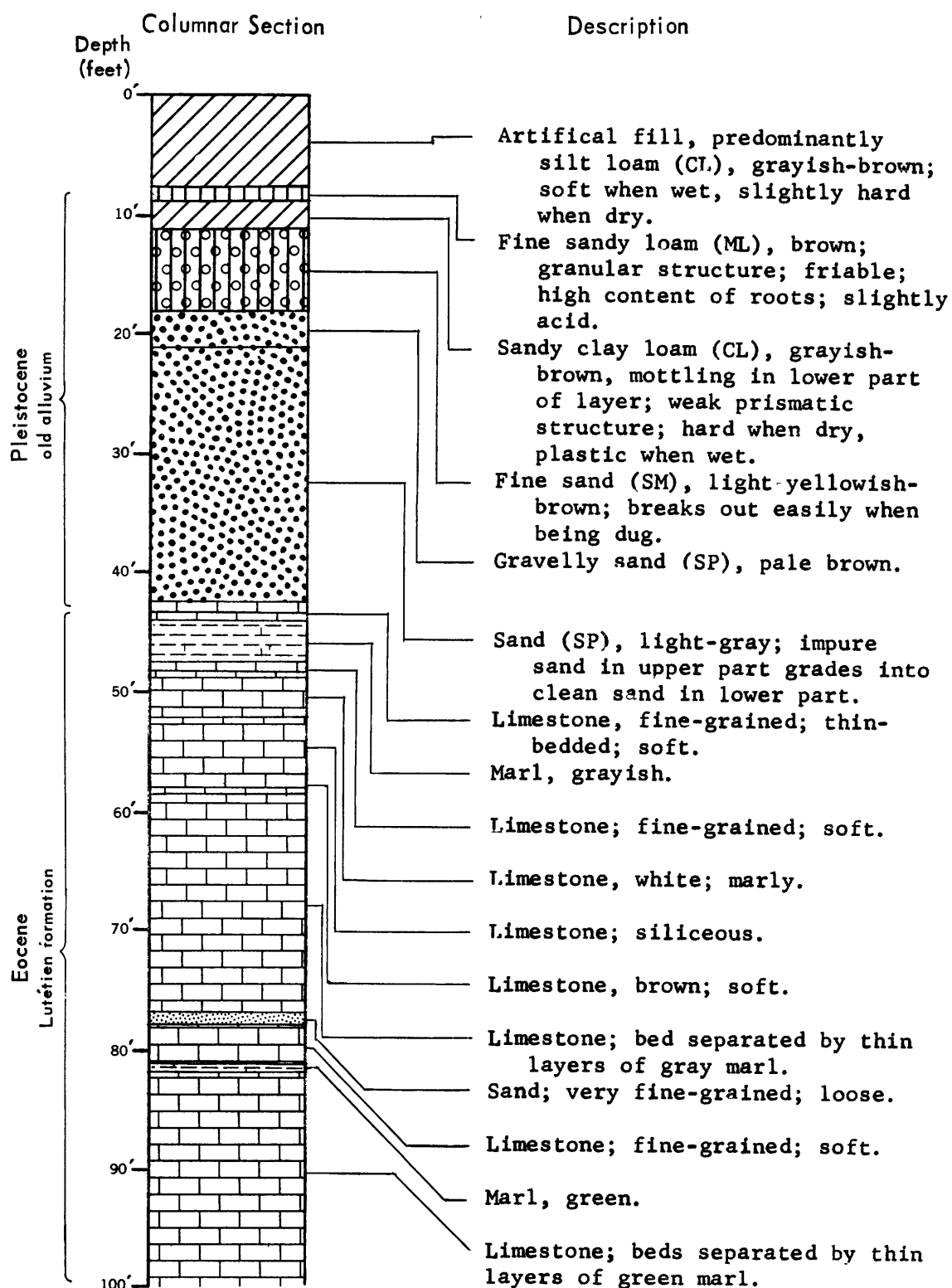
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	43	33	1.3	84
Feb.	46	33	1.5	79
Mar.	52	36	1.8	71
Apr.	59	40	1.9	67
May	67	47	2.1	63
June	73	52	2.1	65
July	76	55	2.3	64
Aug.	75	55	1.9	67
Sept.	70	51	1.9	72
Oct.	60	44	2.4	79
Nov.	49	38	2.0	85
Dec.	44	35	2.3	85
Ann.	60	43	23.9	74

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Jamagne, M., 1964, Introduction a une Étude Pédologique dans la Partie Nord du Bassin de Paris Bull. de la Société Belge de Pedologie, v. 14, no. 2, p. 228-342.
- Soyer, R., 1953, Géologie de Paris: Pour Servir à L'Explication de la Carte Géologique Détaillée de la France Mem.

SITE 59



SITE 60

Europe

Austria

Salzburg

Location -- Lat 47°25'N.; long 13°15'E.; 350 ft south of the intersection of the railroad to Stiegl Brewery and the Innsbruck state highway, southwest of the city near the airport.

Geologic-Geographic Setting -- Level farmland on the outskirts of a medium-sized city in west-central Austria. The city is built on both banks of the Salzach River at the point where the river leaves its narrow valley through the limestone Alps and enter the Alpine foreland. Thick alluvial deposits overlie late Tertiary and Pleistocene sediments, that in the upper part are mixed marine and reworked glacial sediments. The city is bordered by mountains on all sides but the northwest and in the city two hills, the Kapuzinerberg and Monchsberg, rise 300 to 600 ft above the surrounding terrain. Slopes are less than 3 percent at the site and vicinity but in the nearby mountains they become very steep. Elevation at the site is about 1,300 ft above sea level.

Water Table -- Water table is about 15 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Moist throughout the year; soil frozen in the upper several inches to 1 ft most of time from about mid-Dec. through Feb.; soil generally wet in early spring. Soil permeability moderate in upper 3 or 4 ft; rapid below.

Climate (based on station at Salzburg) --

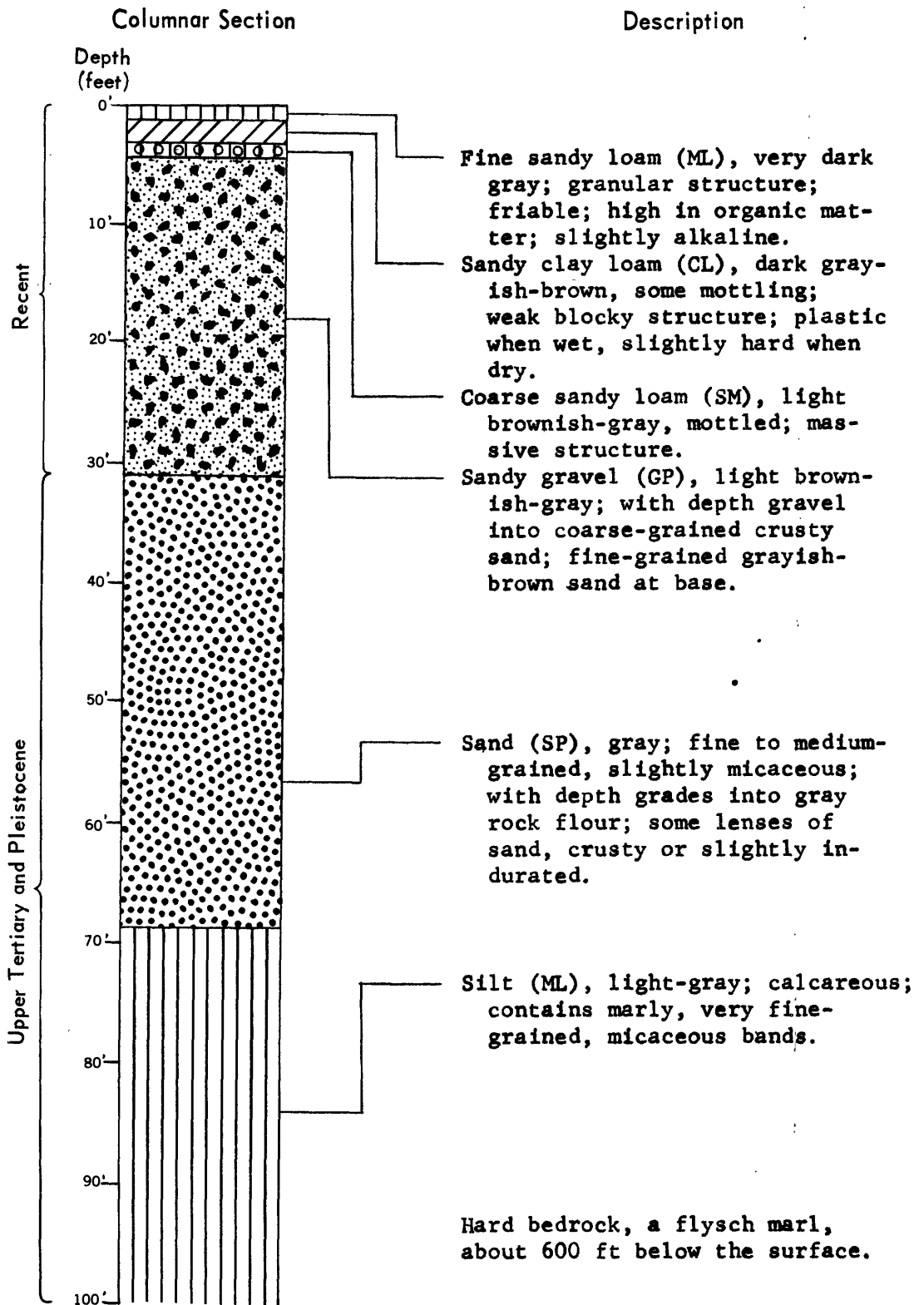
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 2 p.m.
Jan.	36	25	2.8	83
Feb.	40	26	2.3	77
Mar.	50	33	2.6	61
Apr.	58	40	4.2	53
May	67	47	5.2	57
June	71	52	7.4	57
July	76	57	8.2	56
Aug.	74	55	7.0	56
Sept.	70	51	5.3	61
Oct.	58	43	3.5	66
Nov.	46	34	2.8	76
Dec.	36	27	3.0	81
Ann.	57	41	54.3	65

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Deutschen Bodenkundlichen Gesellschaft, 1961, Exkursionen Durch Österreich:
Vienna, Österreichischen Bodenkundlichen Gesellschaft Mitteilungen,
v. 6.
- Prey, S., 1959, Zwei Tiefbohrungen der Stieglbrauerei in Salzburg:
Geologischen Bundesanstalt Verhandlungen, no. 2, p. 216-224.

SITE 60



SITE 61

Europe

Austria

Vienna

Location -- Lat 48°12'N.; long 16°22'E.; at the gasworks, southwest of the Donau Canal, in the southeastern part of Vienna.

Geologic-Geographic Setting -- A large urban-industrial complex serving as an inland port on the right bank of the Danube River. Situated on a broad flat plain at the eastern foot of the Wiener Wald, limestone ridge that reaches heights of more than 1,500 ft a short distance west of the city. Thick, flat-lying, unconsolidated and semiconsolidated late Tertiary sediments overlie hard bedrock at a depth of several hundred feet below the surface. Slopes are less than 3 percent at the site and vicinity but immediately west of the city they become very steep. Elevation at the site is about 480 ft above sea level.

Water Table -- Water table is about 18 ft below the surface and does not fluctuate much seasonally due to the influence of the nearby Donau Canal.

Soil Moisture and Permeability -- Moist most of year, except upper 2 or 3 ft dry during summer; upper 1 ft generally wet and soft late winter and early spring; ground frozen for several inches, Dec., Jan., and Feb. Soil permeability has an overall rating of moderately slow, except gravelly and silty layers where permeability increases to rapid.

Climate (based on station at Vienna) --

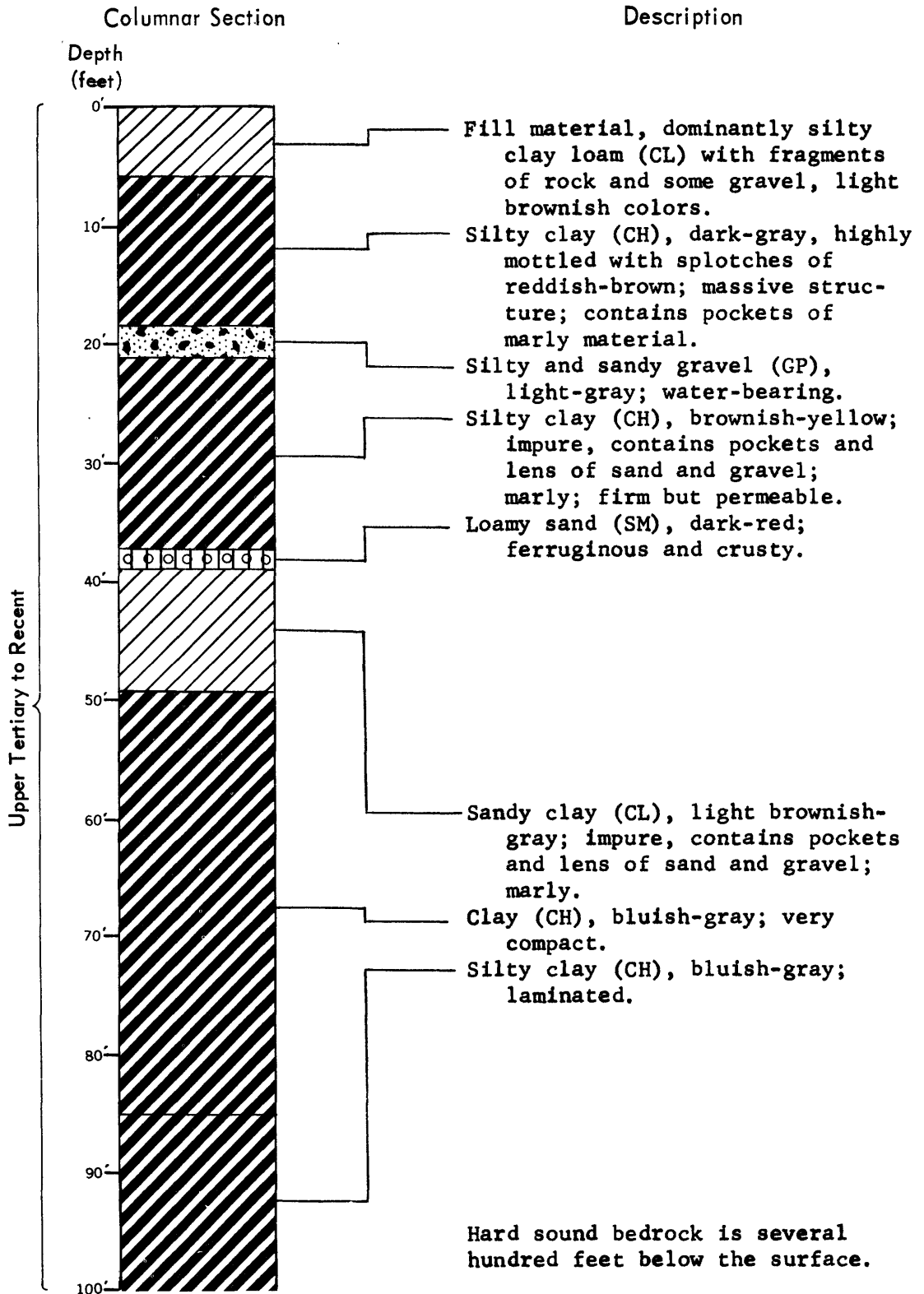
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 2 p.m.
Jan.	36	28	1.5	79
Feb.	38	29	1.3	74
Mar.	48	35	1.8	59
Apr.	56	41	2.1	54
May	65	50	2.8	56
June	70	55	2.7	54
July	73	58	3.1	55
Aug.	72	57	2.7	57
Sept.	65	51	2.0	62
Oct.	55	43	1.9	71
Nov.	42	35	1.8	77
Dec.	38	31	1.8	80
Ann.	55	43	25.4	65

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Fink, J., 1960, Bemerkungen Zur Bodenkarte Niederösterreichs: Vienna, Österreichischen Bodenkundlichen Gesellschaft Mitteilungen, v. 4.
Schaffer, F. X., 1904-1906, Geologie von Wien: Vienna, R. Lechner (Wilh. Müller) K.U.K. Hof-und Univ.-Buchhandlung, 3 v.

SITE 61



SITE 62

Europe

Hungary

Budapest

Location -- Lat 47°30'N.; long 19°05'E. The southern section of the city about 3/4 of a mile inland from the Soroksár River.

Geologic-Geographic Setting -- A large urban-industrial complex on both sides of the Danube River in north-central Hungary. West and northwest of the city the Buda Hills rise to elevations of about 1,500 ft, but in other directions the flat sandy plain of Pest spreads outward from the city. Site is on the Pest plain in glacial till that overlies several hundred feet of unconsolidated and semiconsolidated, flat-lying Tertiary sediments. Slopes are less than 3 percent at the site and vicinity, but in the western and northwestern sectors of the city they become much steeper. Elevation of site is 333 ft above sea level and 42 ft above the level of the Danube River.

Water Table -- Water table is about 15 ft below the surface and usually does not fluctuate much seasonally.

Soil Moisture and Permeability -- Soil generally moist throughout year, except upper foot periodically dry during summer; from Dec. through Feb. soil may be frozen to depth of 4 to 6 inches; ground occasionally snow covered during this period but not to great depths. Soil permeability slow in artificial fill; below the fill to water table permeability is moderately rapid.

Climate (based on station at Budapest) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 7 a.m. 2 p.m.	
Jan.	37	28	1.5	85	77
Feb.	40	27	1.3	84	69
Mar.	52	36	1.8	81	57
Apr.	62	43	2.3	76	51
May	72	51	2.7	75	50
June	77	56	2.9	73	50
July	82	60	2.1	72	46
Aug.	81	58	1.9	76	47
Sept.	73	52	2.1	83	53
Oct.	62	44	2.3	87	62
Nov.	47	37	2.1	88	74
Dec.	39	31	2.0	86	79
Ann.	60	44	25.0	80	60

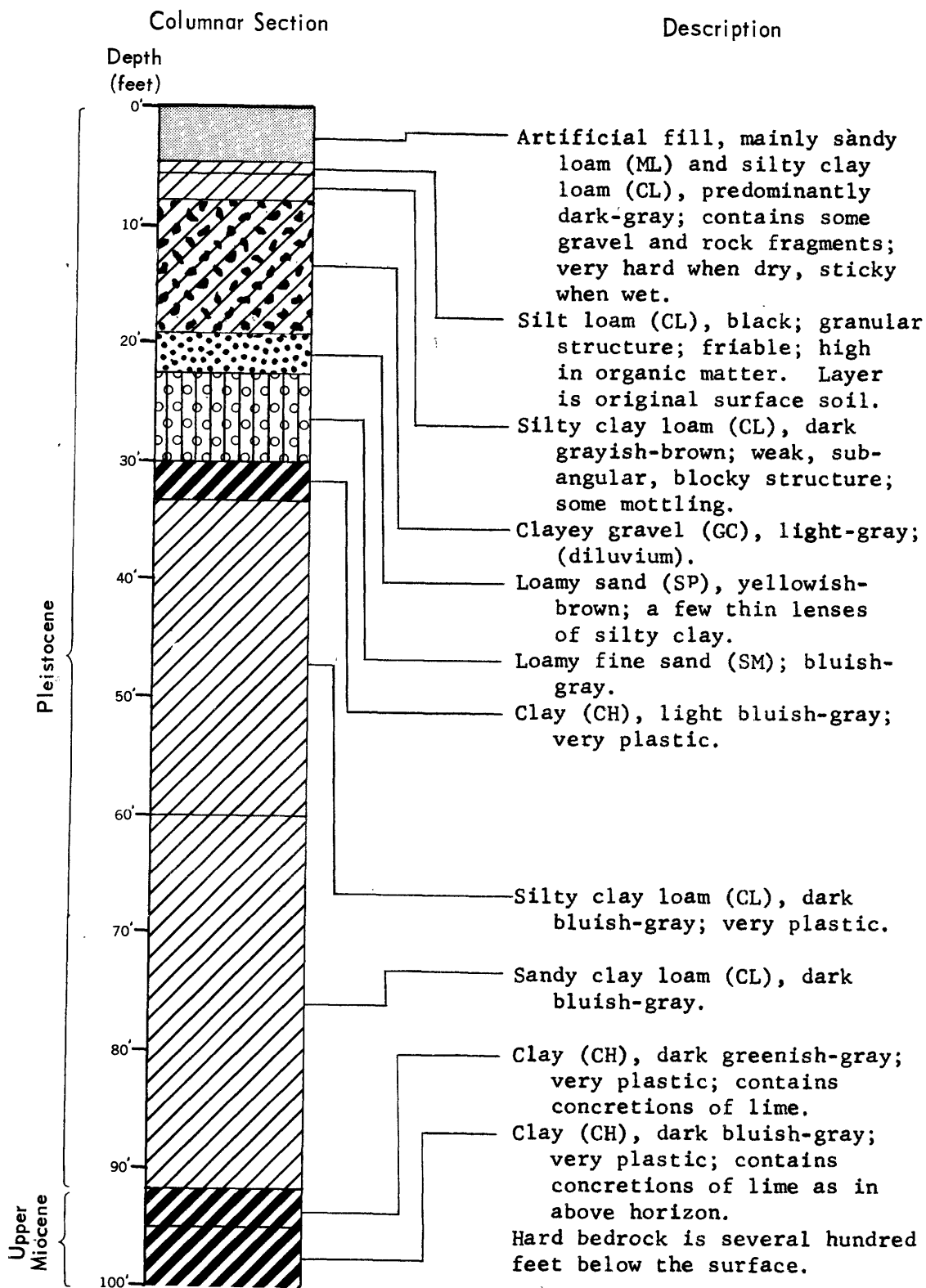
*Mean daily maximum, **mean daily minimum, ***mean monthly, + mean daily.

Principal Sources --

Halaváts, Gyula, 1911, Die Neogenen Sedimente der Umgebung von Budapest:
Jahrbuche der Königlich Ungarischen Geologischen Reichsanstalt,
Mitteilungen, v. 17, no. 2.

Stefanovits, P., and Szucs, L., 1961, Explanation to the genetic soil map
of Hungary, in Hungarian: Budapest, Hungarian Acad. of Sci., Research
Inst. for Soil Sci. and Agricultural Chem.

SITE 62



SITE 63

Europe

Hungary

Eger

Location -- Lat 47°54'N.; long 20°23'E. In Heves County, about 25 miles southwest of Miskolc in northern Hungary.

Geologic-Geographic Setting -- A small town serving as an agricultural and marketing center, whose chief occupation is winemaking and the cultivation of vineyards and tobacco. Situated in a small valley on a rolling plain just west of the Eger River near the eastern foothills of the Matra Mountains. The mountains rise to about 3,000 ft less than 20 miles to the north, but in other directions the terrain opens out into a broad, flat, extensive plain. Slopes are moderate, between 3 and 5 percent at the site and in the immediate vicinity. The Tertiary sediments, on which the site is located, are generally flat-lying. Elevation of site is about 480 ft above sea level.

Water Table -- Water table is about 16 ft below the surface and does not fluctuate more than a few feet seasonally.

Soil Moisture and Permeability -- Soil generally moist throughout year, except upper foot periodically dry; Dec. through Feb. soil may be frozen to depth of 4 to 6 inches; ground occasionally snow covered during this period. Soil permeability moderately rapid; rapid in silty and sandy gravel.

Climate (based on stations at Kékes, Eger, and Miskolc) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	29	21	1.1	91	79
Feb.	28	18	1.1	91	77
Mar.	38	27	1.4	87	60
Apr.	48	36	2.1	82	52
May	59	45	2.6	80	53
June	63	44	2.8	81	58
July	69	55	2.5	80	52
Aug.	68	54	2.2	83	53
Sept.	63	49	2.0	89	52
Oct.	52	43	2.2	93	62
Nov.	39	32	1.8	93	79
Dec.	32	25	1.6	92	87
Ann.	49	37	23.4	87	64

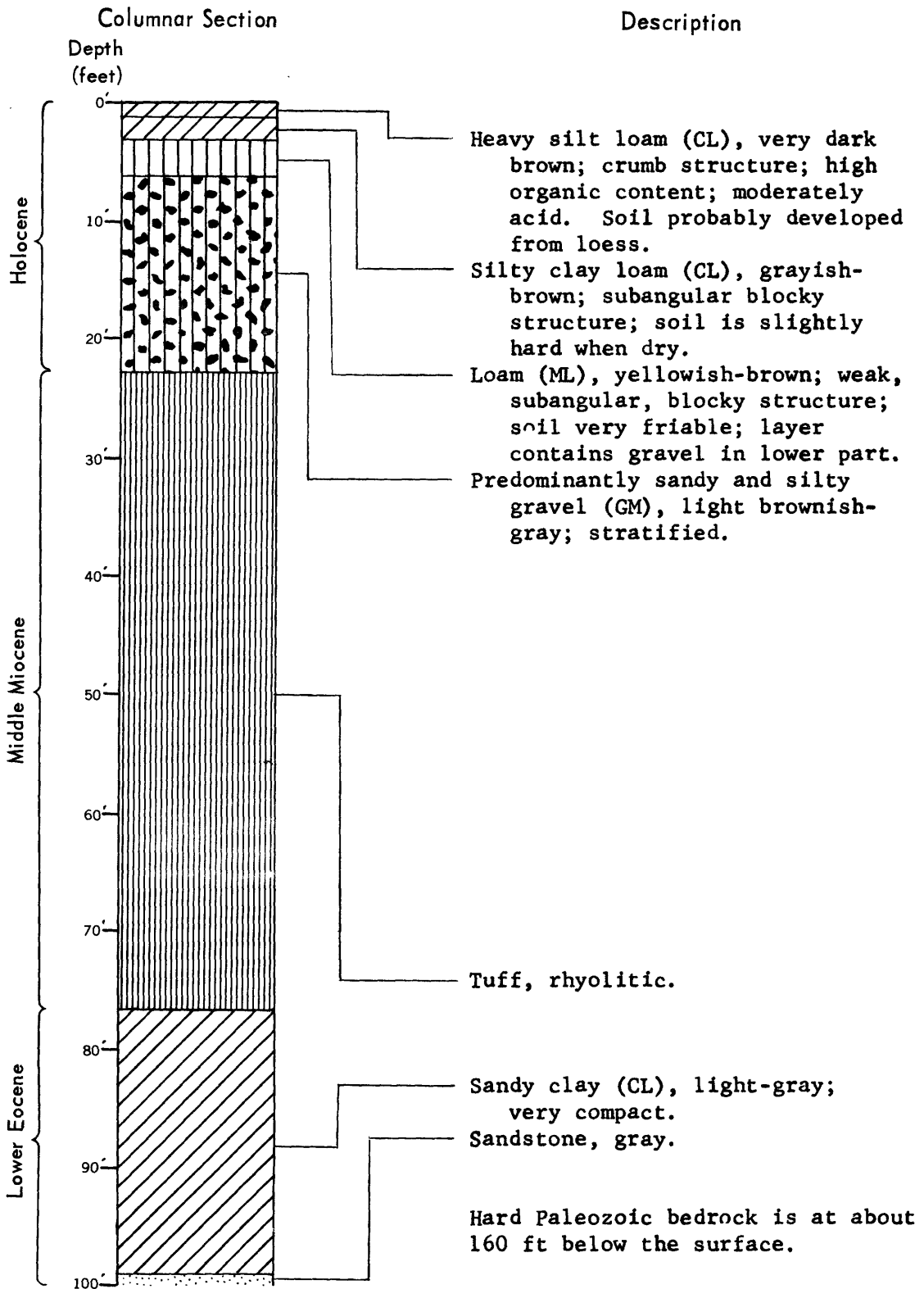
*Mean daily maximum, **mean daily minimum, ***mean monthly, + mean daily.

Principal Sources --

Stefanovits, P., and Szucs, L., 1961, Explanation to the genetic soil map of Hungary, in Hungarian: Budapest, Hungarian Acad. of Sci., Research Inst. for Soil Sci. and Agricultural Chem.

Zoltán, Schréter, 1932, Der thermaler artesische Brunnen der Wasserleitung von Eger: Budapest, Hungarian Geol. Soc., Hydrol. Sec. Hidrológiai Közlöny, no. 12.

SITE 63



SITE 64

Europe

Italy

Milan

Location -- Lat 45°28'N.; long 9°12'E. At the intersection of Via Benedetto Marcello and Via Vitruvio, in the northeast sector of Milan, about 1/4 mile southeast of the main railroad station.

Geologic-Geographic Setting -- A large urban-industrial complex about 25 miles north of the Po River and 25 miles south of the Alps. Situated on a low terrace on a flat, gently sloping plain that is extremely fertile and much irrigated. It is a little north of a line of springs which parallels the foot of the Alps. Deep alluvium overlies glacial material which in turn overlies soft Tertiary sediments. Slopes are less than 3 percent over a wide area. Elevation at the site is about 395 ft above sea level.

Water Table -- Water table is within 10 ft of the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Ordinarily, dry from June through Sept., but if site is landscaped, surface may be watered frequently during this period; remainder of year soil alternately wet and moist. Soil permeability is rapid to depth of water table.

Climate (based on station at Milan) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 9 a.m.
Jan.	38	28	2.4	78
Feb.	46	33	2.3	79
Mar.	55	40	2.8	69
Apr.	64	47	3.4	70
May	73	54	3.9	62
June	82	61	3.2	59
July	87	66	2.8	61
Aug.	85	65	3.1	60
Sept.	75	59	3.4	65
Oct.	62	49	4.7	72
Nov.	50	40	4.2	73
Dec.	41	32	3.0	74
Ann.	63	48	39.4	69

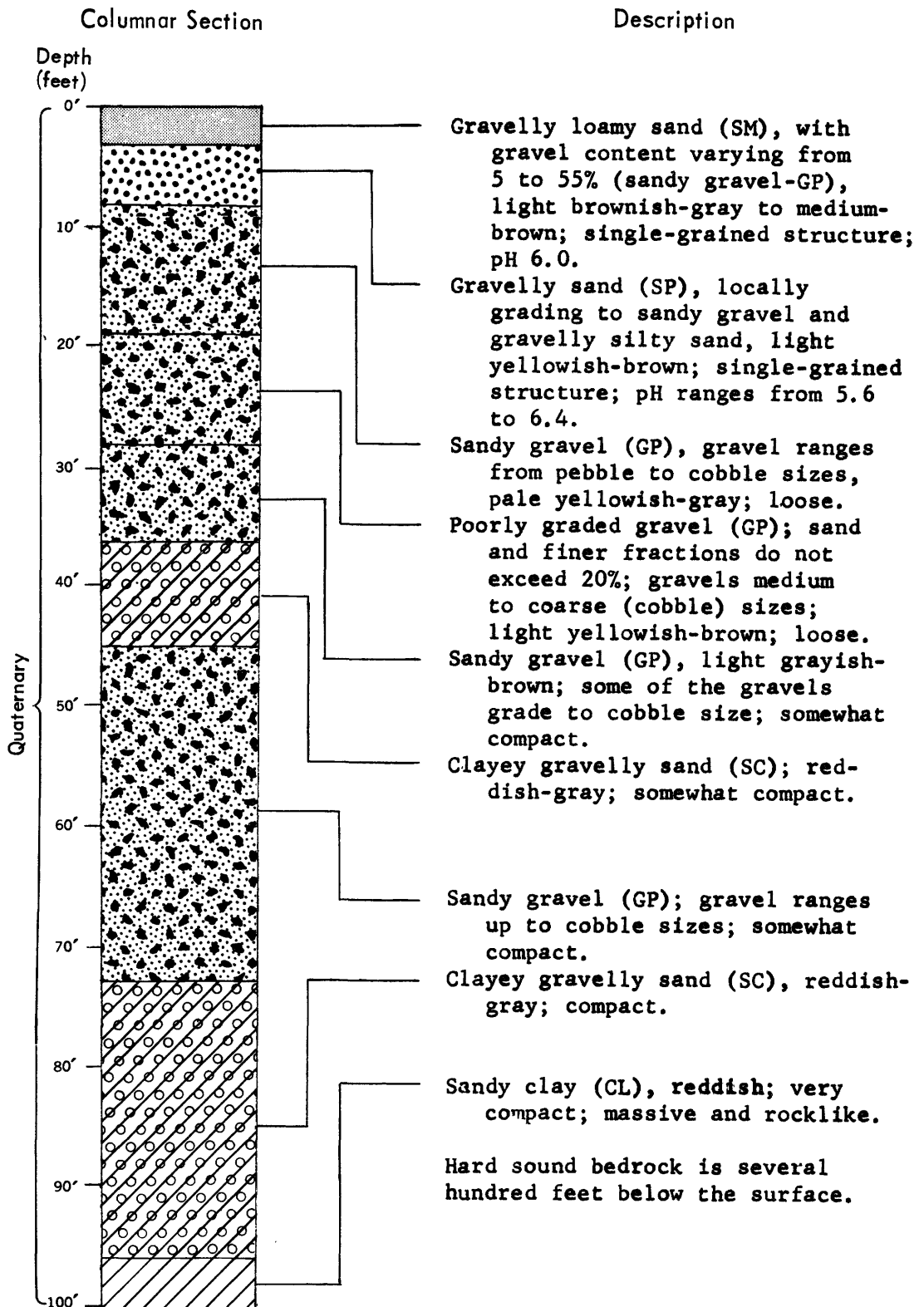
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Desio, Ardito, Caratteri Fisici e Geologici della Provincia di Milano:
Rome, Annali della Sperimentazione Agraria, v. 32.

Nordio, Ezio, 1957, Il sottosuolo di Milano: Comune di Milano, Servizio
Acqua Potabile, Milan Univ., A cura Dell Istituto Di Geol., Geog.
Fisca E Paleontologia, Pub. Series G, no. 96.

SITE 64



SITE 65

Europe

Italy

Legnago

Location -- Lat 45°11'N.; long 11°18'E., 23 miles southeast of Verona on the Adige River in northern Italy.

Geologic-Geographic Setting -- A small town situated on the flat, irrigated, fertile plain of the Po River valley. Very deep alluvial and glacial deposits overlies soft Tertiary sediments. Slopes are less than 3 percent over a wide area. Elevation at the site is about 38 ft above sea level.

Water Table -- Water table is within 10 ft of the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Unless irrigated, alternately dry, moist, and wet, Apr. through Oct.; remainder of year, prevaillingly wet or moist. Soil rapidly permeable to depth of more than 50 ft.

Climate (based on station at Verona) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				9 a.m.	3 p.m.
Jan.	41	30	1.4	83	73
Feb.	46	33	1.6	82	66
Mar.	55	40	2.6	75	57
Apr.	63	49	2.8	72	58
May	73	55	3.5	65	52
June	80	62	3.3	64	52
July	84	65	3.6	58	47
Aug.	84	65	2.9	58	47
Sept.	75	59	2.9	70	54
Oct.	63	50	3.9	76	62
Nov.	51	40	3.0	81	70
Dec.	44	35	2.5	80	71
Ann.	64	48	33.9	72	59

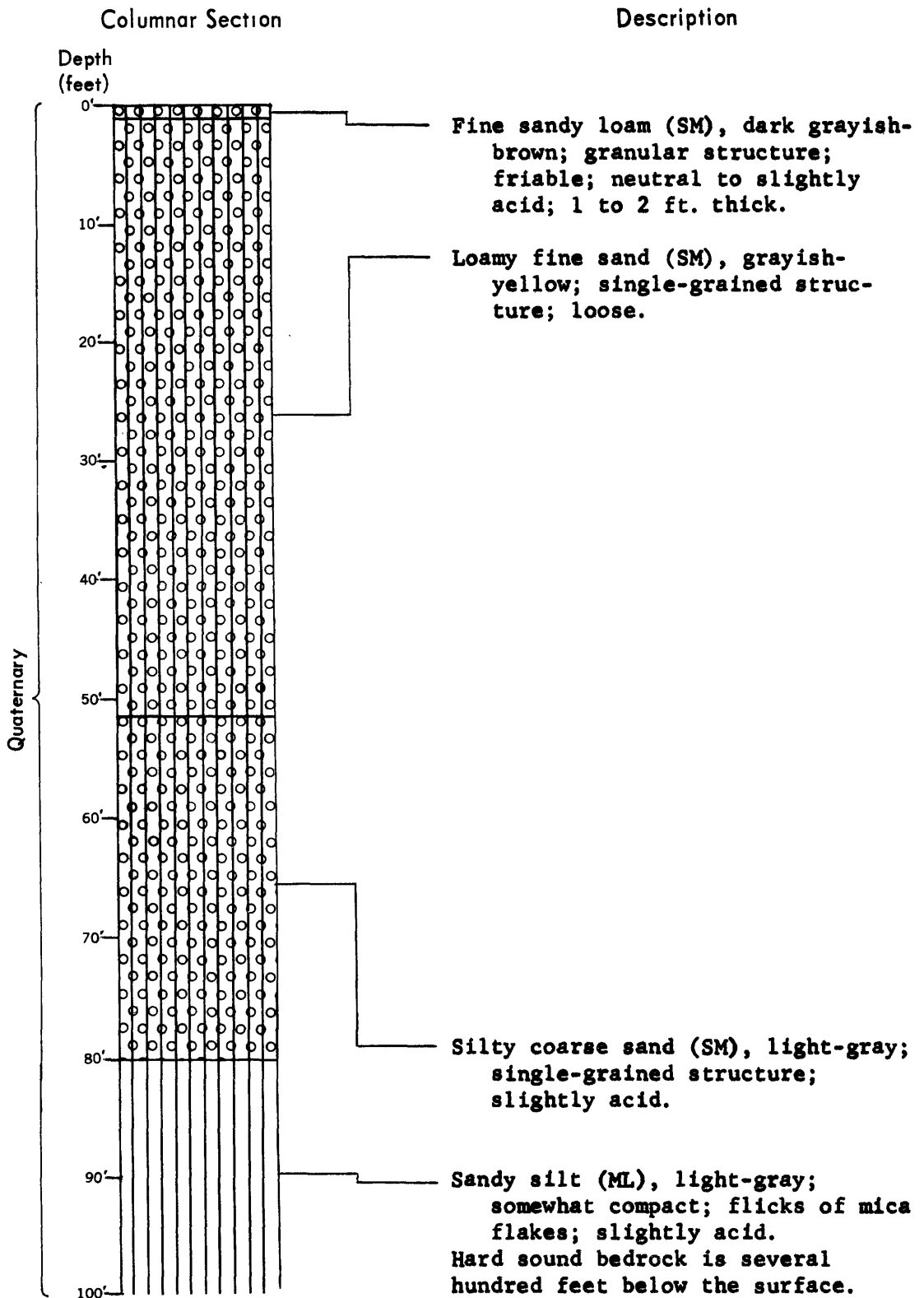
*Mean daily maximum, **mean daily minimum, ***mean monthly, + mean daily.

Principal Sources --

Principi, P., 1953, Geopedologia: Rome, Ramo Editoriale degli Agricoltori Trattati di Agricoltura, v. 13.

De Nicolis, Enrico, 1890, Nuova contribuzione alla conoscenza della costituzione della bassa pianura veronese e della relativa idrografia sotterranea: Soc. Geol. Italiana Bollettino, v. 9, pt. 1, p. 50-55.

SITE 65



SITE 66

Europe

Italy

Perugia

Location -- Lat 43°08'N.; long 12°19'E.; about 4 miles southwest of Perugia, in the vicinity of the railroad station at Ellera.

Geologic-Geographic Setting -- Level dry farmland planted mainly in orchards and vineyards. Situated in a small Quaternary basin surrounded mostly by hills that rise a few hundred feet above the surrounding terrain. Terra rosa, as colluvium washed in from the surrounding mountains, overlies travertine of Pleistocene age resting on fluvial-lacustrine clays and silts. Slopes are less than 3 percent, except in the nearby hills and mountains. Elevation at the site is about 870 ft above sea level.

Water Table -- In general there is no shallow water table, but springs occur at some places near the foot of the hills and mountains. Artesian water is present at about 230 ft below the surface.

Soil Moisture and Permeability -- Very likely irrigated; alternately moist and wet throughout the year. Slowly permeable to 6 ft; then impermeable except for some transmission along joints and cracks of travertine rock; locally this rock may be somewhat porous.

Climate (based on station at Perugia) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				9 a.m.	3 p.m.
Jan.	44	35	2.0	80	80
Feb.	44	33	2.1	81	78
Mar.	52	38	3.2	77	74
Apr.	59	43	3.6	77	73
May	69	52	3.1	73	70
June	77	58	3.4	71	66
July	84	63	1.4	67	60
Aug.	84	68	1.9	65	58
Sept.	73	57	2.8	75	67
Oct.	64	51	5.2	79	77
Nov.	53	43	4.3	81	81
Dec.	46	36	2.7	81	80
Ann.	63	48	36.4	75	72

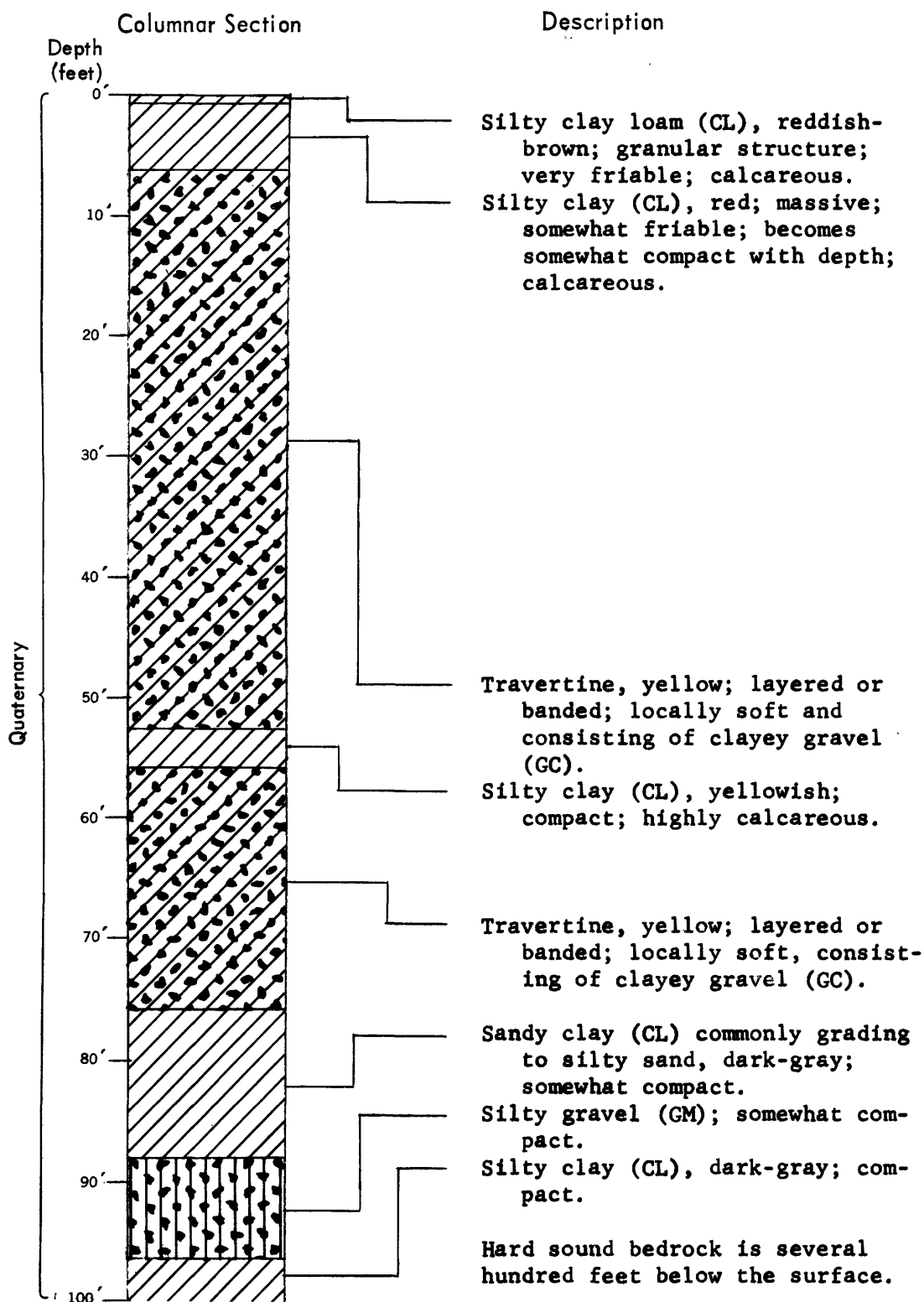
*Mean daily maximum, **mean daily minimum, ***mean monthly, + mean daily.

Principal Sources --

Giovagnotti, Celso, 1963, Studio sedimentologico e pedologico del bacino di Ellera (Perugia): Soc. Geol. Italiana Bollettino, v. 81, pt. 1.

Principi, P., 1943, I terreni d'Italia: Genoa, Soc. Anonima Editrice Dante Alighieri, p. 93.

SITE 66



SITE 67

Europe

Italy

Rome

Location -- Lat 41°54'N.; long 12°25'E., at the Ministry of Justice, near the Tiber River in the central part of Rome.

Geologic-Geographic Setting -- An urban-industrial area built on both banks of the Tiber River about 18 miles inland from the Tyrrhenian coast. Situated on a low, undulating to rolling plain nearly enclosed by volcanic hills. The plain slopes up from the center of the city to the broken, irregular rim of hills, in places more than 300 ft high, which flank the city on the northwest, northeast, and southeast. Southwest of the city the low undulating plain extends to the coast. Within the city, several low ridges (the seven hills of Rome) reach heights of 164 to 194 ft above sea level. Site is on a level area near a bend in the Tiber River where slopes are less than 3 percent and the elevation is 57 ft above sea level.

Water Table -- Water table is 27 ft below the surface and does not fluctuate much seasonally.

Soil Moisture and Permeability -- Prevailing dry, June through Sept., unless site is landscaped and watered during this period; remainder of year, alternately wet and moist. Soil permeability is moderately slow to depth of water table.

Climate (based on station at Rome) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				9 a.m.	3 p.m.
Jan.	52	39	3.3	76	60
Feb.	55	40	2.6	77	62
Mar.	59	44	2.9	71	56
Apr.	65	49	2.6	67	56
May	73	55	2.2	57	58
June	81	61	1.5	52	46
July	87	66	0.7	50	41
Aug.	86	65	1.0	55	44
Sept.	80	61	2.5	67	52
Oct.	70	55	5.0	73	59
Nov.	60	46	4.5	77	64
Dec.	53	40	3.9	76	65
Ann.	68	52	32.7	67	55

*Mean daily maximum, **mean daily minimum, ***mean monthly, + mean daily.

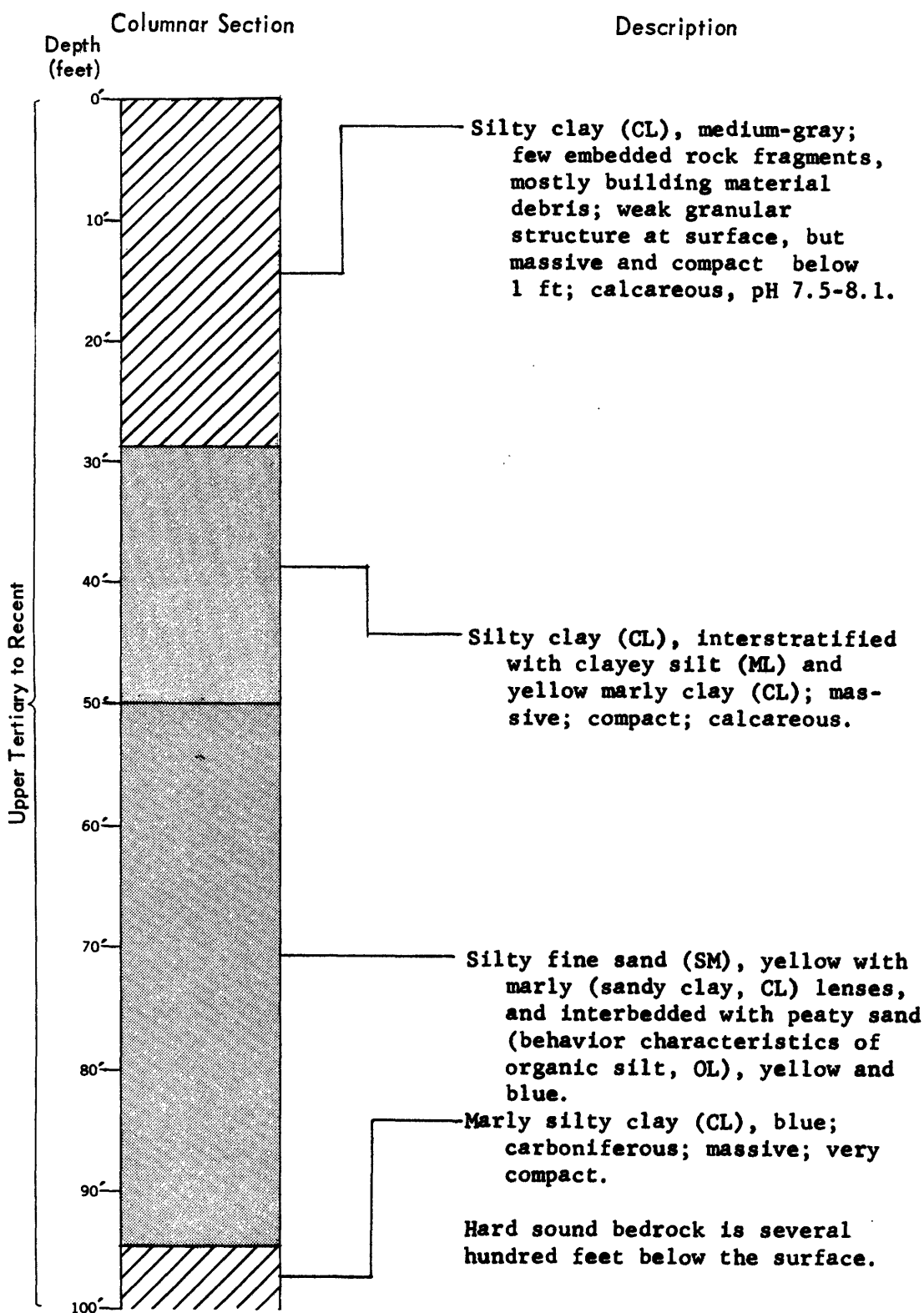
Principal Sources --

Conforto, Bruno, 1958, A Pliocene formation to the west of Rome: Rome, Quaternaria, v. 5, p. 119-130.

Singer, Max, 1932, Der baugrund: Wien, Julius Springer.

Tommasi, G., and Morani, V., 1939, Studio chemico agrario dei terreni italiano-Lazio Nota II I terreni della parte centro-orientale dell' Agro Ramano: Rome, Min. of Agriculture and Forestry, Annali della Sperimentazione Agraria, v. 34.

SITE 67



SITE 68

Europe

Italy

Aprila

Location -- Lat 43°31'N.; long 12°41'E.; about 4 miles southeast of Aprila and 8 miles northwest of Anzio.

Geologic-Geographic Setting -- Undulating farmland generally planted in cereals, sugar beets, vegetables, or used for stockraising. Situated in a small valley within the reclaimed area of the Pontine Marshes. Deep unconsolidated Quarternary sediments overlie thick unconsolidated and semiconsolidated Tertiary deposits. Slopes are generally less than 3 percent over a wide area. Elevation at the site is about 200 ft above sea level.

Water Table -- Water table is within a few feet of the surface and the level does not fluctuate much seasonally.

Soil Moisture and Permeability -- Prevailingly moist June through Sept. if water table is maintained a few feet below the surface; remainder of year, alternately wet and moist. Soil permeability moderately slow to depth of 28 ft then, generally moderately rapid to 33 ft.

Climate (based on station at Rome) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				9 a.m.	3 p.m.
Jan.	52	39	3.3	76	60
Feb.	55	40	2.6	77	62
Mar.	59	44	2.9	71	56
Apr.	65	49	2.6	67	56
May	73	55	2.2	57	58
June	81	61	1.5	52	46
July	87	66	0.7	50	41
Aug.	86	65	1.0	55	44
Sept.	80	61	2.5	67	52
Oct.	70	55	5.0	73	59
Nov.	60	46	4.5	77	64
Dec.	53	40	3.9	76	65
Ann.	68	52	32.7	67	55

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

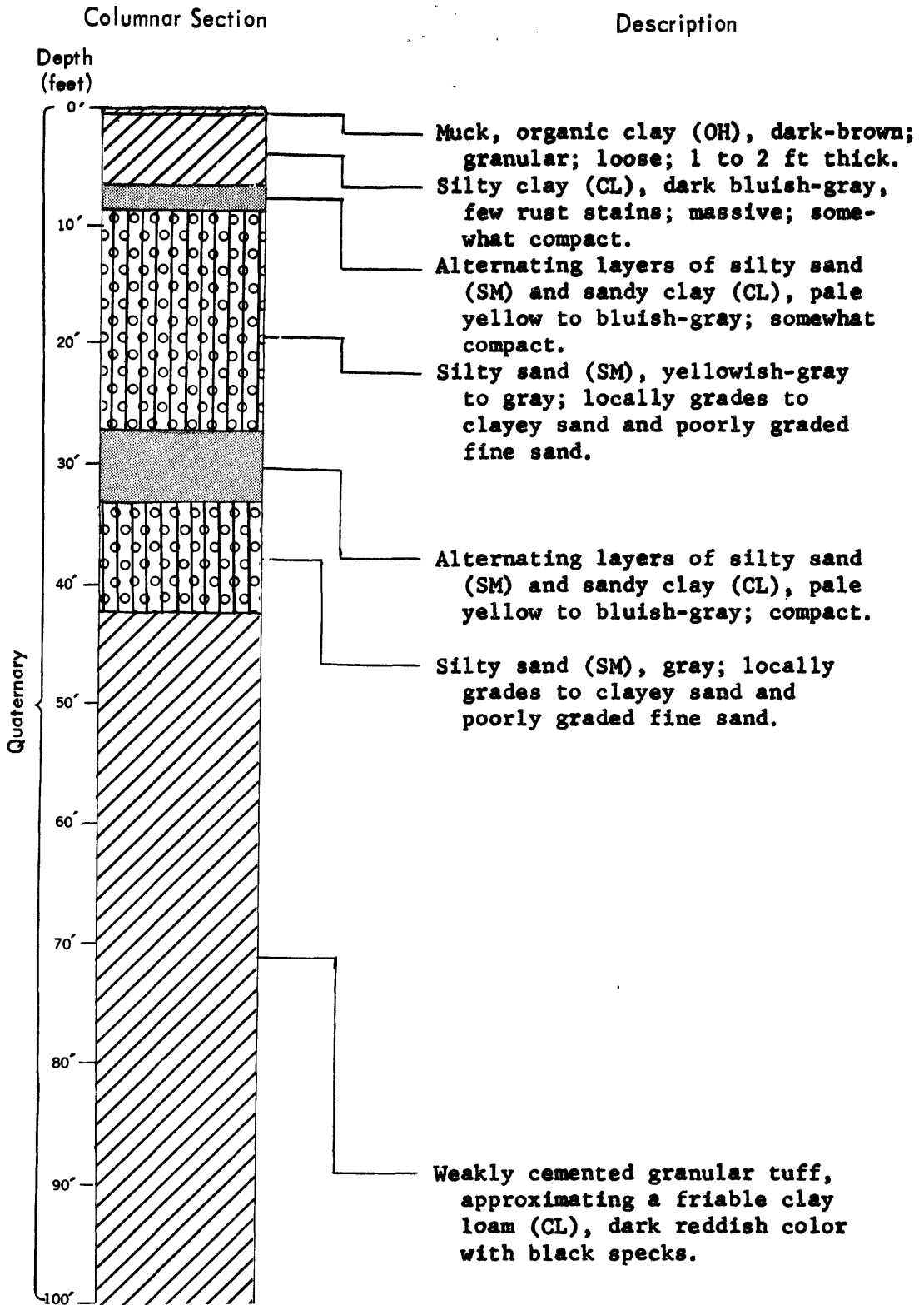
Principal Sources --

Blanc, A. C., and others, eds., 1961, Indagine sulle acque sotterranee dell'Agro Ramano e Pontino: Cassa per Opere Straordinarie di Pubblico Interesse Nell'Italia Meridionale (Cassa per il mezzogiorno), pt. 1.

Principal Sources --

Tommasi, G., and Morani, V., 1941, Studio Chimico-Agrario dei Terreni Italiani-Lazio. Nota III: L'Agro Pontino Settentrionale: R. Stazione Chimico-Agraria Sperimentale di Roma Pub. no. 360, Serie II, v. 17.

SITE 68



SITE 69

Europe

Italy

Naples

Location -- Lat 40°50'N.; long 14°15'E.; near the main office of the Bank of Naples on Via Roma in the old part of the city.

Geologic-Geographic Setting -- An urban-industrial port city on the Bay of Naples, built at the base of and on slopes of a volcanic ridge that rises sharply to 500 ft on the western side of the city. Immediately north and east of the city is a broad level plain that extends to the foothills of the Apennines, about 15 miles to the north. Mt. Vesuvius begins to rise about 3 to 4 miles east of Naples. This is an active volcano, 4,166 ft high, that has had numerous eruptions, the last in 1944. The locality is seismically active. At the site slopes are less than 5 percent, but in nearby areas they are much steeper. Elevation at the site is about 80 ft above sea level.

Water Table -- Water table depths vary considerably in different parts of the city; in some places boiling water is only a few feet below the surface. At the site, the water table is about 35 ft below the surface.

Soil Moisture and Permeability -- Unless irrigated as part of landscape maintenance, soil prevailingly dry, Apr. through Oct.; remainder of year, alternately wet and moist. Soil moderately permeable to depth of about 100 ft.

Climate (based on station at Naples) --

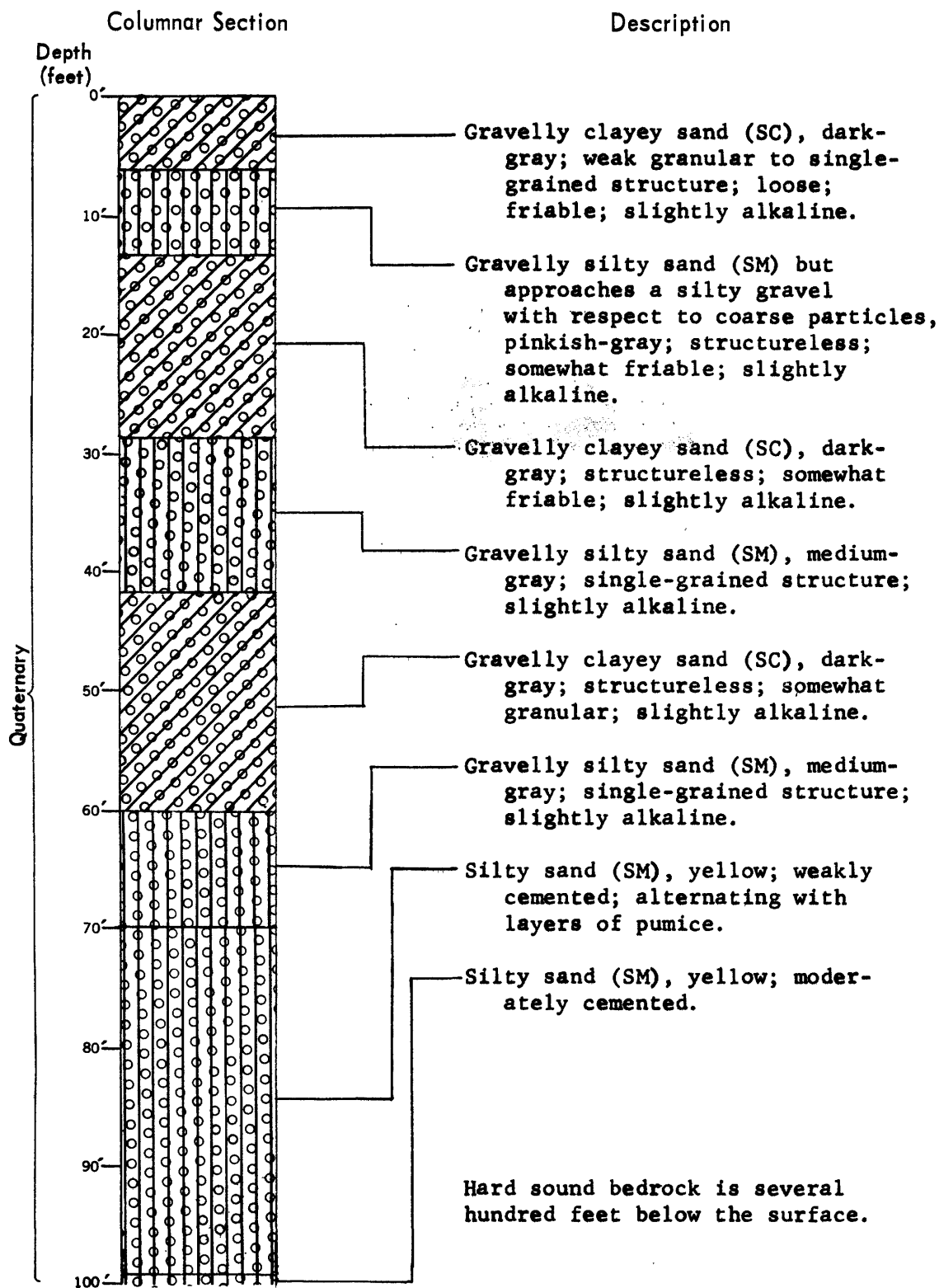
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 9 a.m.
Jan.	51	43	3.7	68
Feb.	53	44	2.9	70
Mar.	58	45	2.8	64
Apr.	63	52	2.5	62
May	69	57	2.0	56
June	77	64	1.4	56
July	83	69	0.6	58
Aug.	82	69	1.1	57
Sept.	77	65	2.9	60
Oct.	69	59	4.6	63
Nov.	61	52	4.5	68
Dec.	54	46	4.4	69
Ann.	66	55	33.4	62

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Bottini, O., and Giannico, E. M., 1933, La Regione Vesuviana: Studio chimico-geoagrologico; La zona pianeggiante: Min. of Agriculture and Forestry, Annali della Sperimentazione Agraria, v. 12, p. 57-89.
- Lambertina, D., and Scorza, V., 1956, Relazione sull'esame dell'acqua di un pozzo artesiano esistente nell'interno del nuovo palazzo del Banco di Napoli, a Via Roma (Napoli): Soc. dei Naturalisti in Napoli Bollettino, v. 65, p. 3-7.
- Principi, P., 1943, I terreni d'Italia: Genoa, Soc. Anonima Editrice Dante Alighieri, p. 93.

SITE 69



SITE 70

Europe

Spain

Barcelona

Location -- Lat 41°23'N.; long 2°11'E. In the northeast part of Barcelona, on the northeast coast of Spain about 50 miles south of the Pyrenees Mountains.

Geologic-Geographic Setting -- A large urban-industrial port city situated between the Besos and Llobregat Rivers on a small coastal plain between the Mediterranean Sea and the Catalanian Ranges. The plain slopes gently upward to the northwest to forested Monte del Tibidabo (elevation 1,680 ft) just outside the city. An isolated hill Montjuich, elevation 575 ft, is in the southeast part of the city. Site is on a terrace of an alluvial plain approximately 75 ft above sea level. On the outskirts of Barcelona, some dryland cultivation of small grains and grasses used for pasture. The alluvium is a few hundred feet thick and overlies several hundred feet of soft seaward dipping upper Tertiary coastal plain sediments. Slopes are generally less than 3 percent except near the mountains.

Water Table -- Water table is about 30 ft below the surface but the level varies greatly in different parts of the city. Seasonal fluctuations are not great.

Soil Moisture and Permeability -- Surface 1 or 2 ft dry most of time except after rains; subsurface mostly dry but moist for a few months especially in Sept. and Oct. Soil permeability is moderate in upper 1 ft, grading to moderately slow with depth; permeability of thick layer of red clay is slow.

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	56	42	1.4	74	60
Feb.	57	44	1.4	72	59
Mar.	61	47	1.8	75	61
Apr.	64	51	1.9	72	61
May	71	57	1.6	70	61
June	77	63	1.4	67	61
July	81	69	1.0	68	61
Aug.	82	69	1.3	73	63
Sept.	78	65	3.0	74	64
Oct.	71	58	3.1	77	66
Nov.	62	50	1.8	75	63
Dec.	57	44	1.4	73	60
Ann.	68	55	21.1	73	62

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Instituto Geológico y Minero de España, 1928, Mapa geológico memoria explicativa de la hoja no. 421 (Barcelona): Madrid.

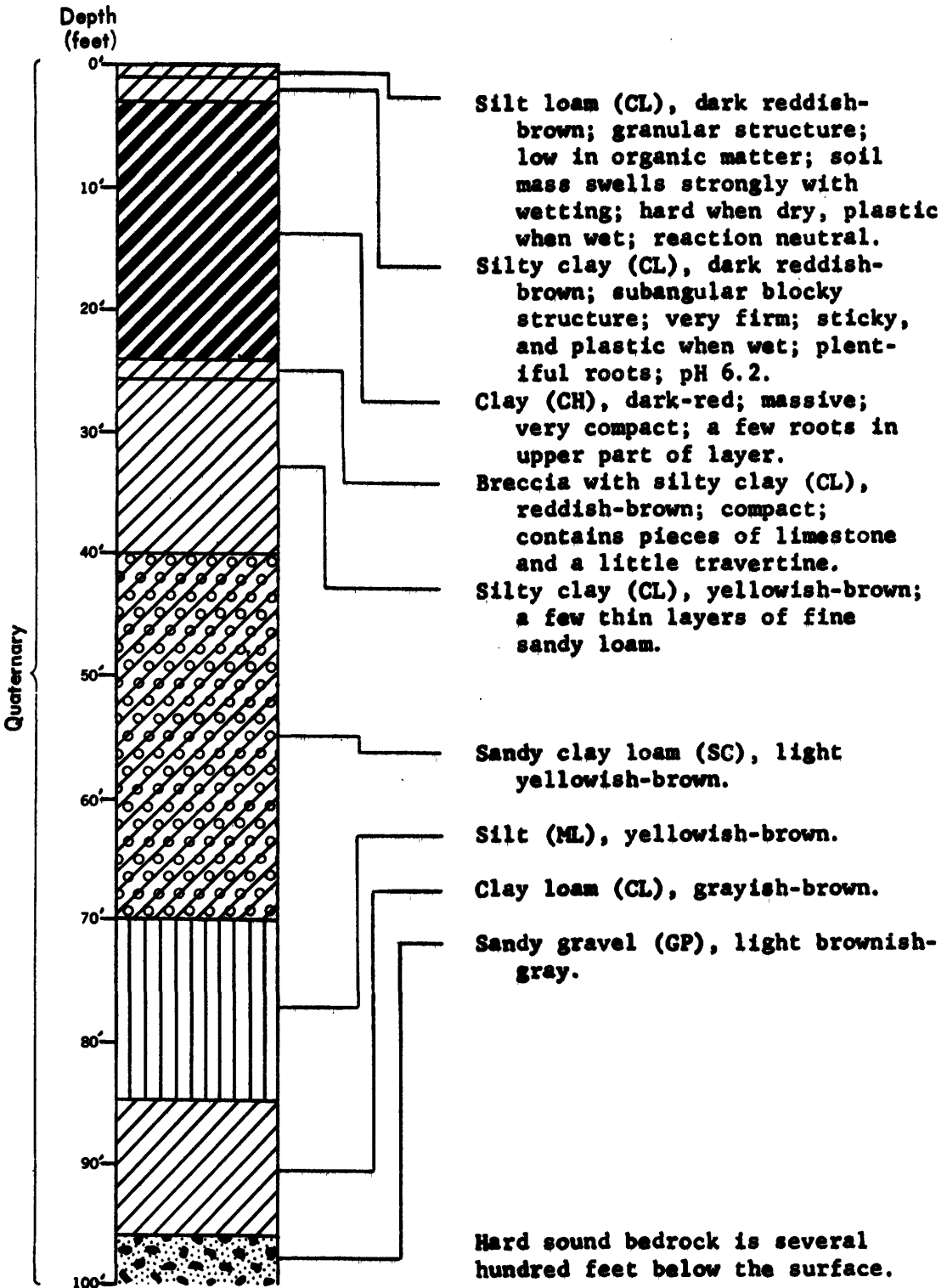
Sabarís, L. S., Virgili, C., and Perelló, E. R., 1957, Environs de Barcelone et Montserrat: INQUA, 5th Cong. Internat., Livret Guide de l'excursion B₁.

Spain, Ministerio de Agricultura, 1958, Los Grupos Principales de Suelos de la España Peninsular: Madrid, Mapa Agronomico Nacional.

SITE 70

Columnar Section

Description



SITE 71

Europe

Spain

Madrid

Location -- Lat 40°24'N.; long 3°42'W.; near the right bank of the Manzanares River in the southern part of Madrid.

Geologic-Geographic Setting -- A large urban-industrial complex situated on a high, open, nearly level, treeless plateau in the center of the Iberian Peninsula. The plain is planted principally in small grain crops. The nearest topographic rise is the Sierra de Guadarrama, a range of mountains about 20 miles to the northwest, that rises to about 5,700 ft above sea level. Site is on a low alluvial terrace a short distance from the small and canalized Manzanares River. The alluvium overlies soft, continental sediments of late Tertiary age. Slopes average less than 3 percent over a wide area. Elevation is about 2,100 ft above sea level.

Water Table -- Shallow ground water occurs in only a few inextensive places. During summer, water tables are deeper and less extensive. Deep artesian water is present a few hundred feet below the surface.

Soil Moisture and Permeability -- Soils generally dry in upper 1 or 2 ft; moist in upper 1 or 2 ft several days after rains; seldom wet; soil moisture highly dependent on topographic position. Soil permeability moderately rapid in upper 1 or 2 ft, moderate from 2 to 5 ft, rapid below 5 ft in sandy and gravelly layers, and considerably slower in clayey layers.

Climate (based on station at Madrid) --

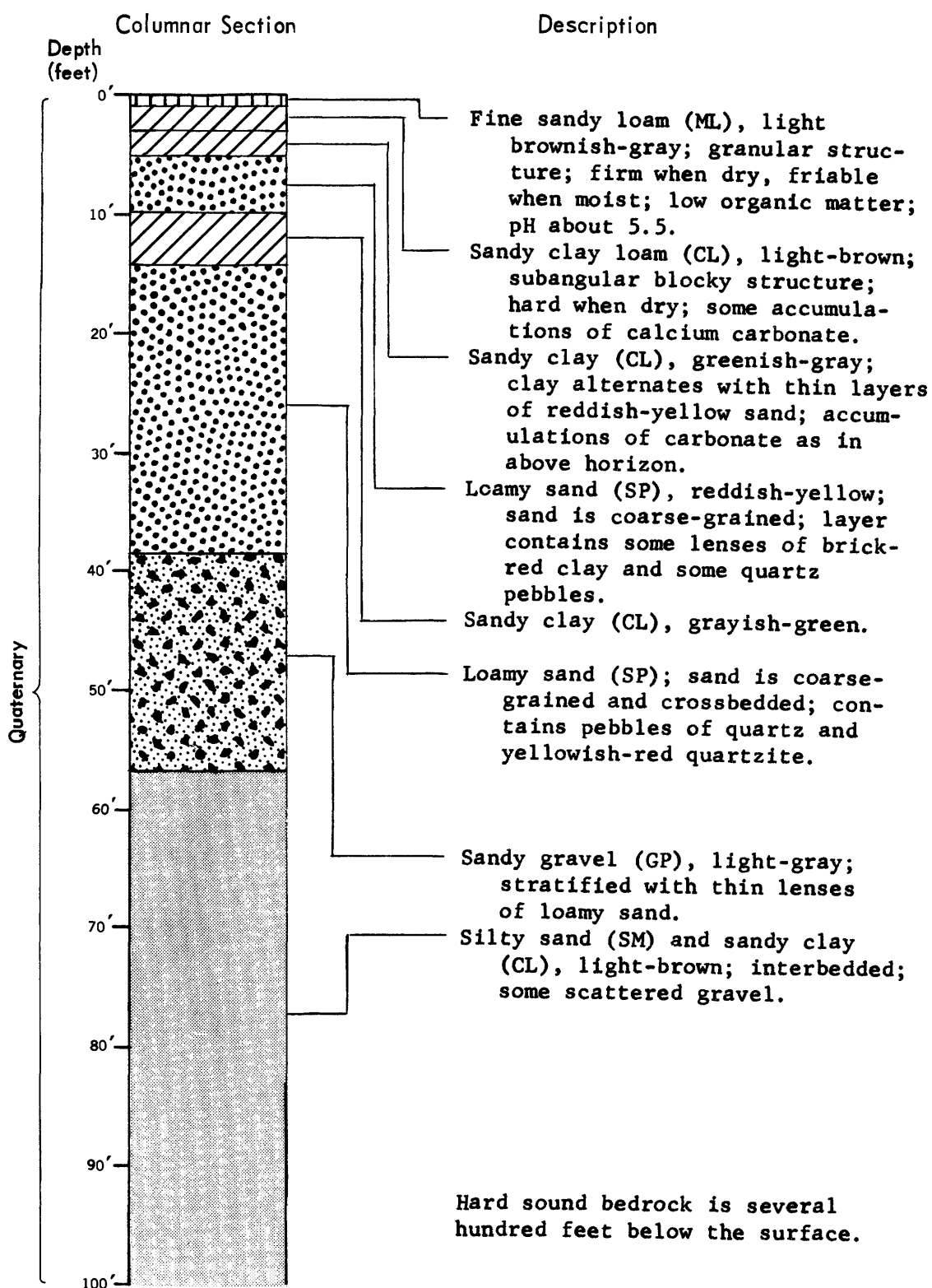
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	47	33	1.1	89	71
Feb.	51	35	1.7	87	64
Mar.	57	40	1.7	84	58
Apr.	64	44	1.7	78	52
May	71	50	1.5	75	51
June	80	57	1.2	69	43
July	87	62	0.4	63	37
Aug.	86	62	0.3	63	36
Sept.	77	56	1.2	73	47
Oct.	66	48	1.9	83	57
Nov.	54	40	2.2	89	68
Dec.	48	35	1.6	90	73
Ann.	66	47	16.5	79	55

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Riba, Oriol, 1957, Terrasses du Manzanares et du Jarama aux environs de Madrid: INQUA, 5th Cong. Internat., Livret Guide de l'excursion C2.
Spain, Ministerio de Agricultura, 1958, Los Grupos Principales de Suelos de la España Peninsular: Madrid, Mapa Agronomico Nacional.

SITE 71



SITE 72

Europe

Spain

Bujalance

Location -- Lat 37°47'N.; long 4°20'W. About 24 miles east of Cordoba and about 5 1/2 miles northeast of Bujalance on the road to Villa del Río, near the intersection of the road and Arroyo de Caneiejo, in south-central Spain.

Geologic-Geographic Setting -- Near a small stream in rolling to hilly farmland that is planted principally in orchards and some vineyards. Situated on the Andalusian Plain a few miles from the base of Sierra Morena which rises to about 3,500 ft to the north, and more than 20 miles from the Cordillera Penibetica which rise to 6,000 ft to the south. The soft Miocene sediments of the plain have been dissected into alternate valleys and flat-topped uplands, resulting in hilly topography with fairly deep residual or colluvial soils. Slopes are moderately steep, generally between 5 and 15 percent. Elevation at the site is 672 ft above sea level.

Water Table -- Water table is within 10 ft of the surface because the site is in a valley near a stream. Deeper water tables may be expected in nearby uplands. Water tables in the area are a few feet lower during summer.

Soil Moisture and Permeability -- In the immediate vicinity of site, soils probably irrigated and soil moisture conditions highly varied; on the surrounding uplands, soils generally moist only during winter, and then only the surface few feet; otherwise, especially during summer, non-irrigated ground dry and hard. Snow and frozen ground very rare. Soil permeability moderately slow.

Climate (based on station at Granada) --

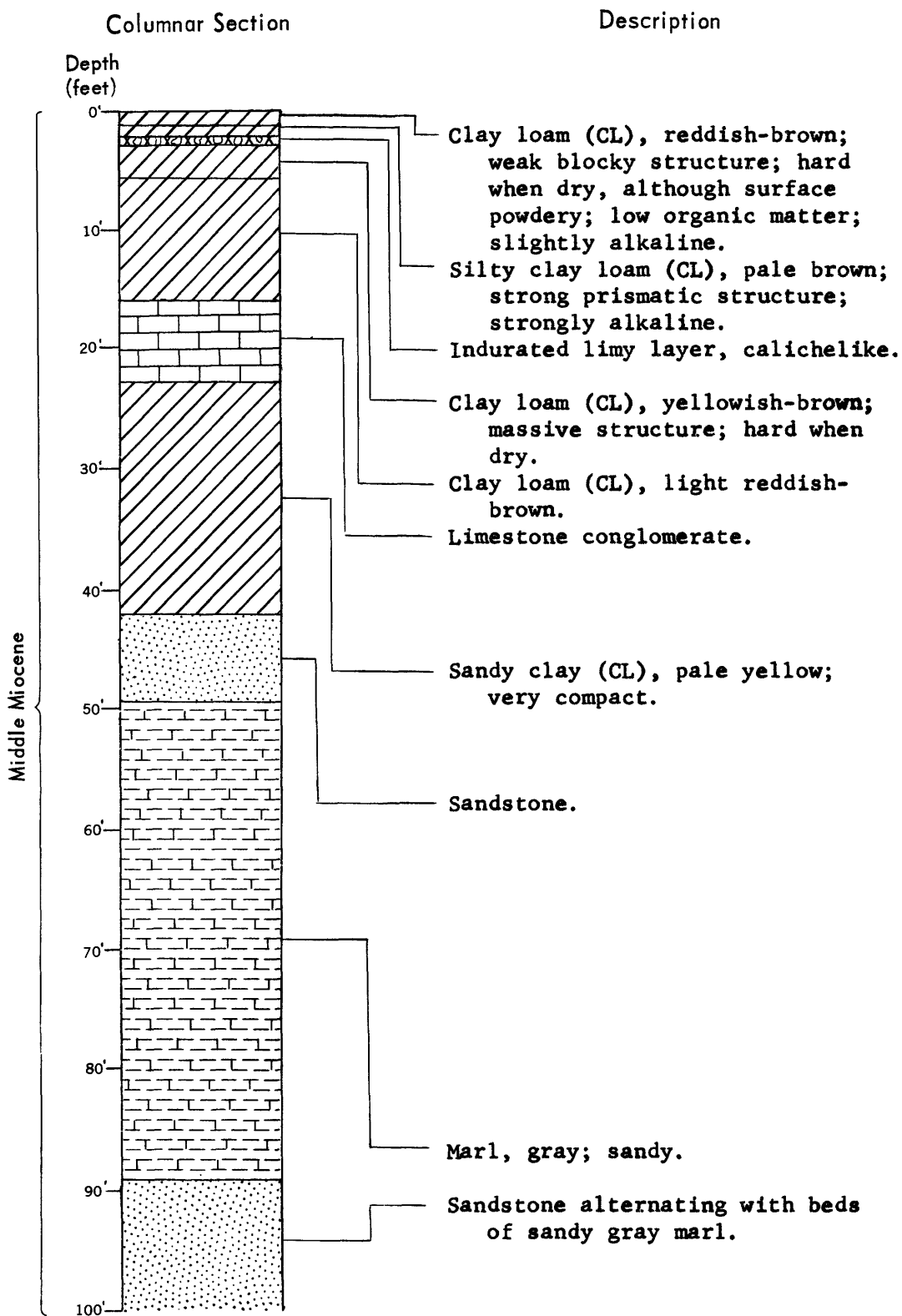
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+ 7 a.m.
Jan.	53	36	1.4	89
Feb.	56	37	1.7	87
Mar.	59	41	2.7	84
Apr.	64	45	1.9	78
May	73	52	1.3	75
June	81	58	0.8	69
July	90	64	0.2	63
Aug.	91	64	0.1	63
Sept.	81	58	0.9	73
Oct.	72	51	1.6	83
Nov.	59	42	2.0	89
Dec.	54	37	1.8	90
Ann.	70	49	16.4	79

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Carrasco, I. P., and Roldán, J., 1949, Estudios sobre prolongación de cuencas hulleras. Notas sobre el Mioceno del Valle Bético (Sondeo de Bujalance): Inst. Geol. y Minero de España Bol., v. 62, p. 273-296.
- Spain, Ministerio de Agricultura, 1958, Los Grupos Principales de Suelos de la España Peninsular: Madrid, Mapa Agronomico Nacional.

SITE 72



SITE 73

Europe

Spain

Toledo

Location -- Lat 39°52'N.; long 4°09'W. Near the left bank of the Tagus River, 13 kilometers west of Toledo.

Geologic-Geographic Setting -- Undulating pasture land on the southern part of the generally arid central plateau of Spain. Vegetation consists chiefly of sparse grass and brush, but some grains, mostly cereals and beans, are grown on the uplands, and olive orchards and vineyards are grown in the valleys. The plain is open except to the south, where about 20 miles from the site the Montes de Toledo rise to heights of over 4,800 ft. Site is on a terrace of the Tagus River near the confluence of the Guadarrama River. The Tagus is deeply incised at this point and its flow fluctuates greatly seasonally. The area is underlain by unconsolidated and semiconsolidated rocks about 150 ft thick, that dip about 20°NE, and nonconformably overlie granitic rocks. Slopes are low on the uplands, less than 3 percent, but the valleys are generally steep sided and are cut by many arroyos. Elevation at the site is about 1,600 ft above sea level and maximum local relief in the area is about 738 ft.

Water Table -- Ground water is scarce and unevenly distributed. At the site the water table is about 20 ft below the surface, but this is due to infiltration from the Tagus River and is not representative of the general area.

Soil Moisture and Permeability -- Soil generally dry, except in irrigated fields; upper few feet moist for several days after rains which occur chiefly during late fall through early spring. Soil permeability moderate.

Climate (based on station at Madrid) --

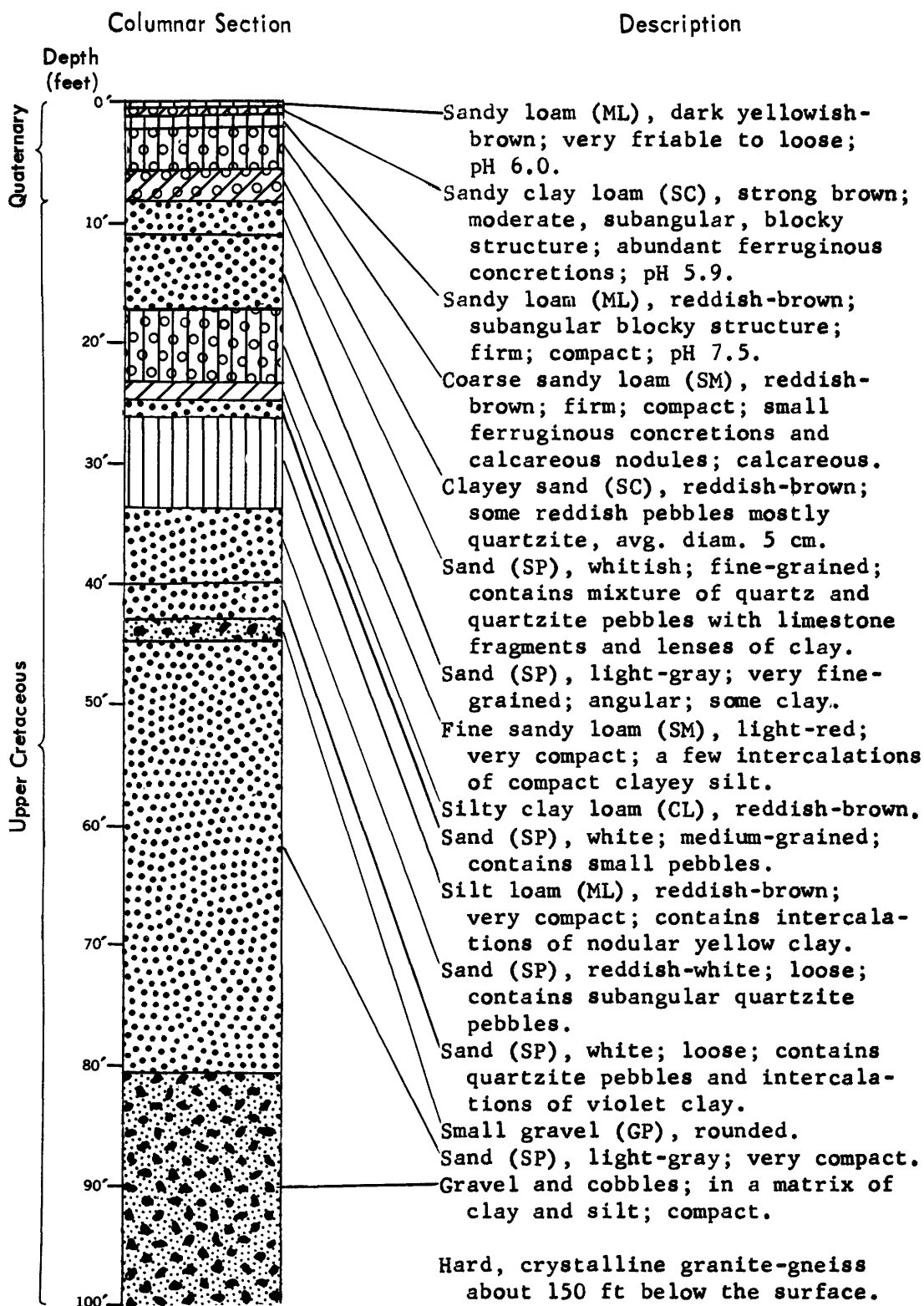
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				7 a.m.	1 p.m.
Jan.	47	35	1.1	89	71
Feb.	51	35	1.7	87	64
Mar.	57	40	1.7	84	58
Apr.	64	44	1.7	78	52
May	71	50	1.5	75	51
June	80	57	1.2	69	43
July	87	62	0.4	63	37
Aug.	86	62	0.3	63	36
Sept.	77	56	1.2	73	47
Oct.	66	48	1.9	83	57
Nov.	54	40	2.2	89	68
Dec.	48	35	1.6	90	73
Ann.	66	47	16.5	79	55

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Herrera, J., and others, 1966, Mapa de suelos de España: Madrid
Inst. Nacional de Edajologia y Agrobiologia del C. S. I. C.
International Society of Soil Science, Commission V, 1966, Tour
guide (Guia de la excursion). Conferencia sobre suelos
Mediterraneos: Madrid.
Spain, Instituto Geológico y Minero, 1944, Mapa geológico de
España, Explicacion de la hoja no. 629, Toledo: Inst. Geol.
y Minero de España.

SITE 73



SITE 74

Union of Soviet Socialist Republics

Russian Soviet Federated Socialist Republic

Leningrad

Location -- Lat 59°58'N.; long 30°18'E. In the north-central part of the city at the Lesotekhnicheskoi Akademii (Forestry College) on Karl Marx Prospect.

Geologic-Geographic Setting -- The city is built mostly on a number of islands and extensive marshes of the Neva River delta. The site is located on a wave-cut terrace composed of marine and glacial sediments of Recent age near the edge of the Neva delta. Underlying these Recent sediments are Cambrian rocks and the Precambrian rocks of the Baltic Shield. City streets are mostly hard surfaced, main streets with asphalt, concrete, and cutstones, secondary streets with cutstone or cobblestones. Vegetation in the city is primarily grass, trees, and other park vegetation; outside it is mainly cultivated oats, barley, and other grains; the site was originally occupied by wetland-type grasses. The elevation is about 52.8 ft above sea level and the slope is less than 1 percent.

Water Table -- Ground water at the site is about 20 ft deep; water table is only a few feet below surface in most of the city. Leningrad is subject to annual flooding particularly in autumn when severe winds blow from the west.

Soil Moisture and Permeability -- Soil is predominantly moist; wet for a few months after spring thaw; soils frozen from late Nov. to late Mar. or early Apr. to depth of about 16 inches depending on snow cover. Permeability of the clays and silty clays slow, and of the sandy horizons is moderately rapid.

Climate (based on station at Leningrad) --

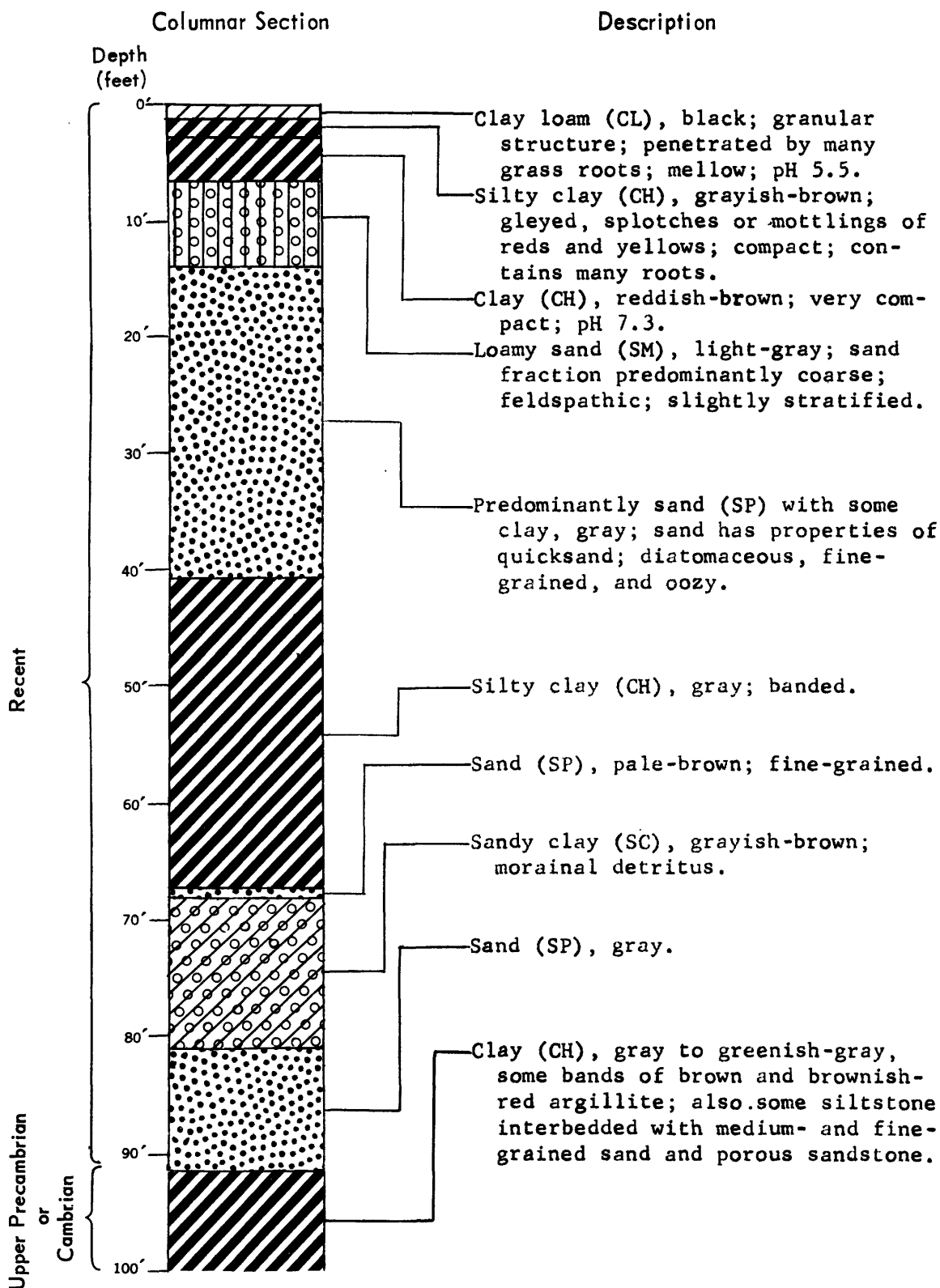
	Temp. (°F)*	Precip. (in.)**	Rel. Humidity (%)*
Jan.	19	1.1	86
Feb.	20	1.0	85
Mar.	29	1.0	79
Apr.	42	1.3	71
May	55	1.8	63
June	63	2.3	63
July	68	2.3	67
Aug.	64	3.2	74
Sept.	55	2.4	79
Oct.	44	1.9	82
Nov.	31	1.6	86
Dec.	23	1.3	87
Ann.	43	21.2	77

*Mean daily, **mean monthly.

Principal Sources --

- Kadenskii, A. A., 1963, Geologicheskie ekskursii v okrestnostiakh Leningrada: Leningr. gos. pedagog. in-t., 190 p.
- Nemchinova, Z. F., 1965, Dark-colored Sod-Gley Soils in the north-western U.S.S.R. developed on calcareous and noncalcareous deposits: Soviet Soil Science, no. 4, p. 360-366.
- Yakovlev, S. A., 1956, Osnovy geologii chetvertichnykh otlozhenii Russkoi Ravniny (Stratigrafiia): Russia. Vsesoiuznyi nauchno-issledovatel'skii geol. inst. Trudy, no. 17, 313 p.

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SITE 75

Union of Soviet Socialist Republics

Belorussian Soviet Socialist Republic

Ivanovo

Location -- Lat 52°09'N.; long 25°25'E. About 25 miles west of Pinsk in Brest oblast' or, according to some sources, Pinsk oblast'.

Geologic-Geographic Setting -- Ivanovo is on the remnant of a terminal moraine in the northwest part of the Dneiper-Donets Plain north of the Pripet Marshes. Quaternary deposits 157.77 ft thick overlie Cretaceous and Triassic deposits. The vegetation consists of wheat, barley, and rye, tracts of mixed deciduous-coniferous forests, and poorly drained meadows. The elevation at the site is 488.4 ft above sea level and the slope of the area is less than 1 percent.

Water Table -- Depth to ground water is approximately 4 ft; the area is subject to periodic flooding.

Soil Moisture and Permeability -- Generally moist, except wet during spring months; upper 2 ft occasionally dry during summer months; Dec. through Mar. the soil is frozen to a depth of 2 to 3 ft. Upper 2 ft moderately permeable becoming moderately rapid in sandy zones.

Climate (based on station at Vasilevichi) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	24	14	1.0	86
Feb.	28	16	1.0	83
Mar.	36	25	1.1	80
Apr.	49	36	1.8	72
May	65	46	2.4	68
June	71	52	3.0	73
July	73	55	3.7	78
Aug.	72	52	2.6	78
Sept.	60	45	2.2	81
Oct.	51	36	2.1	82
Nov.	35	27	1.6	86
Dec.	27	20	1.4	88
Ann.	49	35	23.9	79

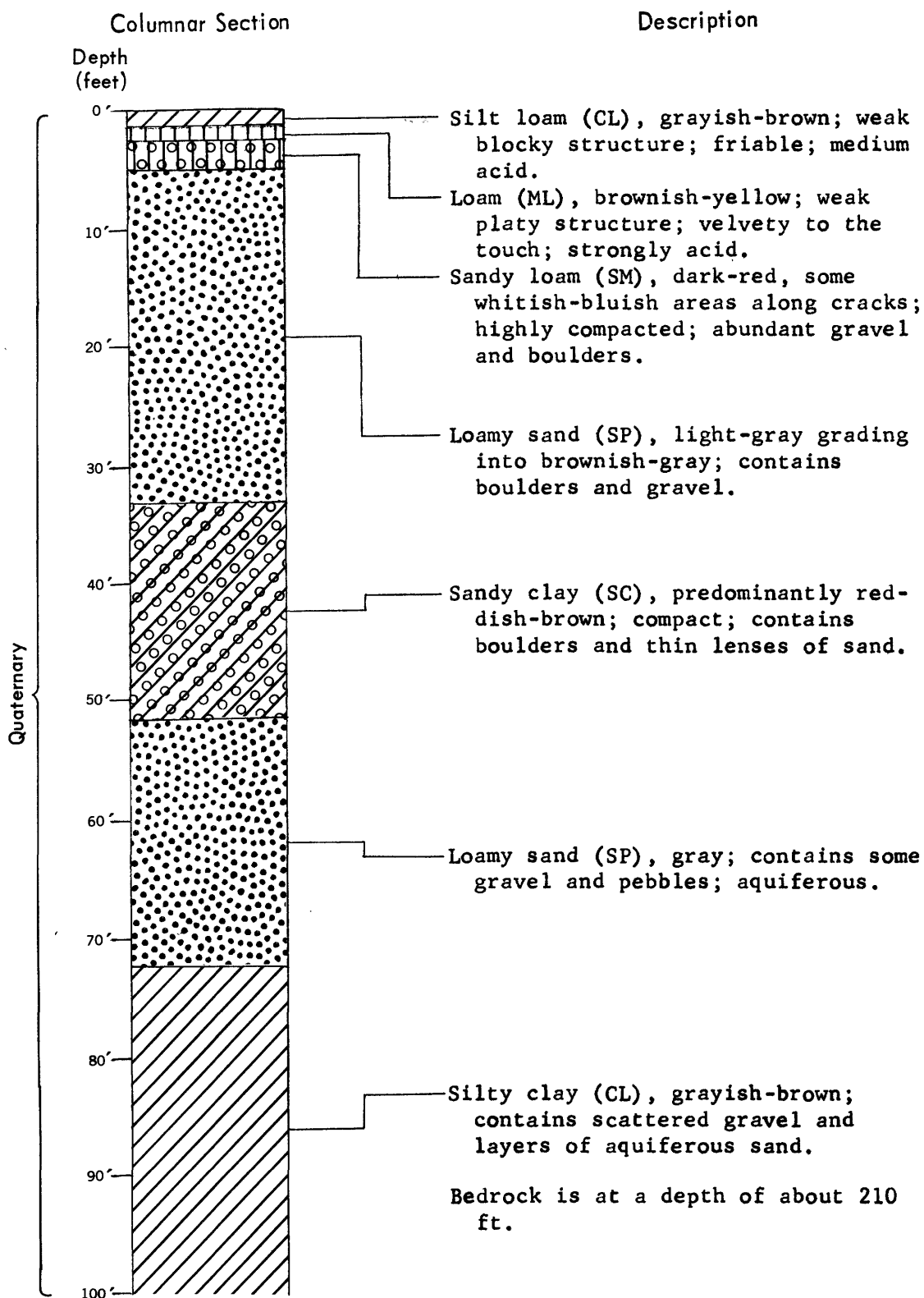
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Nogina, N. A., 1952, O palevo-podzolistykh pochvakh Belorussii: Pochvovedenie, no. 2.

Tsapenko, M. M., and Makhach, N. A., 1959, Antropogenovye otlozheniia Belorussii: Minsk, Izd-vo Akad. Nauk BSSR, 221 p.

SITE 75



SITE 76

Union of Soviet Socialist Republics

Ukrainian Soviet Socialist Republic

Kiev

Location -- Lat 50°27'N.; long 30°30'E., on right bank of Dneiper River in the "First of May" Garden.

Geologic-Geographic Setting -- Kiev occupies both banks of the Dneiper River on the fertile plains of the north-central Ukraine. Most of the city is on the right (west) bank of the river on a relatively flat terrace fronted by bluffs more than 200 ft higher than the river level and dissected in places by deep gullies. A small section of the city is located north of the terrace on lowland adjacent to the river, and embankments are being built for flood prevention. The part of the city on the low left bank is built on a slightly higher area far enough from the river so that it is not readily inundated. In the city the vegetation consists of gardens, trees, and park grass; the rural areas are mostly planted to wheat and other grains. Main streets within the urban area are surfaced with asphalt, side streets with asphalt or stone block. Landslides have occurred in the vicinity of the bluffs. The elevation is approximately 610 ft above sea level and the land slopes 45 percent at the site; slopes are 3 percent west and east of the city, and 1 percent or less in the northern part of the city.

Water Table -- Water table at the site is more than 100 ft below the surface. On the left bank and in the low areas in the northern part of the city, water table is within 6 ft of the surface. Depths to ground water vary considerably, even within short distances. The low areas northeast and northwest of the city are subject to flooding. The city's water supply comes from the Dneiper and Desna Rivers and artesian wells are sources of water for the suburban areas.

Soil Moisture and Permeability -- Moist most of year, but periodically dry in upper 1 or 2 ft during summer; wet for short periods after soaking rains; soil predominantly wet during winter and early spring, when not frozen; depth of freezing about 12 to 16 inches. Soil permeability is moderate throughout.

Climate (based on station at Kiev) --

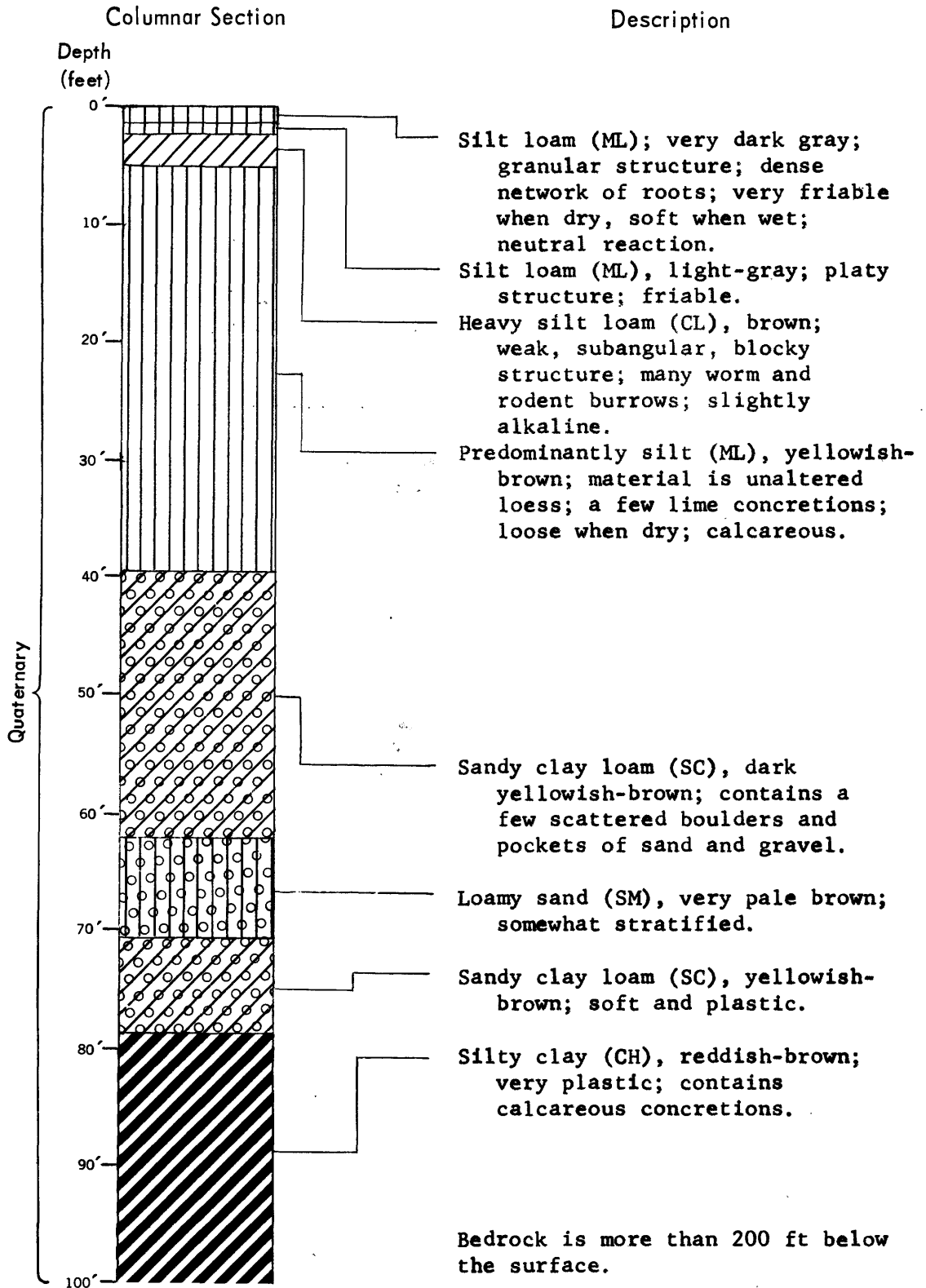
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	24	16	1.5	86
Feb.	28	19	1.3	84
Mar.	35	26	1.8	82
Apr.	39	37	1.8	70
May	66	50	2.0	62
June	71	55	3.1	68
July	74	58	3.0	69
Aug.	73	56	1.9	68
Sept.	63	48	2.0	72
Oct.	52	39	2.2	78
Nov.	35	28	1.4	85
Dec.	27	20	1.4	89
Ann.	49	38	23.4	76

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

- Chirvinsky, V. N., 1937, Kiev region: Internat. Geol. Cong., 17th, U.S.S.R. 1937, v. 4, The Southern Excursion, The Ukrainian S.S.R., p. 78-90.
- Lichkov, L., 1938, On the regularity of landslip phenomena in the city of Kiev and its suburbs: Acad. of Sci. of the Ukrainian S.S.R., Inst. of Geol. Geologichnii zhurnal, v. 5, no. 4, p. 145-198.
- Makhov, G., 1931, Soils of the steppe and the Donetz Basin: Kharkov, Ukrainian Inst. for Soil Research Contr., v. 3.

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SITE 77

Union of Soviet Socialist Republics

Ukrainian Soviet Socialist Republic

Khar'kov

Location -- Lat 49°58'N.; long 36°15'E. In the eastern part of the city on the bank of the Nemishli River.

Geologic-Geographic Setting -- Khar'kov, on the northern wing of the North Ukrainian syncline, is in the northeastern part of the Ukrainian S.S.R., at the confluence of the Khar'kov and Lopan' Rivers. Terraces have been cut into the marine sediments of Eocene and Oligocene age that underlie the gently rolling terrain. There is a surficial cover of loess on the terraces and dunes on the broad river terrace. Wide ravines dissect the terraces in the area surrounding the city. In the city, vegetation consists of trees and grass in parks; rural areas are cultivated for wheat, corn, and sugar beets, and there are some orchards and oak forests. Main streets are wide and surfaced with asphalt; secondary streets are paved with stone blocks; outside the urban area, unpaved roads are prevalent. The elevation at the site is 620.4 ft above sea level and the slopes are between 3 and 5 percent, locally steeper.

Water Table -- The depth to ground water is 141.9 ft below the surface at the site, but depth is less to the east and west in the vicinity of the river channels.

Soil Moisture and Permeability -- Moist except the upper 2 or 3 ft that alternate between wet and dry during the summer. Ground commonly freezes to depth of 20 to 25 inches from Dec. to mid-Mar. depending on snow cover. Overall permeability is moderate.

Climate (based on station at Kursk) --

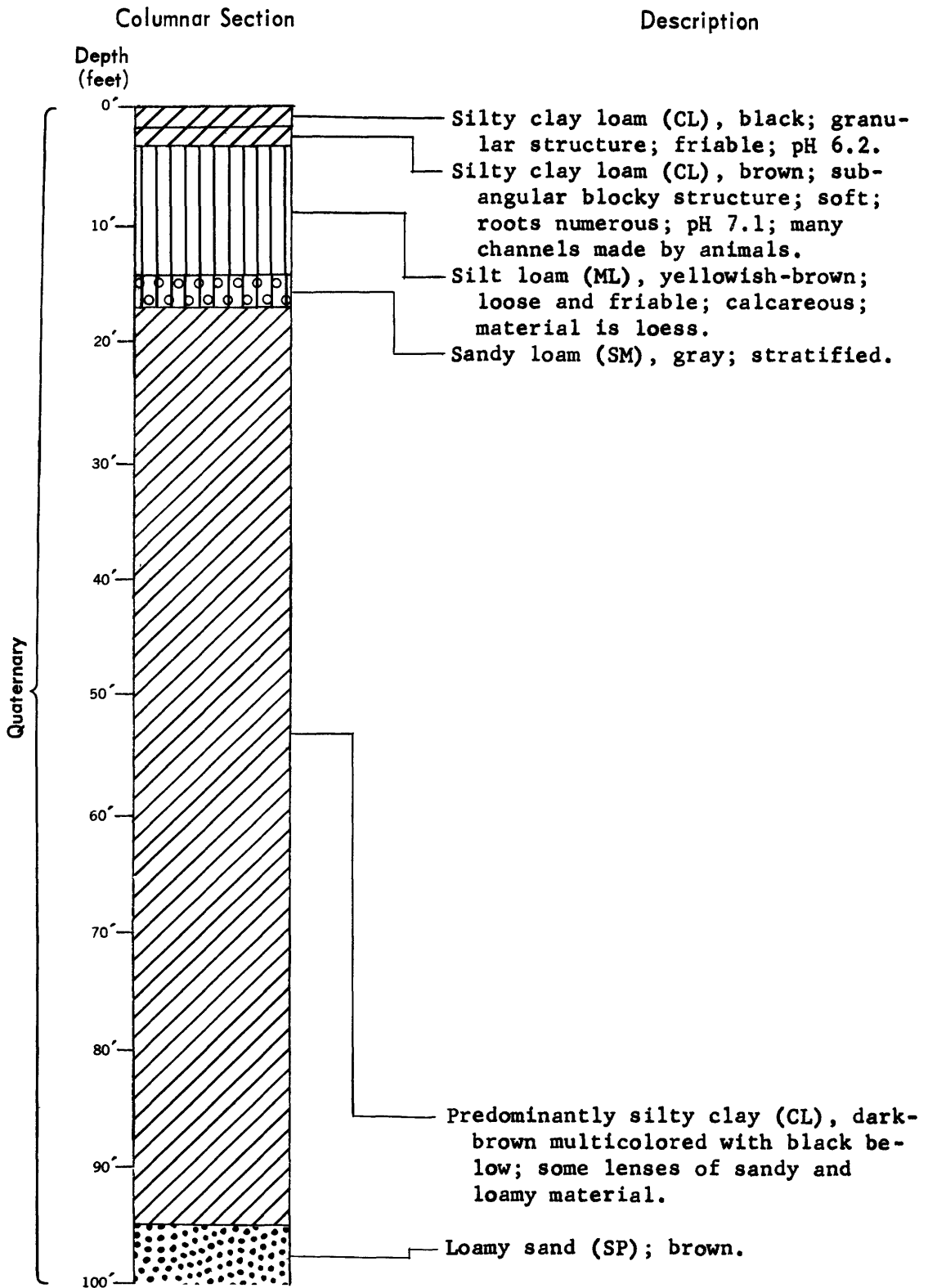
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	18	11	1.4	86
Feb.	22	13	1.4	83
Mar.	30	20	1.2	83
Apr.	46	35	1.7	72
May	64	48	2.0	63
June	71	55	2.8	67
July	74	55	3.0	67
Aug.	72	55	2.0	66
Sept.	61	46	1.6	72
Oct.	48	36	2.0	78
Nov.	31	24	1.6	86
Dec.	22	16	1.5	86
Ann.	47	35	22.0	75

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Bondarchuk, V. G., 1963, *Geologichna Budova Ukrains'koi RSR*: Kiev, 372 p.
- Taran, A., 1935, O geologicheskoi stroenii i gidrogeologii vostochnikh okrestnostei g. Khar'kova: *Geologicheskii zhurnal*, v. 2, no. 1, p. 91-123.
- U. S. Dept. of Agriculture, Soil Conservation Service, 1959, Soil and water use in the Soviet Union, report of a technical study group.

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SITE 78

Union of Soviet Socialist Republics

Russian Soviet Federated Socialist Republic

Moscow

Location -- Lat 55°45'N.; long 37°34'E. In an industrial area in central part of city northeast of Red Square, on the right bank of the Yazua River.

Geologic-Geographic Setting -- Moscow is built on four terraces; the upper two are composed of old and new alluvium, and the lower two are of glaciofluvial origin. The city is ringed on the southwest by the Lenin Hills approximately 600 ft in elevation and across the Moscow River from the site which is at an elevation of 452.5 ft. Elevations in the northern part of the city reach 577 ft. Slopes are generally less than 3 percent. Main radial streets are asphalt, generally quite wide with grass median strips; other streets in the central district are asphalt, cobblestones, or dirt.

Water Table -- Water table is 38 ft below the surface; 1,000 ft east of the site the surface of the Yazua River is at an elevation of 408 ft.

Soil Moisture and Permeability -- Soil generally moist, except wet during spring thaw; frozen to depth of 20 to 25 inches in winter. Permeability moderate.

Climate (based on station at Moscow) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	15	13	1.6	84
Feb.	19	12	1.4	82
Mar.	29	19	1.4	78
Apr.	44	31	1.4	70
May	60	42	1.9	60
June	67	51	2.5	68
July	71	56	3.1	68
Aug.	67	54	2.8	73
Sept.	56	45	2.4	78
Oct.	44	36	2.5	80
Nov.	29	26	1.8	84
Dec.	19	17	1.7	86
Ann.	43	34	24.5	76

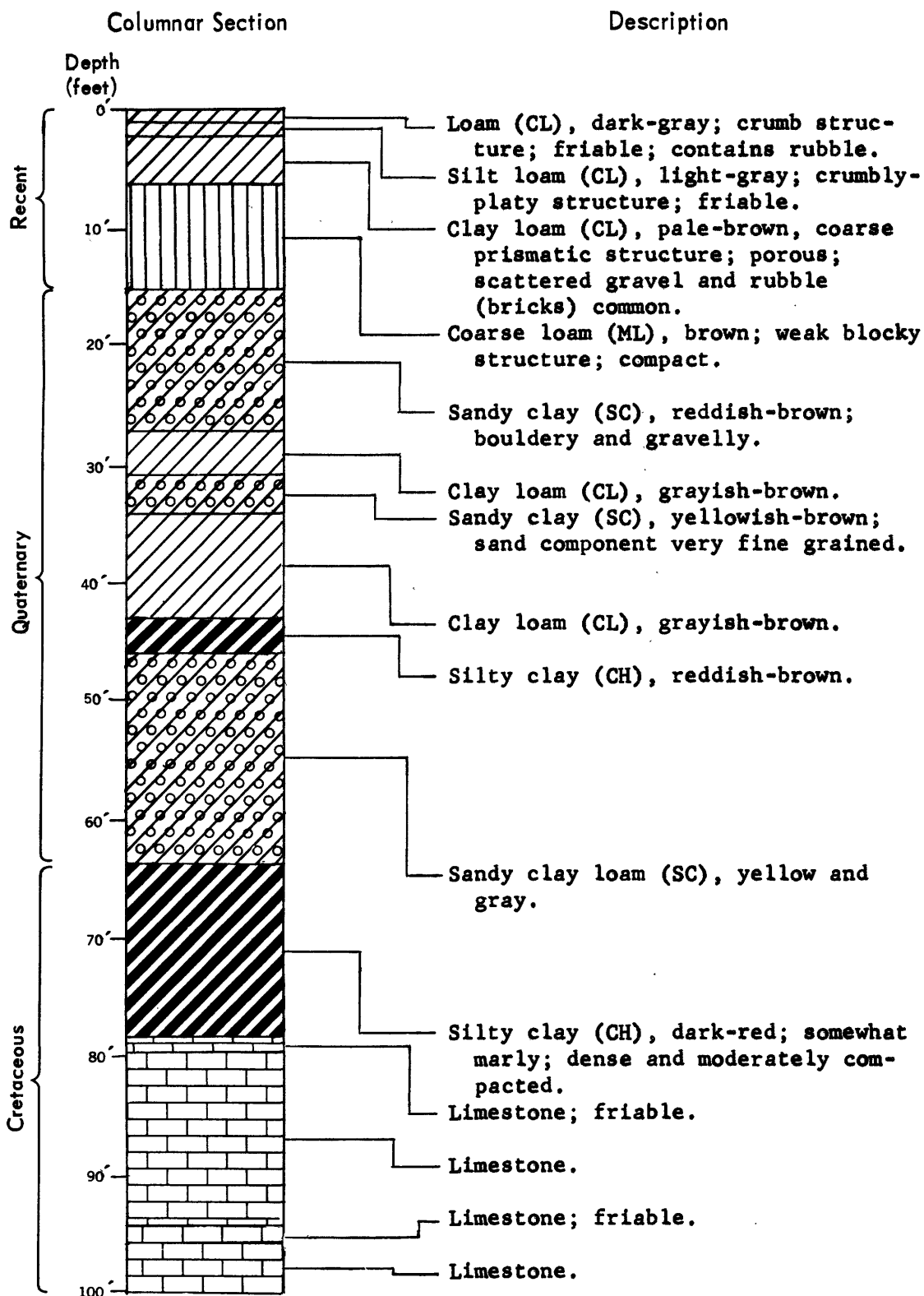
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Moro, A. I., 1936, Voprosy inzhenernoi geologii v sviaze s rekonstruktsiei r. Yazy: Russia. G. Geologo-razvedochnoe upravlenie. Moskovskii otdelenie ser. 1, geologiya Trudy, no. 22, 73 p.

U.S.S.R., Ministry of Agriculture, 1964, Short guide to soil excursion from Moscow to Kherson: Moscow, Koslos Publishing House.

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SITE 79

Union of Soviet Socialist Republics

Russian Soviet Federated Socialist Republic

Gor'ky

Location -- Lat 56°20'N.; long 44°00'E.; on the right bank of the Volga River in the northern part of the city.

Geologic-Geographic Setting -- The city is located in the middle Volga Valley at the confluence of the southeast-flowing Volga and the north-east-flowing Oka Rivers. The city occupies both banks of the Oka; the left bank (north and west) is generally flat to slightly rolling terrain; the right bank (east and south) is higher, moderately rolling terrain. Right banks of both rivers are bluffs. The northern part of the city is subject to landslides. In the city, the vegetation consists of grass and trees mainly in parks. Wheat and corn are cultivated on the well-drained uplands outside the city; on the poorly drained plains, the vegetation is meadow and pasture. Only the main streets of the urban area are paved, generally with asphalt or stone block; side streets are mostly dirt. At the site, elevation is 623 ft above sea level, one of the highest locations in the area. On the left bank of the Volga River slopes are less than 3 percent and on the right bank they are more than 3 percent; locally slopes are as much as 10 percent.

Water Table -- Ground water is 30 ft below the surface at this elevation; on the left bank of the Oka, water table is from 4 to 10 ft deep.

Soil Moisture and Permeability -- Soil is generally moist, except wet during spring thaw; surface 2 or 3 ft alternatingly dry and wet during summer; soil is frozen to depth of 20 to 25 inches during winter.

Climate (based on station at Gor'ky) --

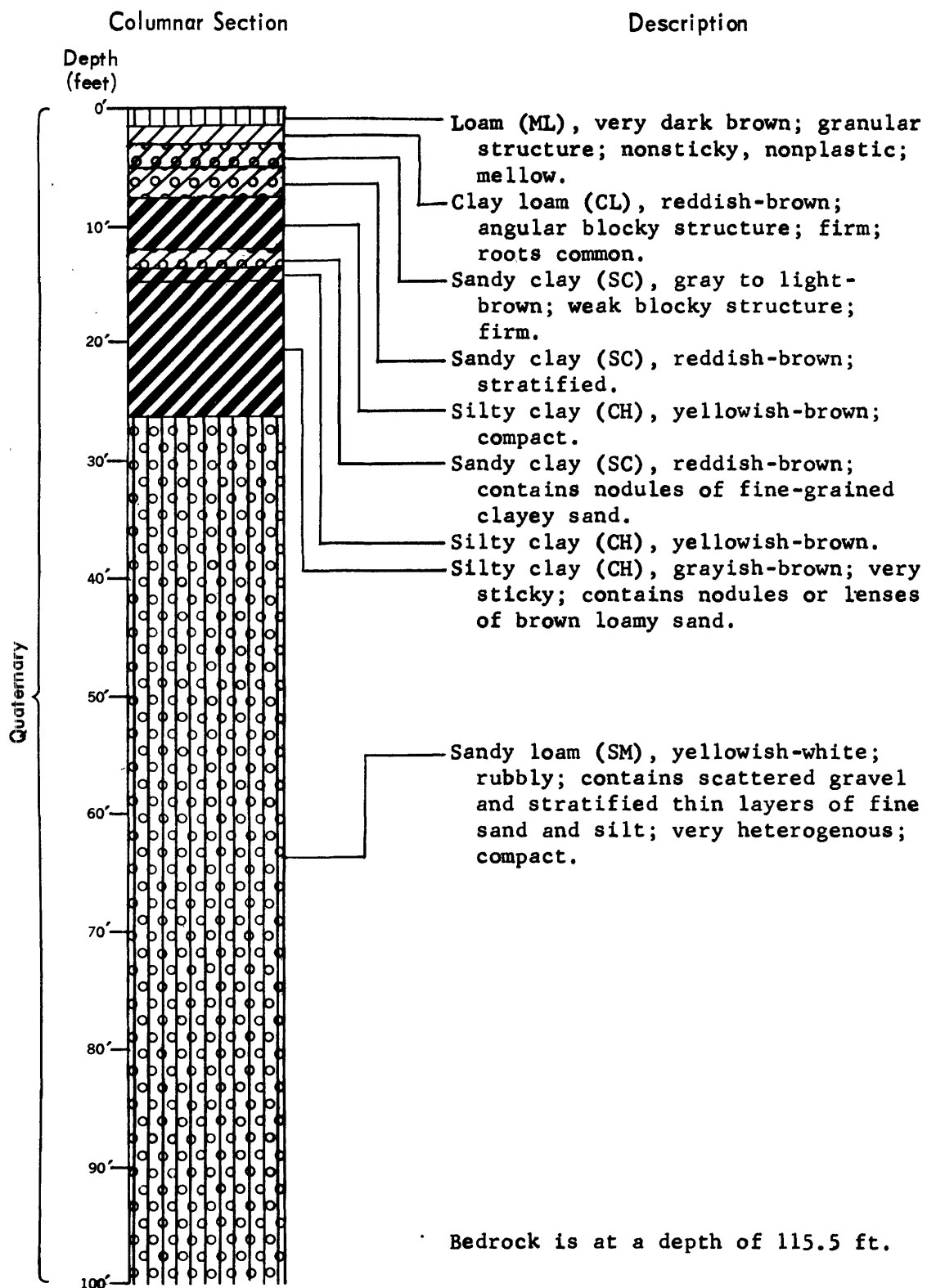
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	11	4	1.5	88
Feb.	17	8	1.5	85
Mar.	27	16	1.3	80
Apr.	43	32	1.3	71
May	61	46	1.7	62
June	68	54	2.4	68
July	73	58	2.6	68
Aug.	69	55	2.5	72
Sept.	55	44	2.2	78
Oct.	42	34	2.2	81
Nov.	25	20	2.1	88
Dec.	14	7	1.9	89
Ann.	42	32	23.2	78

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Ayzin, B. I., 1937, Opolznevye yavleniya rayona g. Gor'kogo i inzhenerno-tekhnicheskie meropriyatiya po bor'be s nimi: Moscow, Geologo-razvedochnyi institut im. Ordzhonikidze Trudy, v. 6, p. 98-107.
- Russia. Geologo-razvedochniye trest Gor'kovskaia Kraia, 1933, Nedra Gor'kovskogo Kraya, Geologicheskoe stroenie podzemnye vody i poleznye iskopaemye: v. 1 and 2.
- Tiurin, I., and Ivanova, E., 1959, Soil map of Europe (Eastern part), scale 1:2,500,000: Acad. of Sci. U.S.S.R., Dokuchaev Soil Institute.

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SITE 80

Union of Soviet Socialist Republics

Russian Soviet Federated Socialist Republic

Zhdanovka

Location -- Lat 51°04'N.; long 47°09'E. A town 5 miles east of a spur of the Ryazano-Ural'skaya Railroad on the Yeruslan River.

Geologic-Geographic Setting -- The Lower Volga region, in the southern part of the Great Russian Plain, is a dry steppe changing to semidesert in the southeast. The site is on the left bank of the Volga, an area of low relief having flat surfaces interrupted by incised streams and gullies, and low mounds. Elevation at the site is 267.3 ft above sea level and the slope is 3 percent.

Water Table -- Depth to ground water at the site is 60 ft; the water is salty and has weak flow. There are, however, fresh water wells in the area.

Soil Moisture and Permeability -- Prevailing dry; occasionally wet or moist, chiefly May through Oct.; frozen progressively to a depth of 20 inches, Dec. through Feb., and thawed out by the end of Mar. Soil is slowly permeable at least to depth of 30 ft.

Climate (based on stations at Alexandrov Gay and Saratov) --

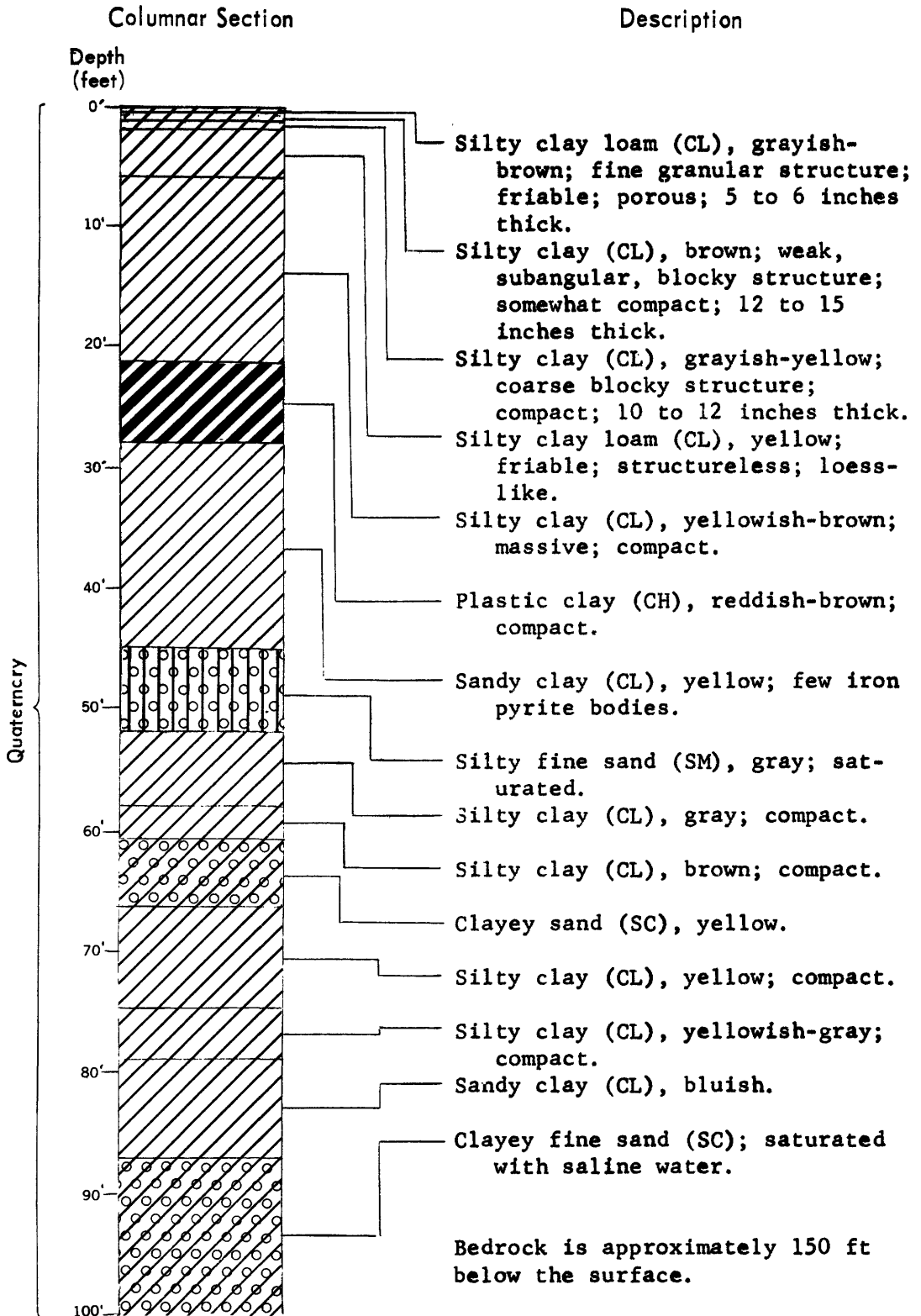
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	11	-3	1.0	87
Feb.	10	-6	0.8	86
Mar.	29	13	0.7	87
Apr.	58	36	1.1	75
May	74	48	1.2	59
June	84	56	1.6	56
July	90	63	1.5	61
Aug.	87	62	1.4	61
Sept.	72	47	1.2	65
Oct.	52	34	1.5	78
Nov.	34	20	1.4	87
Dec.	24	13	1.5	89
Ann.	52	32	14.9	74

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Kozyrev, A. A., 1927, Kratki gidrogeologicheski ocherk Kazakhstana: Akad. Nauk SSSR. Osobyi Komitet po issledovaniyu Soiuznykh i avtonomnykh respublik, Materialy no. 4, p. 5-14.
- Usov, N. I., 1948, Pochvy Saratovskoi oblasti. Part 2: Zavolzh'e: Saratovskoe obl. izd-vo, 361 p.

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SITE 81

Union of Soviet Socialist Republics

Kazakh Soviet Socialist Republic

Saksaul'skiy

Location -- Lat 47°00'N.; long 60°45'E. Village is a station on the Transcaspian Railroad between Chelkar and Aral'sk in the northwestern part of the Kzyl-Orda oblast', 30 miles northwest of Aral'sk.

Geologic-Geographic Setting -- Saksaul'skiy is on the flat crust of the Tasaiansk anticline, a smooth upland area. The crest includes small areas of saline soils with salty effervescences on the surface. The immediate area is used for livestock grazing and the predominant cover is wormwood (*Artemesia* g.). The total plant population covers 60 to 70 percent of the surface. The area is very flat, maximum elevation is 800 ft 20 miles south of location, and desert conditions prevail. The elevation at the site is 298.65 ft above sea level and the slope is less than 1 percent.

Water Table -- Water table is more than 100 ft below the surface. The water table is generally deep except in slight local saline depressions where perched water table occurs following spring thaw. There is no surface water.

Soil Moisture and Permeability -- The upper 3 ft are predominantly dry and only occasionally wettened surficially from May to Oct.; frozen Oct. until Mar.; wet to moist Mar. through Apr. Snow cover generally 1 to 2 inches, rarely as much as 12 inches, but wind may leave the surface patchy and in some winters snow cover may be lacking. Soil permeability is moderately slow; in saline area, very slow below 1 to 2 ft.

Climate (based on station at Aral'sk) --

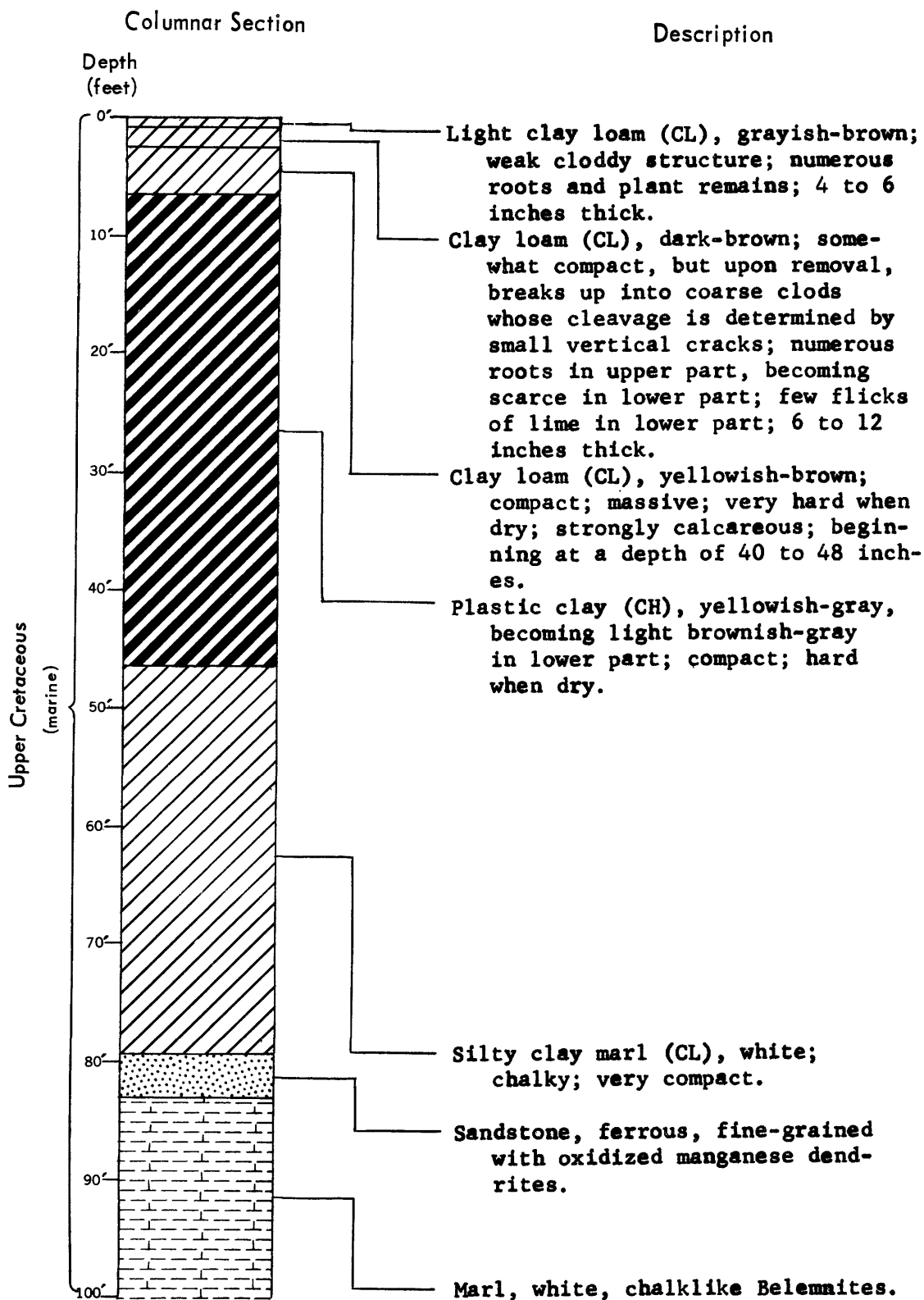
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)
Jan.	17	1	0.3	n.a.
Feb.	15	0	0.2	n.a.
Mar.	31	16	0.2	n.a.
Apr.	57	38	0.4	n.a.
May	74	52	0.4	n.a.
June	83	63	0.4	n.a.
July	92	70	0.3	n.a.
Aug.	87	65	0.2	n.a.
Sept.	73	54	0.2	n.a.
Oct.	56	37	0.7	n.a.
Nov.	33	18	0.4	n.a.
Dec.	22	6	0.3	n.a.
Ann.	53	35	4.0	n.a.

*Mean daily maximum, **mean daily minimum, ***mean daily, n.a. - data not available.

Principal Sources --

- Bikmykhametov, M. A., 1962, Pustynnyye pochvy severo-zapadnoy chasti kзыl-Ordinskiy Oblasti: Alma-Ata, Akad. Nauk Kazakhskoi SSR, Inst. pochvovedeniia Trudy, v. 13, p. 114-129.
- Yanshin, A. L., 1953, Geologiya severnogo Priaral'ia: Materialy k poznaniyu geologicheskogo stroeniia SSSR, new series, no. 15 (19), p. 168-169.

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SITE 82

Union of Soviet Socialist Republics

Turkmen Soviet Socialist Republic

Cheshme

Location -- Lat 38°41'N.; long 61°11'E. Site is in the village of Cheshme in the Kara-Kum Desert about 75 miles northwest of Merv (Mary).

Geologic-Geographic Setting -- The Kara-Kum Desert is a large sandy plain with numerous sandy hillocks and ridges. Shifting and stabilized dunes are common and range in height from 10 to 100 ft. The site is in an area where the desert merges with the alluvial fans and foothills of the Kopet Dag Mountains. Elevation at the site is 617 ft above sea level and the land slopes about 1 percent; hillocks and dunes in the area have a slope of about 15 percent.

Water Table -- Depth to ground water is 19 ft. The Murgab River flows from the mountain range along the U.S.S.R.-Afghanistan border north to the Mary Oasis; the oasis is formed by multiple branches of the Murgab and these branches gradually disappear into the sands of the Kara-Kum. One of these buried streams is the source of ground water at this location.

Soil Moisture and Permeability -- The soil is prevailingly moist due to irrigation and is rapidly permeable to depth of water table.

Climate (based on station at Chardzhou) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)
Jan.	45	28	0.5	n.a.
Feb.	49	30	0.6	n.a.
Mar.	54	36	1.2	n.a.
Apr.	74	51	0.7	n.a.
May	87	60	0.6	n.a.
June	92	66	0.1	n.a.
July	97	72	0.1	n.a.
Aug.	93	67	0.0	n.a.
Sept.	84	56	<0.05	n.a.
Oct.	71	43	0.2	n.a.
Nov.	53	29	0.2	n.a.
Dec.	45	26	0.3	n.a.
Ann.	70	47	4.5	n.a.

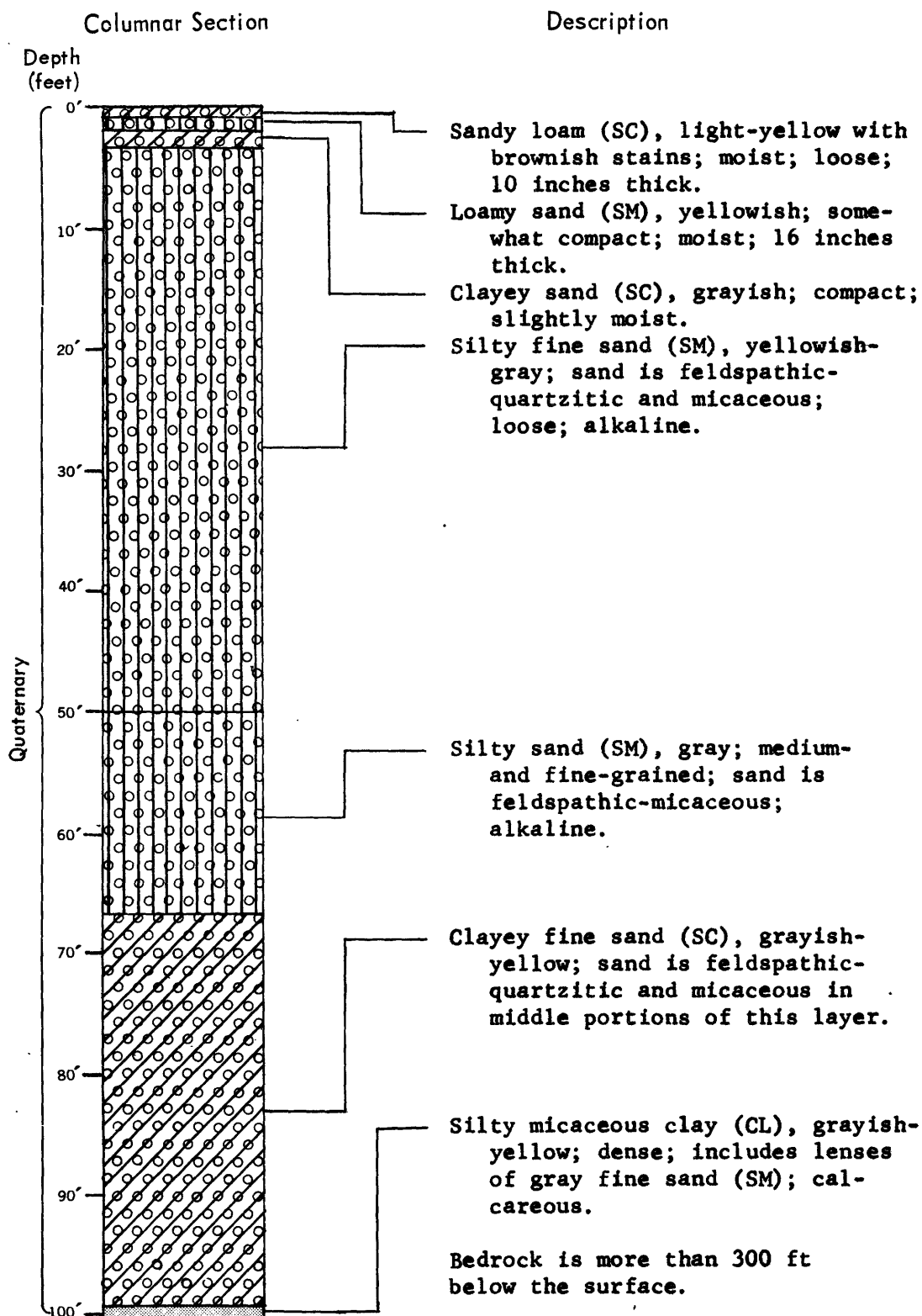
*Mean daily maximum, **mean daily minimum, ***mean monthly,
n.a. - data not available.

Principal Sources --

Ainemer, A. I., and others, 1963, Stratigraficheskoe raschlenenie i litologicheskaya Kharakteristika razreza strukturno-profil'noi skvazhiny, probuirennoi u kol. Cheshme (Nizmennye Karakumy): Russia, Vsesoiuznyi geologicheskii institut Trudy, new series, v. 109, p. 302-318.

Saparliev, R., 1962, [On the characterization of the soils of the Murgab District, Mary Oblast.]: Ashkabad, Akad. Nauk Turkmenskoi SSR Izvestiya. Seriya biologicheskaya no. 4, p. 53-61.

SITE 82



SITE 83

Union of Soviet Socialist Republics

Uzbek Soviet Socialist Republic

Tashkent

Location -- Lat 41°20'N.; long 69°18'E. Near the Akyi streetcar station in the north-central part of the city.

Geologic-Geographic Setting -- A large urban area on a fertile oasis at the foot of the Tien Shan Mountains about 250 miles north of the borders of Afghanistan and China. The oasis is drained by the Chirchik and Angren Rivers. The Chirchik River, flowing southwest on the southeast edge of the urban area, is silt laden and unnavigable. The city is built on unconsolidated alluvial sand and gravel underlain by clay. This area is an active seismic belt and during 1966 experienced more than 600 earthquakes of varying intensities; between April 26 and May 24, 1966, Tashkent experienced four major tremors, the most severe of which registered 6.3 on the Richter Scale. The old or native section in the northwest part of the city, where single-story buildings are constructed of adobe or mud brick, suffered the most damage; in newer parts of the city damage was less due to specially constructed multi-storied buildings. Elevations in the city range from 1,600 ft in the northeast to 1,400 ft in the southwest; elevation at the site is 1,419 ft. Slope is to the southwest locally at 1 percent or less; for 6 miles west and 20 miles east of the oasis the slope is 3 percent.

Water Table -- Depth to ground water is approximately 6 ft at the site; depths vary between 4.5 ft and 52 ft in this area.

Soil Moisture and Permeability -- Unless irrigated, which is probable, prevailing dry throughout year and only infrequently wet or moist due to rains. Soil is slowly permeable.

Climate (based on station at Tashkent) --

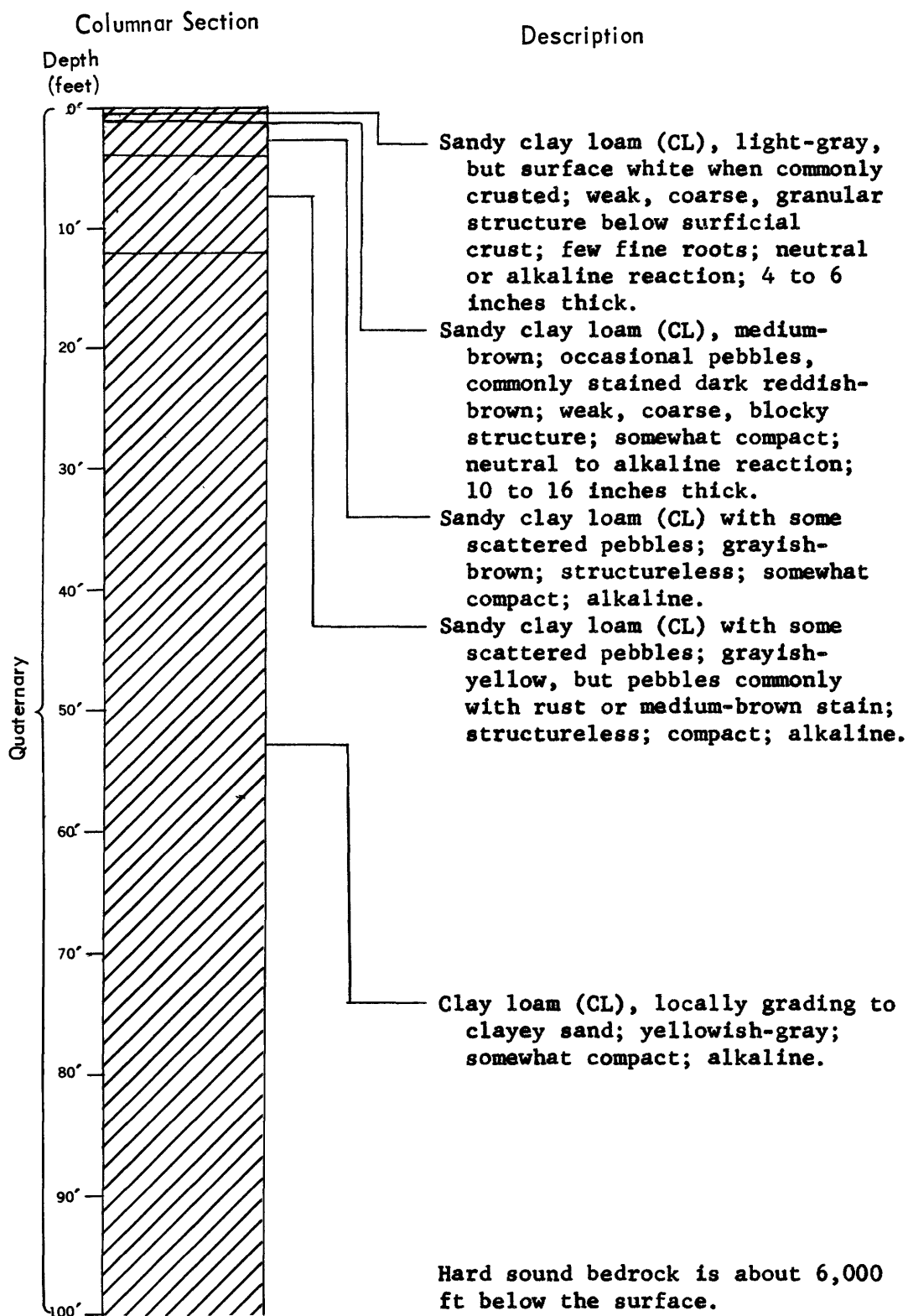
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)
Jan.	37	23	1.8	n.a.
Feb.	44	28	1.4	n.a.
Mar.	53	37	2.5	n.a.
Apr.	66	47	2.0	n.a.
May	78	56	1.1	n.a.
June	87	62	0.5	n.a.
July	92	65	0.1	n.a.
Aug.	89	61	0.1	n.a.
Sept.	81	52	0.2	n.a.
Oct.	66	42	1.0	n.a.
Nov.	53	35	1.3	n.a.
Dec.	45	28	1.7	n.a.
Ann.	66	45	13.7	n.a.

*Mean daily maximum, **mean daily minimum, ***mean monthly, n.a. - data not available.

Principal Sources --

- Korovin, Ye., 1934, Weeds of cotton fields in Middle Asia and their control: Lenin Acad. of Agricultural Sci., Inst. of Fertilizers and Agro-Soil Sci. of Middle Asia, Scientific Series no. 1, p. 130-139.
- Maulianov, G. A., and others, 1963, Podzemnye vody i fiziko-mekhanicheskie svoistva gornyykh porod Pritashkentskogo raiona: Akad. Nauk Uzbekskoi SSR, Inst. Gidrogeol. i Inzhenernoi Geol., 176 p.

SITE 83



SITE 84

Union of Soviet Socialist Republics

Kazakh Soviet Socialist Republic

Uzun-Agach

Location -- Lat 43°13'N.; long 76°20'E. Village 30 miles west of Alma-Ata.

Geologic-Geographic Setting -- Uzun-Agach is on an undulating plain more than 2,700 ft above sea level on the northern edge of the Tien-Shan Mountains that extend along the U.S.S.R.-China border. South of the site dissected foothills rise sharply to the jagged mountains. The plain is covered by thick alluvial outwash material, mostly sand and silty clay from the adjacent uplands. Earthquakes are common in this area. Elevation is 2,970 ft and the slope is less than 5 percent in the immediate vicinity of the site, but to the south, slopes are between 10 and 30 percent.

Water Table -- The depth to ground water is less than 50 ft. The water is fresh and in good supply. Small streams with swift courses are numerous in the area but disappear into the sands after a short distance; the village is located on such a stream.

Soil Moisture and Permeability -- Prevaillingly dry throughout the year unless irrigated; infrequently wet or moist to varied depths after rains; surface layer frozen from Nov. through Feb.; snow cover persists for a little more than 100 days and the snow depths range from 10 to 12 inches. Soil is slowly permeable to depth of at least 30 ft.

Climate (based on station at Alma-Ata) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)
Jan.	23	7	1.3	n.a.
Feb.	23	9	1.1	n.a.
Mar.	38	23	2.1	n.a.
Apr.	55	38	3.7	n.a.
May	68	50	3.5	n.a.
June	76	56	2.4	n.a.
July	81	60	1.4	n.a.
Aug.	80	57	1.2	n.a.
Sept.	71	48	1.1	n.a.
Oct.	55	34	1.9	n.a.
Nov.	40	23	1.8	n.a.
Dec.	30	15	1.2	n.a.
Ann.	53	35	22.7	n.a.

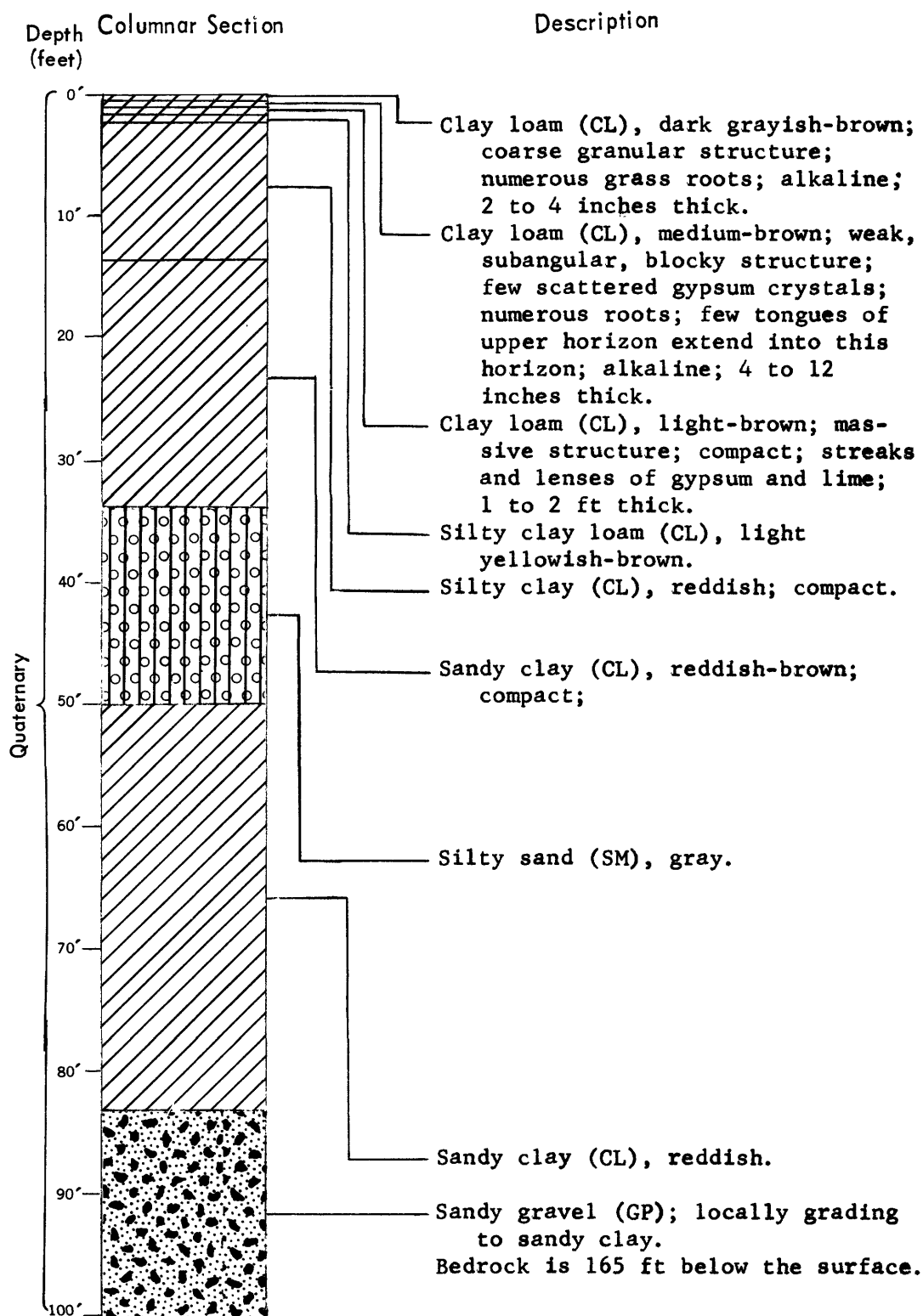
*Mean daily maximum, **mean daily minimum, ***mean monthly,
n.a. - data not available.

Principal Sources --

Kozyrev, A. A., 1927, *Kratkii gidrogeologicheskii ocherk Kazakhstana*: Akad. Nauk SSSR. Osobyi Komitet po issledovaniyu soiuznykh i avtonomnykh respublik, Materialy, no. 4, p. 143-148.
Shabad, Theodore, 1951, *Geography of the U.S.S.R.*: New York, 584 p.

Sokolov, S., and others, 1962, The soils of Alma-Ata Oblast', in the
Soils of Kazakh Republic: Alma-Ata, Kazakh Acad. of Sci., Soil
Inst., no. 4.

SITE 84



SITE 85

Union of Soviet Socialist Republics

Kazakh Soviet Socialist Republic

Ust'-Kamengorsk

Location -- Lat 49°58'N.; long 82°35'E. Site is on the right (east) bank of Irtysh River at Ust'-Kamengorsk.

Geologic-Geographic Setting -- Ust'-Kamengorsk, located in the southeasternmost part of the West Siberian Plain in the foothills of the Altai Mountains, is built on the 3d of 6 terraces cut by the Irtysh River at the mouth of the Ul'ba River. The city has a zinc-smelting plant as well as tanning and vegetable oil industries; 10 miles south there is a hydroelectric station on the Irtysh River. The elevation at the site is 940 ft above sea level and the slope is between 1 and 3 percent in the vicinity of the site; in the more mountainous areas to the northeast and southeast the slope is about 25 to 35 percent.

Water Table -- The depth to ground water is between 20 and 50 ft. The supply is moderately plentiful and the depth varies a great deal from place to place and seasonally.

Soil Moisture and Permeability -- Prevailingly dry throughout the year; infrequently wet or moist to various depths following rains. Permeability is rapid to a depth of 30 ft.

Climate (based on station at Semipalatinsk) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				6 a.m.	12 m.
Jan.	8	-7	0.7	79	74
Feb.	11	-5	0.5	82	72
Mar.	21	4	0.6	84	71
Apr.	45	26	0.6	79	52
May	68	45	1.0	66	38
June	77	54	1.4	68	42
July	81	57	1.4	70	41
Aug.	77	54	1.0	74	42
Sept.	66	44	0.8	79	40
Oct.	46	30	1.0	82	53
Nov.	25	10	1.1	84	69
Dec.	15	3	0.8	83	77
Ann.	45	26	10.9	78	56

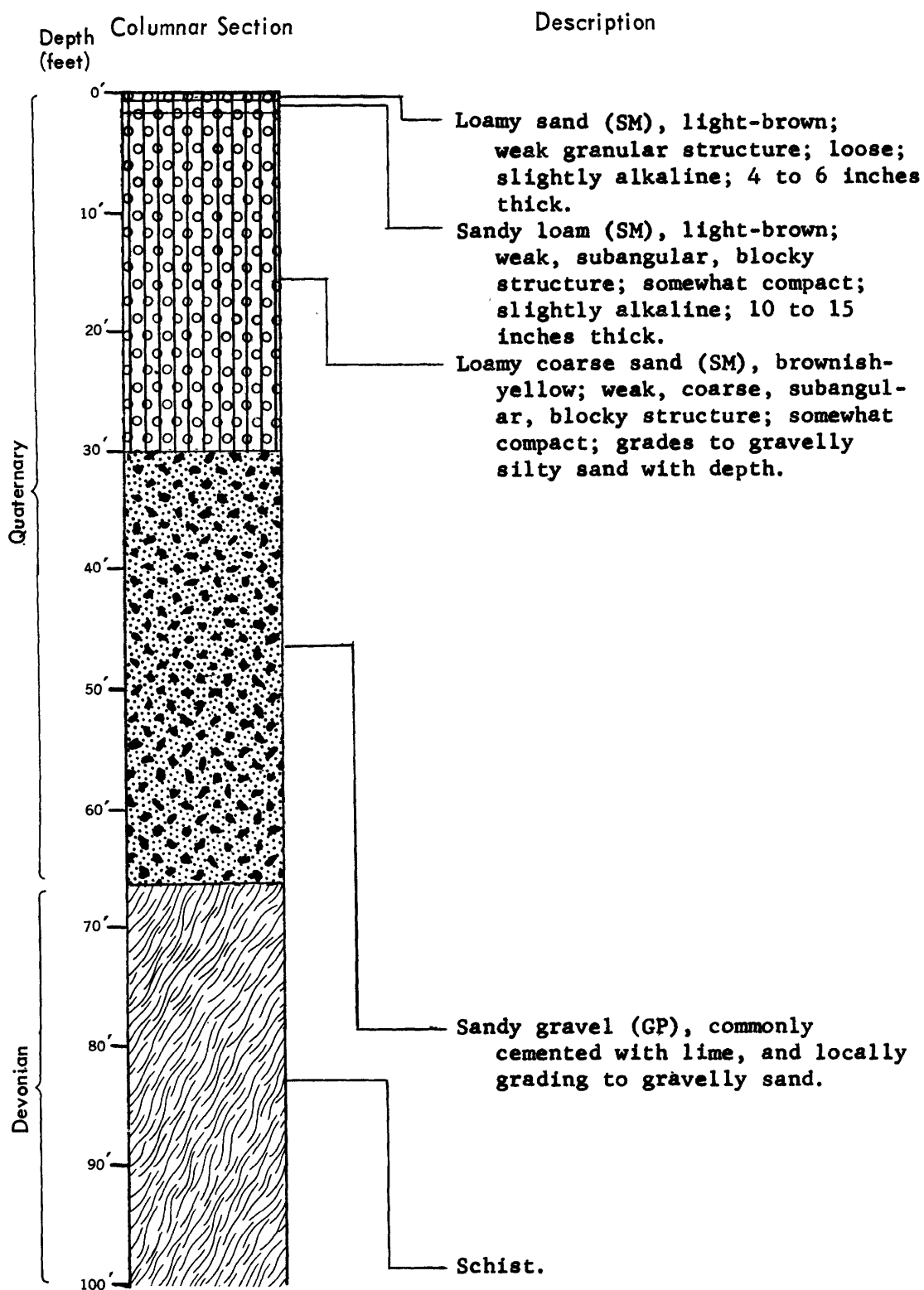
*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

Chumakov, I. S., 1963, Verkhnepliotzenovye (Eopleistotsenovye) otlozheniia Rudnogo Altaia: Akad. Nauk SSSR. Komissia po izucheniiu chetvertichnogo perioda Trudy, v. 22, p. 100-127.

- Nikituik, L. A., 1961, Istoriiia formirovaniia doliny Irtysha na styke Altaia i Zapadno-Sibirskoi Nizmennoiti: Vsesoiuznoe soveshchanie po izucheniiu chetvertichnogo perioda, Moscow, 1957, Materialy v. 3, p. 100-109.
- Sokolov, A. A., 1960, General natural and soil conditions of agricultural production of the oblasts of Kazakhstan: Alma-Ata, Akad. Nauk Kazakhskoi SSR, Inst. pochvovedeniia Trudy, v. 10, p. 49-72.

SITE 85



SITE 86

Union of Soviet Socialist Republics

Russian Soviet Federated Socialist Republic

Novosibirsk

Location -- Lat 55°02'N.; long 82°55'E. The site is immediately below the dam at the Novosibirsk Hydroelectric Power Station, 10 miles south of the city on the west bank of the Ob' River at the village of Chemskiy.

Geologic-Geographic Setting -- Novosibirsk oblast' is at the southeastern extremity of the West Siberian Plain and adjacent to the foothills of the Salairskiy Kryazh (mountains) north, south, and east of the city. The northward-flowing Ob' River separates the city into two sections, Novosibirsk proper on the right bank and the suburbs on the left bank. The right is a bluff 275 ft high that is backed by gently rolling terrain with a maximum elevation of about 600 ft in the northeastern outskirts of the city. The left bank is a flat former flood plain of the Ob' River and numerous swamps are found here near the city. The flood plain was formerly covered with thickets between channels, but with the installation of the dam the vegetation has probably encroached on abandoned channels. The majority of the streets in the urban area of Novosibirsk are wide and asphalt surfaced, but most other important streets are cobblestone. Elevation is about 200 ft above sea level and slopes are less than 1 percent at the site, but on the higher right bank, the slopes are 10 percent.

Water Table -- The water table is within 6 ft of the surface, but is determined largely by the water level at the dam; on the right bank the depth to water table is greater.

Soil Moisture and Permeability -- The upper 3 to 4 ft is predominantly dry during Apr.-Oct., periodically moist or wet for only a few days per month; remainder of the year soil generally frozen in upper 3 to 4 ft, to maximum 6 ft; below the frost depth, moisture conditions vary, depending on stream level at the dam. The soil permeability is excessively rapid in sands and gravels in upper 35 ft; in sandy clay below, permeability is moderately slow except in sandy seams.

Climate (based on stations at Novosibirsk and Barnaul) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	3	-7	0.9	80
Feb.	12	-3	0.6	80
Mar.	20	1	0.7	82
Apr.	38	22	0.8	84
May	59	38	1.5	77
June	73	50	2.7	78
July	76	56	3.5	85
Aug.	69	50	2.7	89
Sept.	59	40	2.0	86
Oct.	45	30	1.3	84
Nov.	21	11	1.7	80
Dec.	8	-4	1.1	79
Ann.	40	24	19.5	82

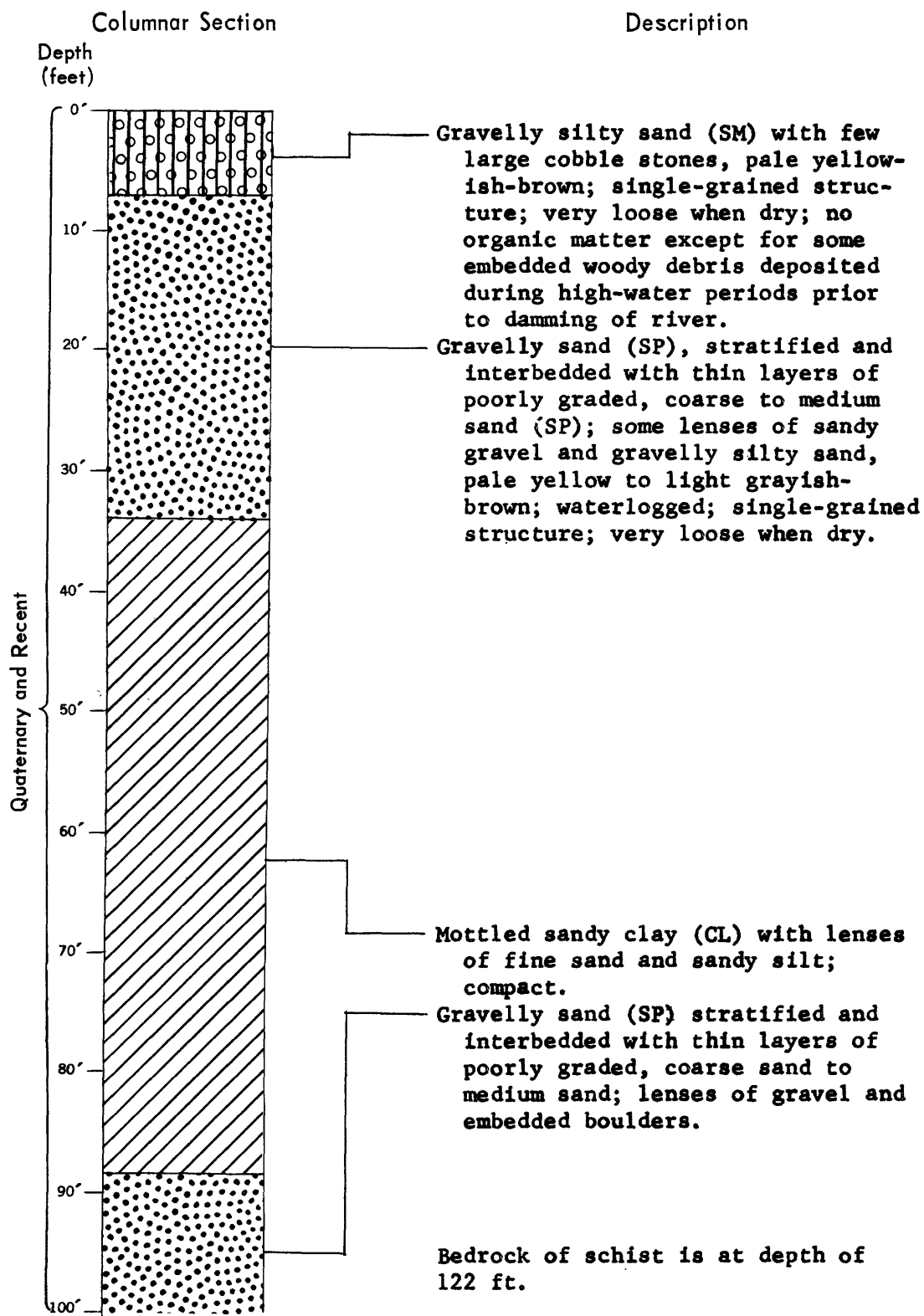
*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Beirom, S. G., and Nevecheria, I. K., 1961, Ispolzovaniye podzemnykh vod beregovoi zony vodokhranilitsa Novosibirskoi GES: Akad. Nauk SSSR, Sibirskoe otd., Transportno-energeticheskii Inst. Trudy, no. 13, p. 169-175.

Shadrina, Z. F., 1951, The soils of Novosibirsk oblast': Admin. of Agricultural Propaganda of the All-Union Agricultural Soc. of the Novosibirsk Dept., 42 p.

SITE 86



SITE 87

Union of Soviet Socialist Republics

Russian Soviet Federated Socialist Republic

Dzhalinda

Location -- Lat 53°29'N.; long 123°54'E.; at the hydroelectric generating station 5 miles west of Dzhalinda on the Amur River.

Geologic-Geographic Setting -- The lowland area along the Amur River is characterized by level to gently rolling marshy terrain interrupted by a few hills. In the vicinity of the site, this lowland rises in a series of steps north and northeast from the river until it becomes part of the foothills of the Stanovoy Range. The site is located on the main terrace cut by the river. The elevation is 378.4 ft above sea level and the slope is 25 percent in the immediate vicinity of the river and its terraces; the overall slope of the area, however, is only about 10 percent.

Water Table -- The depth to ground water is 10 ft.

Soil Moisture and Permeability -- Prevailingly moist and sometimes wet or dry, Apr. through Oct.; frozen Nov. through Mar. Soil permeability is rapid in upper 1 ft, then slow to depth of 33 ft.

Climate (based on station at Skovorodino) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				2 a.m.	2 p.m.
Jan.	-5	-32	0.2	80	68
Feb.	-7	-27	0.2	80	56
Mar.	22	-12	0.1	81	49
Apr.	42	17	0.5	80	44
May	59	32	1.3	80	39
June	72	44	3.2	91	53
July	79	52	3.4	93	55
Aug.	72	48	3.7	95	63
Sept.	59	34	2.0	87	52
Oct.	41	14	0.5	86	44
Nov.	14	-12	0.4	84	62
Dec.	-5	-28	0.2	80	70
Ann.	38	11	15.7	85	74

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

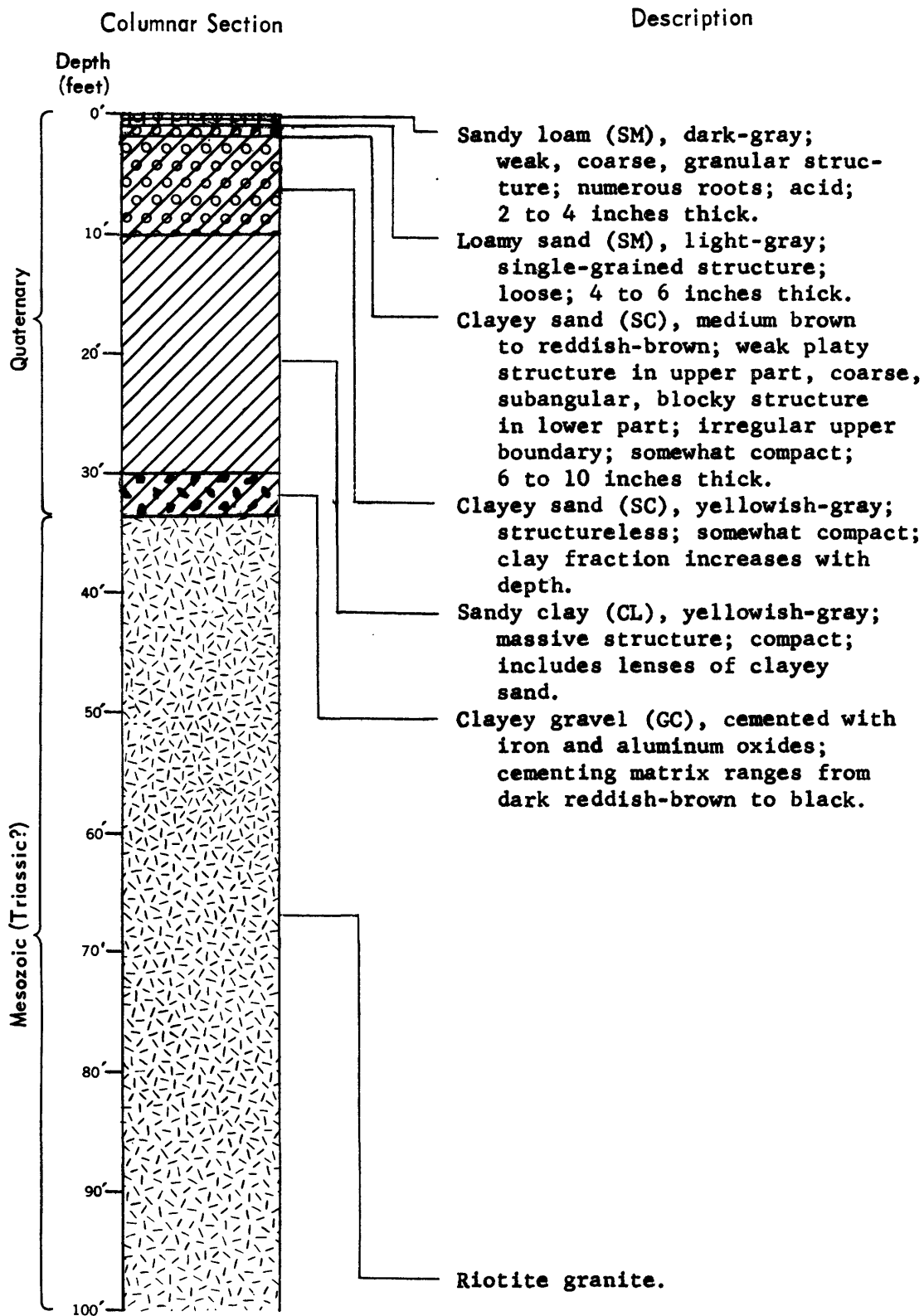
Principal Sources --

Kovda, B. A., Liverovski, Yu. A., and Sun Da-Chen, 1957, An outline of the soils of the near-Amur Region: Akad. Nauk SSSR. Izvestiya Seriya biologicheskaya, no. 1, p. 91-107.

Ohki, Kenichi, comp., 1960, Geologic map of Dzhalinda: Tokyo Geog. Soc., Compilation Comm. Geol. and Mineral Resources Far East, 1:250,000.

- Sergeev, E. M., ed., 1962, Voprosy geologicheskogo stroeniia i inzhenergo-geologicheskoi kharakteristiki doliny verkhnego Amura: Izd-vo Moskovskogo Univ., 171 p.
- Zimouets, B. A., 1965, Characteristics of the accumulation and redistribution of iron in the forest soils of the Amur region: Soviet Soil Sci., no. 5, p. 482-489.

SITE 87



SITE 88

Asia

Turkey

Istanbul

Location -- Lat 41°05'N.; long 28°55'E. In the compound of the Mental Hospital of Bakurkoy in the western part of Istanbul.

Geologic-Geographic Setting -- This part of Istanbul consists of low hills separated by alluvial-floored valleys that drain southward, an area of about 200 sq km lying between the Golden Horn on the east and Lake Kucukcekmece on the west. The site well is in one of the valleys and was drilled through uncemented alluvial clay, sand, and silt to a depth of 193 ft. Bedrock of the region consists of intensely folded and faulted Devonian graywacke and slates overlain unconformably by thick massive Eocene limestone and sandstone that generally dip gently 4° to 15°S or are gently folded. The city is built of stone, concrete, brick, and wood with some wide, generally winding, paved streets and many narrow streets and alleys. Vegetation consists of grass, shrubs, and many shade trees in parks and along the streets. Areas around the city are mainly pasture but with considerable areas planted to wheat.

Water Table -- Probably only 6 to 12 ft below the surface in this low area.

Soil Moisture and Permeability -- The upper 3 to 4 ft of the soil is generally moist from Nov. to early Mar.; it is predominantly dry from Mar. through Oct. Soil permeability has an overall rating of moderately slow.

Climate (based on station at Goztepe) --

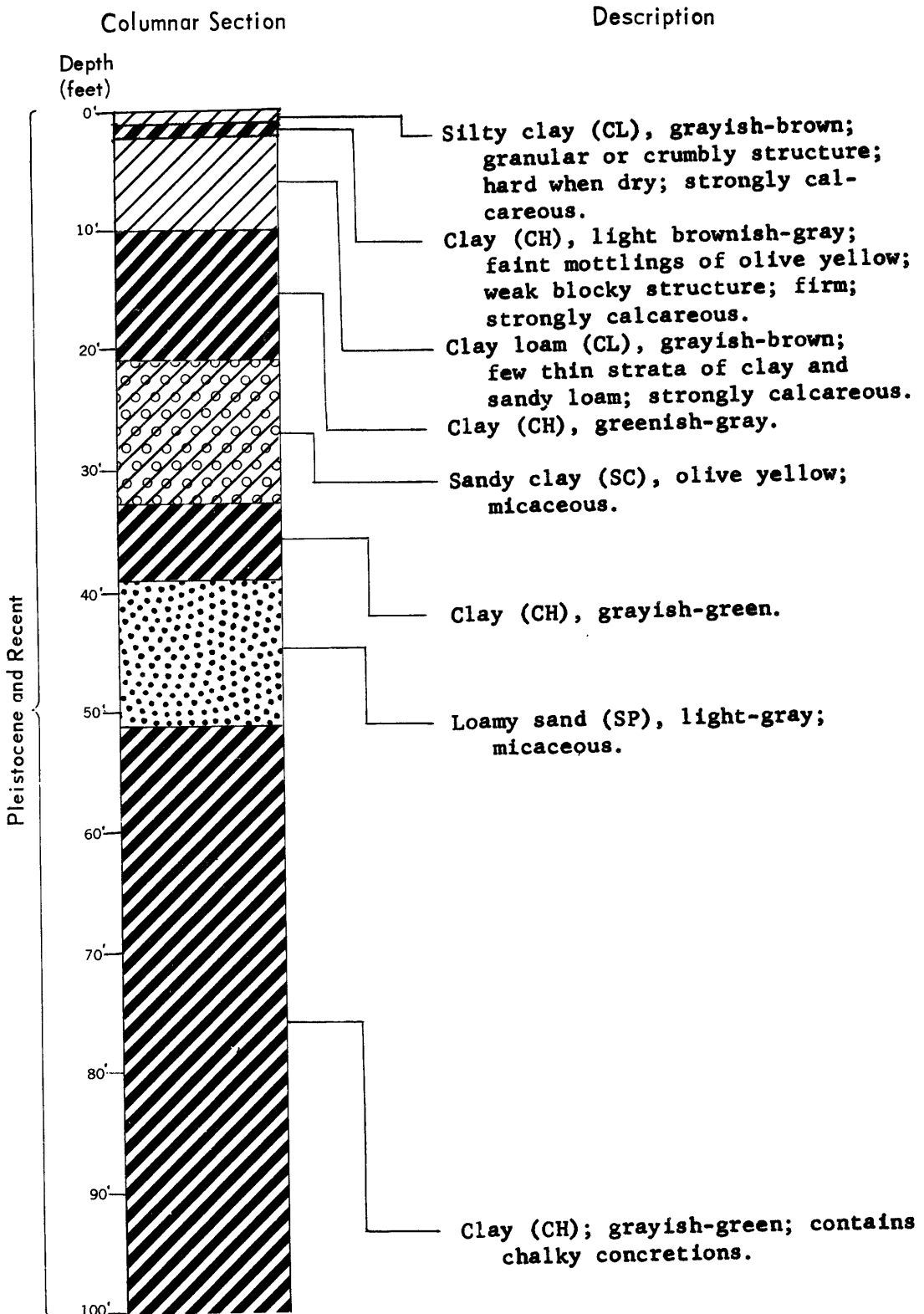
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+
Jan.	46	36	3.1	79
Feb.	47	36	3.1	78
Mar.	52	38	2.1	74
Apr.	62	48	1.5	72
May	71	53	1.2	73
June	79	60	1.1	69
July	83	64	1.1	69
Aug.	84	65	0.7	69
Sept.	77	60	2.1	73
Oct.	69	54	2.8	77
Nov.	60	47	3.1	79
Dec.	52	41	3.7	80
Ann.	65	50	25.6	75

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

- Oakes, H., 1957, The soils of Turkey: Ankara, Turkey, Min. of Agriculture, Soil Conserv. and Farm Irrigation Div. Pub., no. 1.
- Sayar, Cazibe, 1960, Istanbul' un batısındaki arazide yeraltı suları ve arteziyen imkânları: İstanbul Teknik Üniversitesi, Hydrojeoloji enstitüsü Yayınları sayı 6, p. 1-4.

SITE 88



SITE 89

Asia

Turkey

Izmir

Location -- Lat 38°26'N.; long 27°09'E., at Cigli Air Base about 6 miles northwest of Izmir (Smyrna) near the head of the Gulf of Smyrna on the Aegean Sea. The well is Architect Engineer Consultants, Inc. no. TW-11 located at Gunerli, a small village about 1 1/2 miles north of the base.

Geologic-Geographic Setting -- The air base is near the southeast edge of the low, almost level Menenam Plain, which is the lower valley and delta of the Gediz River. The plain is about 100 sq miles in area with a gentle slope (a few feet per mile) southward. The delta is bordered on the south and west by Izmir Harbor and to the north and east, about 4 to 6 miles away, by mountains of basalt, andesite, and limestone that rise as much as 3,620 ft above sea level. The deltaic sediments are hundreds of feet thick and consist mainly of well-bedded unconsolidated alluvium: micaceous sand, silt, clay, and gravel. At one time the river flowed through the area of the air base, but in 1885 it was diverted into a new channel by dikes built north and west of the base. The plain is criss-crossed by irrigation canals and the area is intensely cultivated to grain, tobacco, dates, and vegetables. Areas that are not farmed are used for grazing. Vegetation consists of crops, grasses, and shrubs with scattered trees along the canals, roads and in small groves, and orchards. The area is periodically subjected to strong earthquakes; Izmir was badly damaged in 1928 and 1939.

Water Table -- The water is shallow, probably 5 ft or less below the surface particularly in the wet season.

Soil Moisture and Permeability -- The upper 3 or 4 ft of soil is predominantly moist and periodically wet from Oct. through Mar.; dry remainder of year; moisture conditions are highly variable during the irrigation season. Soil permeability is moderately slow in most of upper 4 or 5 ft, but is moderately rapid in loamy and sandy layers.

Climate (based on station at Izmir) --

	<u>Temp.</u> <u>(°F)*</u>	<u>Temp.</u> <u>(°F)**</u>	<u>Precip.</u> <u>(in.)***</u>	<u>Rel. Humidity</u> <u>(%)+</u>
Jan.	54	41	5.5	72
Feb.	55	40	4.2	70
Mar.	61	43	2.9	65
Apr.	70	49	1.8	63
May	79	57	1.3	61
June	87	63	0.3	53
July	92	69	0.1	49
Aug.	91	69	0.1	51
Sept.	84	63	0.8	57
Oct.	76	56	2.3	65
Nov.	66	50	3.3	71
Dec.	57	44	5.5	73
Ann.	72	54	28.3	63

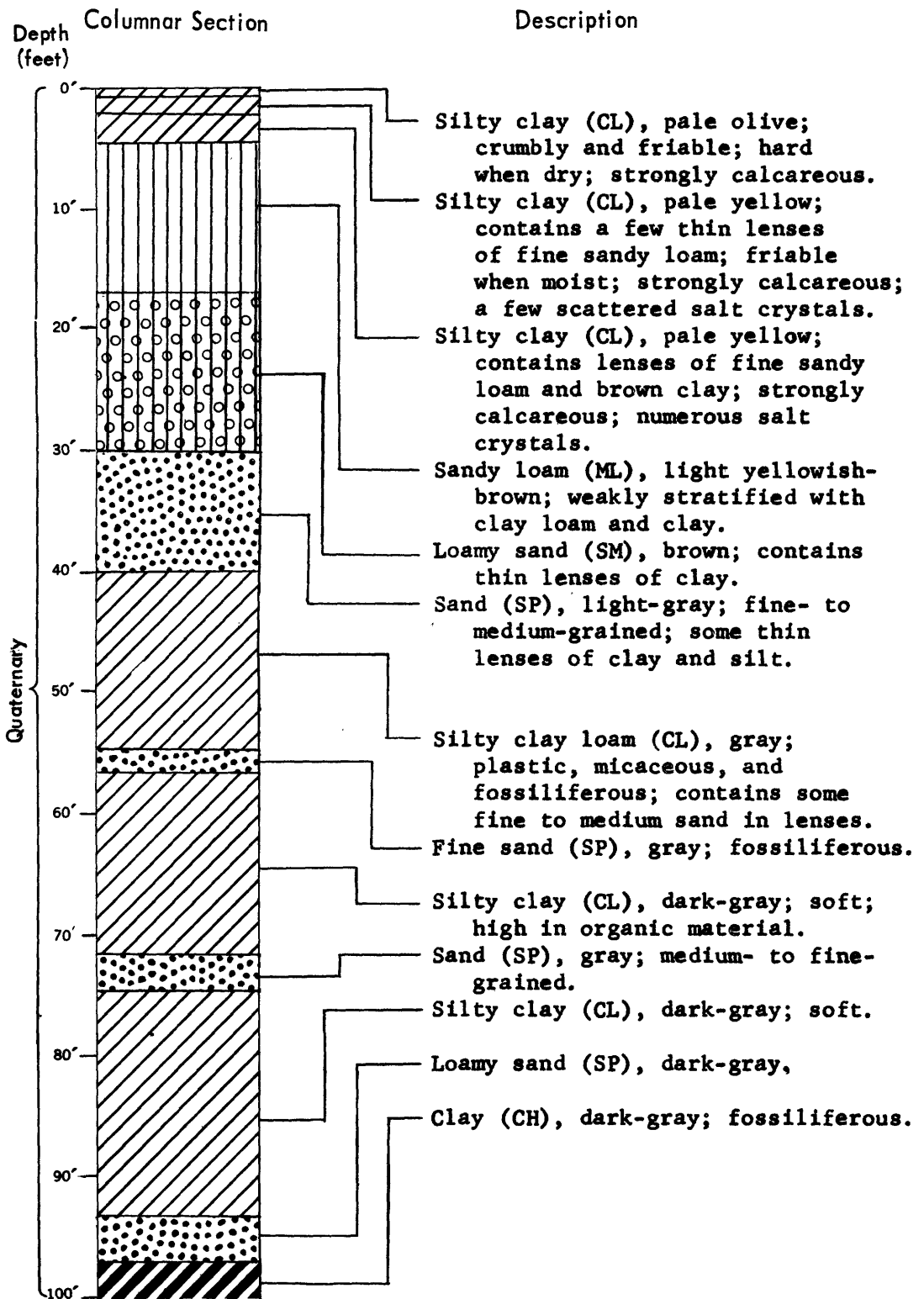
*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Architect Engineer Consultants, Inc., Report on geophysical investigations of underground water sources, Cigli Air Base area: Architect Engineer Consultants, Inc. for U.S. Army Corps of Eng., Mediterranean Div., Livorno, Italy.

Oakes, H., 1957, The soils of Turkey: Ankara, Turkey, Min. of Agriculture, Soil Conserv. and Farm Irrigation Div. Pub. no. 1.

SITE 89



SITE 90

Asia

Iraq

Baghdad

Location -- Lat 33°20'N.; long 44°25'E. In a date orchard behind the new palace in Baghdad.

Geologic-Geographic Setting -- A densely populated urban-industrial river port and the capital city of Iraq. The city is congested with many closely spaced buildings along narrow winding streets. It is situated on the low-lying level banks of the meandering Tigris River in about the center of the Tigris-Euphrates alluvial plain. The city is protected by levees, but the east bank is still subject to inundation during high water stages, which generally occur during Nov. through May. In the surrounding area there is sparse desert vegetation, except in irrigated places where there are lush farms, or orchards which generally have an undergrowth of legumes or vegetables. Silty irrigation sediment mantles most of the ground, overlying fairly young alluvial sediments that are as much as 1,000 ft thick. At the site, the upper soils are formed on a former river levee and are well drained, limy, and nonsaline. Topographically the site is a few feet higher than surrounding area. Slopes are less than 3 percent over a very wide area. Elevation is about 110 ft above sea level.

Water Table -- Water table is 11 1/2 ft below the surface and fluctuates with the water level in the Tigris River. The water is generally non-saline.

Soil Moisture and Permeability -- Soils generally moist throughout year, but highly varied and dependent upon irrigation practices. Soils would be dry if not irrigated. Soil permeability is moderately rapid.

Climate (based on station at Baghdad) --

	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				9 a.m.	3 p.m.
Jan.	59	38	1.0	79	51
Feb.	65	43	1.0	70	42
Mar.	73	49	1.1	60	36
Apr.	83	58	0.4	43	34
May	94	68	0.1	34	19
June	104	76	<0.05	25	13
July	109	80	<0.05	26	12
Aug.	110	79	<0.05	27	13
Sept.	103	72	<0.05	30	15
Oct.	92	63	0.1	38	22
Nov.	75	51	0.8	59	39
Dec.	63	45	1.0	78	52
Ann.	86	60	5.5	47	29

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Buringh, P., 1960, Soils and soil conditions in Iraq: Baghdad, Iraq,
Ministry of Agriculture, Directorate General of Agricultural
Research and Projects, 322 p.

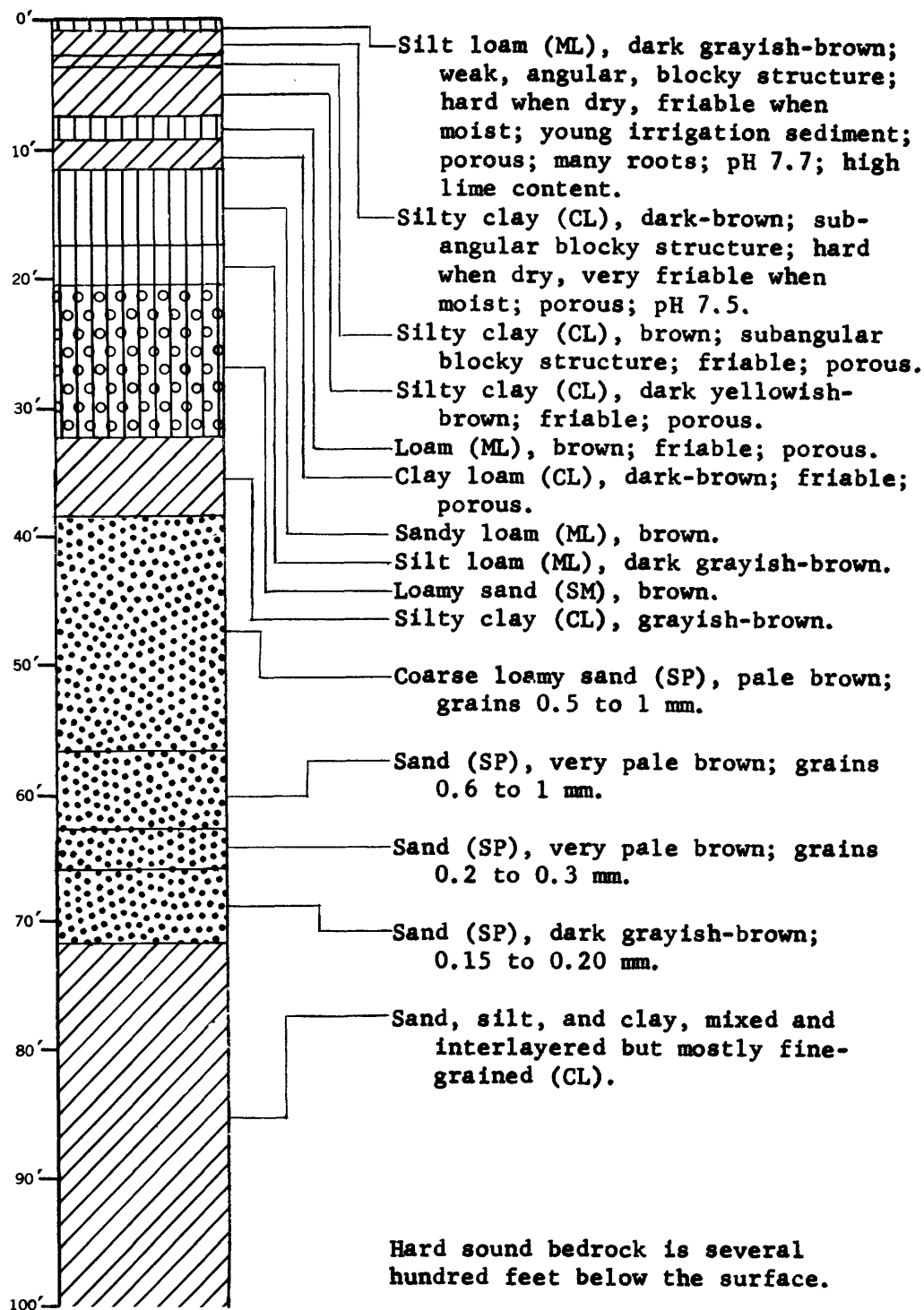
SITE 90

Columnar Section

Description

Depth
(feet)

Quaternary



SITE 91

Asia

Iran

Varamin

Location -- Lat 35°20'N.; long 51°39'E.; about 2 kilometers northwest of Varamin along or near the road to Teheran.

Geologic-Geographic Setting -- The site is in the Varamin plain at an elevation of about 3,075 ft, at the northwestern edge of the arid interior basin of Iran, and near the southern foothills of the Elburz Mountains. The desert plain is composed of deep alluvium at least a few hundred feet deep, and with scattered bedrock hills. The plain is a large, fertile, irrigated agricultural area watered by free-flow channels fed by the Jaj Rud and Rudkhaneh-ye (streams) flowing from the Elburz Mountains. There is considerable production of cereal; the main crops are wheat and barley. There is also some clover and much bare fallow ground. The population is dense and continuous from Teheran to the vicinity of the site. The villages are small, most of the dwellings, constructed in row-house style, are made of adobe. Roads in the villages are usually narrow.

Water Table -- About 55 ft from the surface and there probably is a lowering of the level during the hot dry summer months.

Soil Moisture and Permeability -- Moisture highly varied from field to field due to irrigation; it also depends upon the crops grown and the rotation of crops and fields. In general, the unirrigated soil is continuously dry except for short periods during Dec. through Mar. or Apr.; then about the upper foot is moist after occasional rains. Soil permeability is moderate, except in the silty clay and clay layers where it is moderately slow.

Climate (based on station in Teheran, about 40 kilometer to the northwest) --

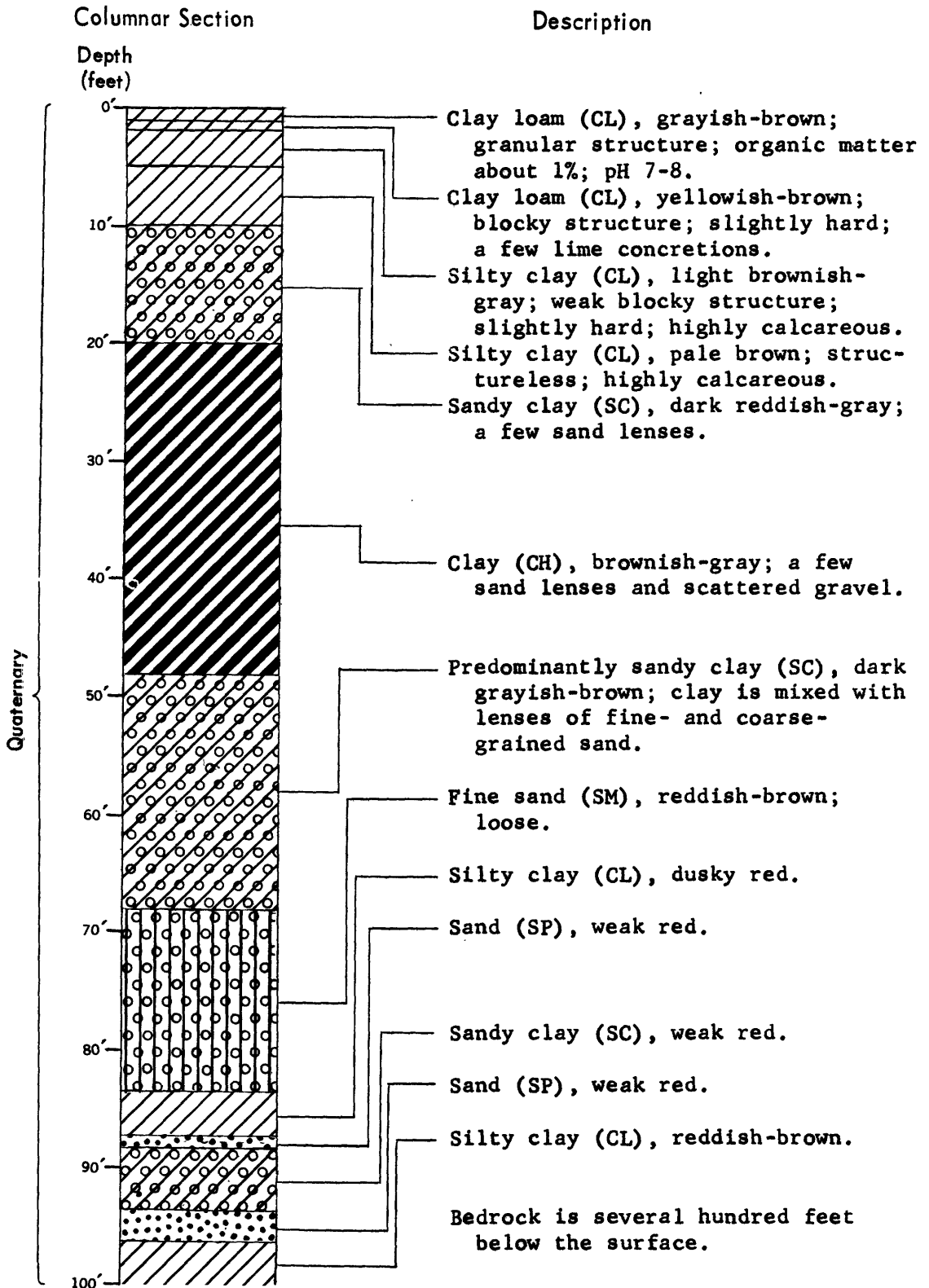
	<u>Temp.</u> <u>(°F)*</u>	<u>Temp.</u> <u>(°F)**</u>	<u>Precip.</u> <u>(in.)***</u>	<u>Rel. Humidity</u> <u>(%)+</u>	
				<u>3 a.m.</u>	<u>3 p.m.</u>
Jan.	45	27	1.8	78	55
Feb.	50	32	1.5	71	46
Mar.	59	39	1.8	62	37
Apr.	71	49	1.4	56	30
May	82	58	0.5	49	26
June	93	66	0.1	35	17
July	99	72	0.1	35	22
Aug.	97	71	0.1	33	20
Sept.	90	64	0.1	34	20
Oct.	76	53	0.3	39	24
Nov.	63	43	0.8	59	41
Dec.	51	33	1.2	72	54
Ann.	73	51	9.7	52	33

*Mean daily maximum, **mean daily minimum, ***mean monthly,
+mean daily.

Principal Sources --

Dewan, M. L., and Famouri, J., 1964, The soils of Iran: Rome, Food and Agriculture Organization of the United Nations.

SITE 91



SITE 92

Asia

Iran

Teheran

Location -- Lat 35°40'N.; long 51°10'E., at the Teheran depot site, 7 1/2 miles west of the city.

Geologic-Geographic Setting -- Located on a great alluvial desert plain that slopes southward at about 180 ft per mile. The alluvium is about 2,000 ft thick and consists of lenticular beds of poorly sorted and stratified sand, gravel, silt, and clay; these sediments are semiconsolidated. The city is about 3,750 ft above sea level. Steep barren desert mountains rise several thousand feet higher than the plain about 10 miles to the north. The regional bedrock is hard volcanic rock. The city is built of brick, concrete, stone, stucco, wood, and especially adobe houses. The main streets are 4-lanes wide and surfaced with asphalt, stone, or gravel. The northern part of the city has wide paved streets, many large residential lots, often walled; whereas the southeast part is congested, with narrow streets and flimsy buildings. A relatively large park is near the center of the city. Surrounding Teheran are nearly level open desert areas with many irrigated fields of melon, vegetables, wheat, sugarbeets, and cotton.

Water Table -- The static water level reported in the well was 155 ft, the water rising from an aquifer at 340 to 600 ft below the surface.

Soil Moisture and Permeability -- The soil is permanently dry except the surface 1 or 2 ft which is occasionally moist during Dec. to Apr. Soil permeability is moderately rapid, except in the heavy clay loam where it is moderate.

Climate (based on station at Teheran) --

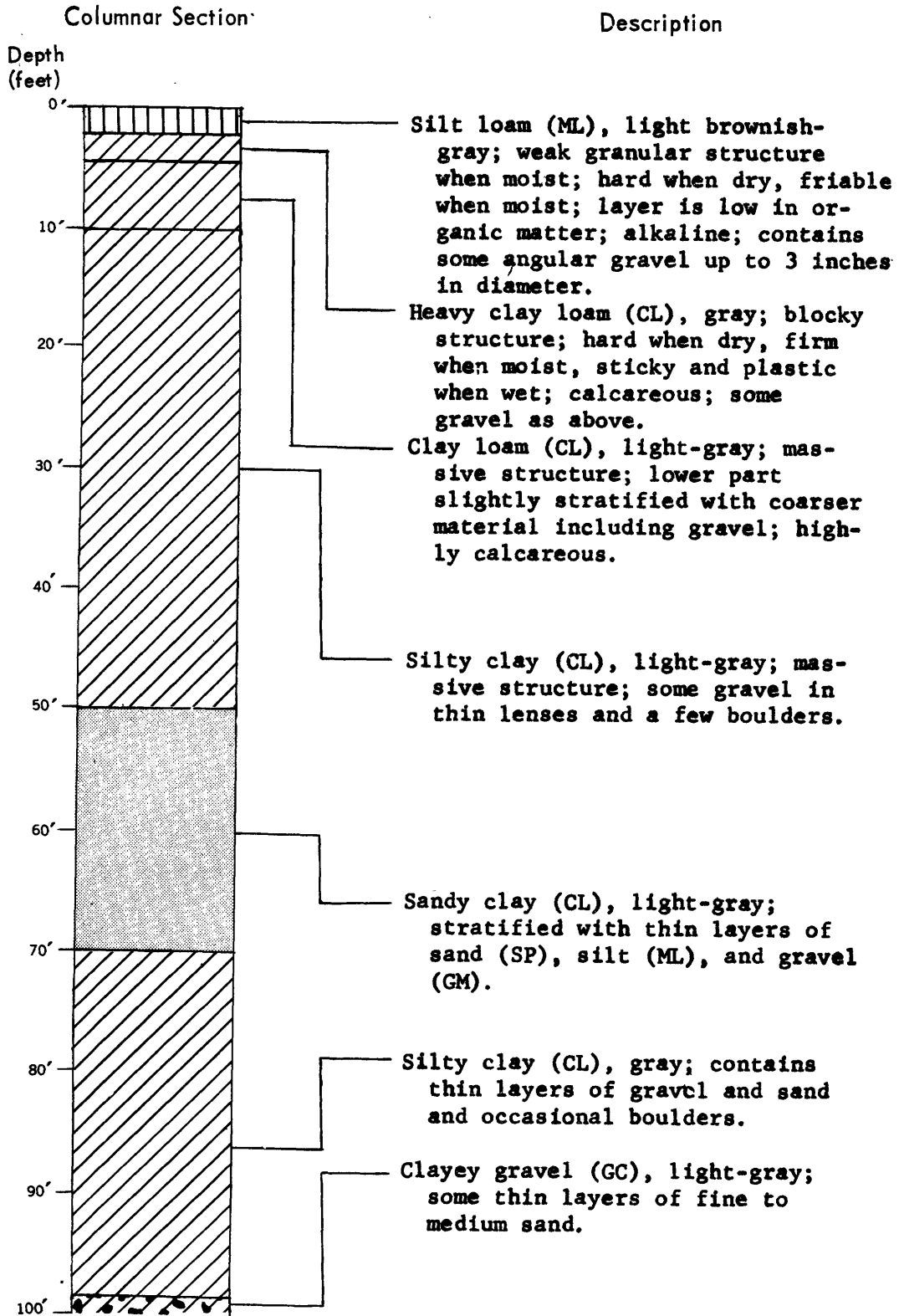
	Temp. (°F)*	Temp. (°F)**	Precip. (in.)***	Rel. Humidity (%)+	
				3 a.m.	3 p.m.
Jan.	45	27	1.8	78	55
Feb.	50	32	1.5	71	46
Mar.	59	39	1.8	62	37
Apr.	71	49	1.4	56	30
May	82	58	0.5	49	26
June	93	66	0.1	35	17
July	99	72	0.1	35	22
Aug.	97	71	0.1	33	20
Sept.	90	64	0.1	34	20
Oct.	76	53	0.3	39	24
Nov.	63	43	0.8	59	41
Dec.	51	33	1.2	72	54
Ann.	73	51	9.7	52	33

*Mean daily maximum, **mean daily minimum, ***mean monthly, +mean daily.

Principal Sources --

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