U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Prepared in cooperation with the
STATE OF CONNECTICUT
DEPARTMENT OF ENVIRONMENTAL PROTECTION
GEOLOGICAL AND NATURAL HISTORY SURVEY

GEOLOGIC MAP OF CONNECTICUT
SURFICIAL MATERIALS
(SHEET 1 OF 2)

DISCUSSION OF SURFICIAL MATERIALS

The unconsolidated deposits overlying bedrock in Connecticut range from a few feet to several hundred feet in thickness. These earth materials significantly affect human development of the land. Most of the unconsolidated materials are deposits of continental glaciers that covered all of New England at least twice during the Pleistocene ice age. These glacial deposits are divided into two broad categories, glacial till and glacial stratified deposits. Till, the most widespread glacial deposit, was laid down directly by glacier ice and is characterized by a nonsorted matrix of sand, silt, and clay with variable amounts of stones and large boulders. Glacial meltwater deposits are concentrated in both small and large valleys and were laid down by glacial meltwater in streams and lakes in front of the retreating ice margin during deglaciation. These deposits are characterized by layers of well-sorted to poorly sorted gravel, sand, silt, and clay. Postglacial sediments, primarily floodplain alluvium and swamp deposits, make up a lesser proportion of the unconsolidated materials of Connecticut. Alluvium is largely reworked from glacial materials and has similar physical characteristics.

The distribution of surficial (unconsolidated) materials that lie between the land surface (below the pedogenic soil) and the bedrock surface is shown on this map to the extent that it is known or can be inferred. The cross sections (figs. 1 and 2) and the block diagram (fig. 3) illustrate the characteristic vertical distribution of glacial till, glacial meltwater deposits, and postglacial deposits encountered in Connecticut. The areal distribution of till and stratified deposits is related to the physiographic regions of the State: the eastern and western highlands and the central lowland (fig. 4.) Cross section ***A–A′*** (fig. 1) transects the central lowland and extends into the bordering eastern and western highlands. In highland areas, till is the major unconsolidated material, present as a discontinuous mantle of variable thickness over the bedrock surface. Till is thickest in drumlins and on the northwest slopes of hills (shaded till areas on map). Glacial meltwater deposits that average 10–40 feet in thickness overlie the till in small upland valleys and commonly in north-sloping pockets between bedrock hills. In the central lowland, especially in the north half, glacial stratified deposits are the predominant surficial materials. These deposits generally overlie till; however, well logs indicate that in some places till is not present and the stratified deposits lie directly on bedrock. The extensive stratified deposits of the central lowland average 50–100 feet in thickness, and in the northern part they almost completely mask the till-draped bedrock surface. Postglacial materials locally overlie the glacial deposits throughout the State. Alluvium occurs on the floodplains of most streams and rivers. Swamp deposits occur in poorly drained areas. Talus occurs along the bases of steep bedrock cliffs, principally along the traprock ridges within the central lowland. Salt-marsh and estuarine deposits occur mainly along the tidal portions of streams and rivers entering Long Island Sound. Beach deposits occur along the shoreline of Long Island Sound.

This map is a companion to the Quaternary Geologic Map of Connecticut (Stone and Schafer, unpublished data). Till and postglacial deposits are shown similarly on both maps. Glacial stratified deposits are particularly emphasized on both maps. These sediments are the major ground-water aquifers in the State and are also the major sources of construction aggregate. On the Quaternary Geologic Map, the glacial stratified deposits are described in terms of depositional environments (fluvial or lacustrine) and depositional chronology. On this the Surficial Materials Map, the texture (grain-size distribution) of these deposits is shown. The units on this map delineate textural changes in the subsurface as well as areally at the surface. An earlier map at 1:125,000 scale of central Connecticut (Stone and others, 1979) shows only surface textural units; a separate map in the same series (Langer, 1979) shows subsurface deposits of fine-grained materials. Several previous 1:24,000-scale quadrangle maps in Connecticut show three-dimensional textural units and refer to them as "superposed deposits" (see Stone, 1976 and Radway and Schanbel, 1976, as examples). On this map, the term "stack unit" (Kempton, 1981) is used in place of superposed deposits.

DISTRIBUTION OF TEXTURES IN GLACIAL MELTWATER DEPOSITS

The distribution of textural units is extrapolated from both point data (well and test-hole logs, gravel pits, and shovel holes) and from interpretation of landforms based on the principles of morphosequence deposition and systematic northward ice retreat (Koteff, 1974; Koteff and Pessl, 1981). These concepts provide a model by which grain-size distribution can be predicted from the morphology of a deposit, given primary data about the textures at specific points. A morphosequence is a package of sediments deposited contemporaneously by meltwater flowing from the glacier margin to a specific base level. Within a morphosequence, grain size decreases and sorting improves from the ice-marginal (proximal) end of a deposit downstream to the distal end. Landforms are transitional within a sequence as well, ranging from ice-contact forms (eskers, kettles, kames) at the head (proximal end) of a deposit to uncollapsed forms (delta-foreset slopes, lake-bottom plains, valley trains) downstream (distal end). Coarser grained sediments are associated with the proximal parts of morphosequences, finer grained sediments are associated with distal parts; given this principle, textural distribution can be mapped using point data that serve as controls.

The relationship between textural variations and morphosequences is illustrated by cross section ***B–B′*** (fig. 2), which shows the distribution of texture units in the northern Quinnipiac River valley. This north-south section transects seven chronologically numbered morphosequences. Dashed lines drawn to the six southern sequences represent the probable generalized surface gradients of the heads of these deposits, prior to collapse (due to melting of buried ice) and subsequent stream entrenchment. From north to south within each of these sequences, the textures grade from coarse- to fine-grained sediments and the topography changes from collapsed to non-collapsed landforms. The longitudinal and vertical relationships illustrated by this section are common in other valleys as well.

Stack units similar to those on cross section ***B–B′*** (fig. 2) occur throughout the stratified deposits of Connecticut. Many deposits having similar superposition of materials of differing texture were produced by geologic processes that occurred repeatedly in time and space during the deglaciation of Connecticut. For example, the **sg/s/f** and **s/f** stack units commonly occur in glacial-lake deltas. Morphosequences **1** through **6** on section ***B–B′*** are in fact a series of ice-marginal deltas. The **sg/f** stack unit commonly results from fluvial meltwater (or postglacial stream) terrace deposition on slightly older lake bottom deposits, as in sequence **7** on section ***B–B′***. The **f/sg** and **s/sg** units commonly occur in the distal parts of morphosequences where the sand or fines overlap the collapsed, coarser, proximal parts of other (older) sequences. Examples of this are found in the distal parts of sequences **4** and **7**. Many basic texture units (**g**, **sg**, **s**, **f**) likewise have broadly common origins. Units of gravel or sand and gravel often occur in the proximal parts of deposits, or were commonly laid down in glaciofluvial environments. Units of sand and fine-grained sediment are typically associated with distal parts of sequences and were usually laid down in lacustrine environments.

THICKNESS OF MATERIALS

The thickness of surficial materials in Connecticut varies considerably because of such factors as the high relief of the bedrock surface, changing conditions of deposition during deglaciation, and various effects of postglacial erosion and removal of glacial sediments. The point data shown on the map are modified logs of wells and test holes (see fig. 5) that provide information about thicknesses. In thick till areas, most of the available point data are shown. Depths to bedrock given in the logs from till areas are shown on the map as the thickness of till, although in some places lenses of sand and gravel may be present within or at the base of till. Various log descriptions were interpreted as till; for example, the term "hardpan" was generally interpreted as till, but in some places, it may represent coarse, stony gravel. In glacial stratified deposits, the point data shown may have been selected from numerous logs to show representative thicknesses of materials both in single units and in individual textural components of stack units; in some areas the logs shown may be the only ones available. The point data are not uniformly distributed across the State. Some logs may describe a textural stacking that is more detailed than or in disagreement with, the map unit. Typical situations where this may occur are explained below and examples are located on the map view of the block diagram (fig. 3).

In areas where coarser material overlies finer material, for example units **sg/s** and **sg/f**, the upper coarse material is commonly absent in places where later stream erosion has taken place (fig. 3, locality 1) or on steep frontal slopes of deltas (fig. 3, locality 2); the details of these areas are too small to show at the scale of this map. Point data from these places will indicate only sand or fines.

Some point data indicate a thickness of sand and gravel or gravel at the base of the section, but this information is not reflected in the map unit (fig. 2 and fig. 3, locality 3). This situation arises because the distribution of coarse-grained material in the subsurface is more patchy and harder to map than subsurface fine-grained materials. Where the point data are adequate, units such as **f/sg** and **s/sg** are shown on the map; otherwise, scattered points indicate the presence of unmapped bodies of coarse-grained material in the subsurface. Some points located in areas shown as sand and gravel (**sg**) on the map indicate a more detailed textural stacking of small bodies of sand or fines within the coarser materials (fig. 3, locality 4).

The block diagram (fig. 3) illustrates that the general location of the thickest stratified materials is in the middle of valleys (except where they have been removed by postglacial erosion along modern streams) and that these deposits thin toward the valley sides.

EXPLANATION OF MAP SYMBOLS

——— **Contact**

● 7sg 28s 25t R **Point data**—Thickness (in feet) and texture of surficial materials from logs of test holes and wells. Sources of logs are indexed in figure 5. Logs have been generalized by combining thin units, and translated into the letter symbols used for map units. For more detailed information, please see Description of Map Units on this sheet.

a	Alluvium
sw	Swamp deposits
sm	Salt-marsh deposits
g	Gravel
sg	Sand and gravel
s	Sand
f	Fines
t	Till
rk	Bedrock
rs	Rotten rock (weathered bedrock)
R	Refusal (may represent surface of bedrock, large boulder, stony till, or coarse gravel)

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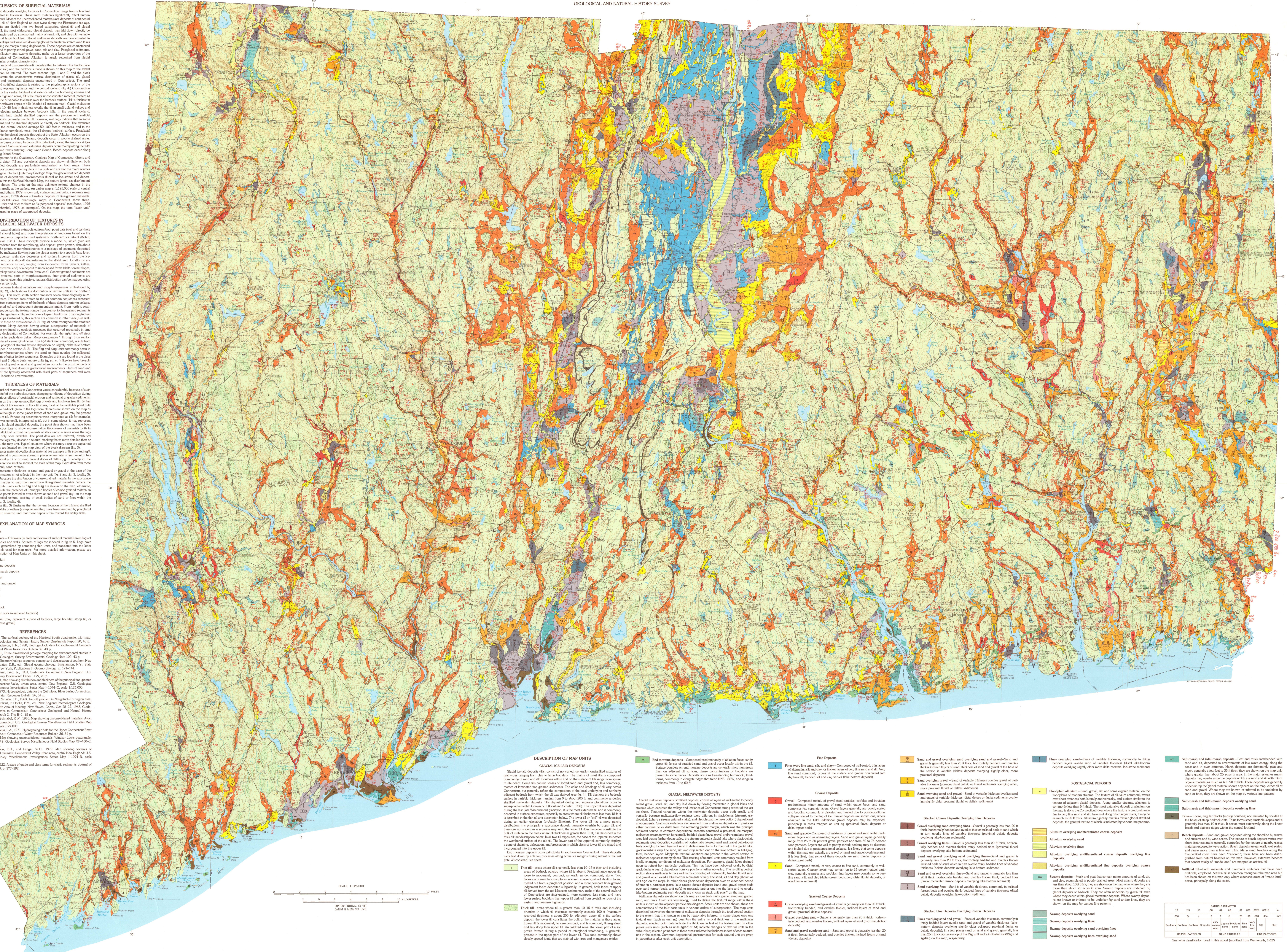

DESCRIPTION OF MAP UNITS

GLACIAL ICE-LAID DEPOSITS

Glacial ice-laid deposits (tills) consist of nonsorted, generally nonstratified mixtures of grain-sizes ranging from clay to large boulders. The matrix of most tills is composed dominantly of sand and silt. Boulders within and on the surface of tills range from sparse to abundant. Some tills contain lenses of sorted sand and gravel and, less commonly, masses of laminated fine-grained sediments. The color and lithology of till vary across Connecticut, but generally reflect the composition of the local underlying and northerly adjacent bedrock from which the till was derived (see fig. 4). Till blankets the bedrock surface in variable thickness, ranging from 0 to about 200 ft, and commonly underlies stratified meltwater deposits. Tills deposited during two separate glaciations occur in superposition within Connecticut (Pessl and Schafer, 1968). The upper till was deposited during the last (late Wisconsinan) glaciation; it is the most extensive till and is commonly observed in surface exposures, especially in areas where till thickness is less than 15 ft; it is described in the thin till unit description below. The lower till or "old" till was deposited during an earlier glaciation (probably Illinoian). The lower till has a more patchy distribution; it is principally a subsurface deposit, generally overlain by upper till, and therefore not shown as a separate map unit; the lower till does however constitute the bulk of material in the areas where till thickness is greater than 15 ft; it is described in the thick till unit description below. In all two-till exposures, the base of the upper till truncates the weathered surface of the old till. The lower part of the upper till commonly displays a zone of shearing, dislocation, and brecciation in which clasts of lower till are mixed and incorporated into the upper till.

End moraine deposits occur principally in southeastern Connecticut. These deposits were laid down by ablation processes along active ice margins during retreat of the last (late-Wisconsinan) ice sheet.

t **Thin till**—areas where till is generally less than 10–15 ft thick and including areas of bedrock outcrop where till is absent. Predominantly upper till; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places; a looser, coarser-grained ablation facies, melted out from supraglacial position; and a more compact finer-grained lodgement facies deposited subglacially. In general, both facies of upper till derived from the red Mesozoic sedimentary rocks of the central lowland of Connecticut are finer-grained, more compact, less stony and have fewer surface boulders than upper till derived from crystalline rocks of the eastern and western highlands.

░ **Thick till**—areas where till is greater than 10–15 ft thick and including drumlins in which till thickness commonly exceeds 100 ft (maximum recorded thickness is about 200 ft). Although upper till is the surface deposit, the lower till constitutes the bulk of the material in these areas. Lower till is moderately to very compact, and is commonly finer-grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of the lower till. This zone commonly shows closely-spaced joints that are stained with iron and manganese oxides.

ts **End moraine deposits**—Composed predominantly of ablation facies sandy upper till; lenses of stratified sand and gravel occur locally within the till. Surface boulders on end moraine deposits are generally more numerous than on adjacent till surfaces; dense concentrations of boulders are present in some places. Deposits occur as free-standing hummocky landforms, commonly in elongate ridges that trend NNE - SSW, and range in thickness from 10 to 60 ft.

GLACIAL MELTWATER DEPOSITS

Glacial meltwater deposits (stratified deposits) consist of layers of well-sorted to poorly sorted gravel, sand, silt, and clay laid down by flowing meltwater in glacial lakes and streams which occupied the valleys and lowlands of Connecticut during retreat of the last ice sheet. Textural variations within the meltwater deposits occur both areally and vertically because meltwater-flow regimes were different in glaciofluvial (stream), glaciodeltaic (where a stream entered a lake), and glaciolacustrine (lake bottom) depositional environments. Grain-size variations also resulted from meltwater deposition in positions either proximal to or distal from the retreating glacier margin, which was the principal sediment source. A common depositional scenario contained a proximal, ice-marginal meltwater stream in which horizontally bedded glaciofluvial gravel and/or sand and gravel were laid down; farther down valley, the stream entered a glacial lake where glaciodeltaic sediments were deposited consisting of horizontally layered sand and gravel delta-topset beds overlying inclined layers of sand in delta-foreset beds. Farther out in the glacial lake, glaciolacustrine very fine sand, silt, and clay settled out on the lake bottom in flat-lying, thinly bedded layers. Mappable textural variations are present in the vertical section of meltwater deposits in many places. This stacking of textural units commonly resulted from locally changing conditions of meltwater deposition. For example, glacial lakes drained upon ice retreat from particular positions. This may have been followed locally by distal glaciofluvial (stream) deposition from ice positions farther up valley. The resulting vertical section shows meltwater terrace sediments consisting of horizontally bedded fluvial sand and gravel which overlie lake-bottom sediments of very fine sand, silt and clay (shown as unit **sg/f** on the map). In other places glaciodeltaic deposition over an extended period of time in a particular glacial lake caused deltaic deposits (sand and gravel topset beds over sand foreset beds, unit **sg/s**) to prograde farther out into the lake and to overlie lake-bottom sediments; such deposits are shown as stack unit **sg/s/f** on the map.

Meltwater deposits are shown on this map as four basic units: gravel, sand and gravel, sand, and fines. Grain-size terminology used to define the textural range within these units is shown on the adjacent particle-size diagram. Stack units are also shown; these are combinations of the four basic units in various orders of superposition. The map units described below show the texture of meltwater deposits through the total vertical section to the extent that it is known or can be reasonably inferred. In some places only one textural unit (such as unit **sg**) describes the entire vertical thickness of the meltwater deposits; selected point data indicate the thickness in feet of the textural unit. In other places stack units (such as units **sg/s/f** or **s/f**) indicate changes of textural units in the subsurface; selected point data in these areas indicate the thickness in feet of each textural unit in the section. Common depositional environments for each textural unit are given in parentheses after each unit description.

Fine Deposits

f **Fines (very fine sand, silt, and clay)**—Composed of well-sorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves (lake-bottom deposits)

Coarse Deposits

g **Gravel**—Composed mainly of gravel-sized particles; cobbles and boulders predominate; minor amounts of sand within gravel beds, and sand comprises few separate layers. Gravel layers generally are poorly sorted and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. Gravel deposits are shown only where observed in the field; additional gravel deposits may be expected, principally in areas mapped as unit **sg** (proximal fluvial deposits or delta-topset beds)

sg **Sand and gravel**—Composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. Layers are well to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. It is likely that some deposits within this map unit actually are gravel or sand and gravel overlying sand. It is less likely that some of these deposits are sand (fluvial deposits or delta-topset beds)

s **Sand**—Composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay (delta-foreset beds, very distal fluvial deposits, or windblown sediment)

Stacked Coarse Deposits

g/sg **Gravel overlying sand and gravel**—Gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker, inclined layers of sand and gravel (proximal deltaic deposits)

g/s **Gravel overlying sand**—Gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker, inclined layers of sand (proximal deltaic deposits)

sg/s **Sand and gravel overlying sand**—Sand and gravel is generally less that 20 ft thick, horizontally bedded, and overlies thicker, inclined layers of sand (deltaic deposits)

sg/s/sg **Sand and gravel overlying sand overlying sand and gravel**--Sand and gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker inclined layers of sand; thickness of sand and gravel at the base of the section is variable (deltaic deposits overlying slightly older, more proximal deposits)

s/g **Sand overlying gravel**—Sand of variable thickness overlies gravel of variable thickness (younger distal deltaic or fluvial sediments overlying older, more proximal fluvial or deltaic sediments)

s/sg **Sand overlying sand and gravel**—Sand of variable thickness overlies sand and gravel of variable thickness (distal deltaic or fluvial sediments overlying slightly older proximal fluvial or deltaic sediments)

Stacked Coarse Deposits Overlying Fine Deposits

g/s/f **Gravel overlying sand overlying fines**—Gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker inclined beds of sand which in turn overlie fines of variable thickness (proximal deltaic deposits overlying lake-bottom sediments)

g/f **Gravel overlying fines**—Gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker thinly bedded fines (proximal fluvial deposits overlying lake-bottom sediments)

sg/s/f **Sand and gravel overlying sand overlying fines**—Sand and gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker inclined beds of sand which in turn overlie thinly bedded fines of variable thickness (deltaic deposits overlying lake-bottom sediment)

sg/f **Sand and gravel overlying fines**—Sand and gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker thinly bedded fines (fluvial meltwater terrace deposits overlying lake-bottom sediment)

s/f **Sand overlying fines**—Sand is of variable thickness, commonly in inclined foreset beds and overlies thinly bedded fines of variable thickness (distal deltaic deposits overlying lake-bottom sediment)

Stacked Fine Deposits Overlying Coarse Deposits

f/sg **Fines overlying sand and gravel**—Fines of variable thickness, commonly in thinly bedded layers overlie sand and gravel of variable thickness (lake-bottom deposits overlying slightly older collapsed proximal fluvial or deltaic deposits); in a few places sand or sand and gravel, generally less than 25 ft thick occurs on top of the **f/sg** unit and is indicated as **s/f/sg** and **sg/f/sg** on the map, respectively

f/s **Fines overlying sand**—Fines of variable thickness, commonly in thinly bedded layers overlie sand of variable thickness (distal lake-bottom deposits overlying slightly older more delta-proximal lacustrine sediment)

POSTGLACIAL DEPOSITS

a **Floodplain alluvium**—Sand, gravel, silt, and some organic material, on the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and is often similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 ft thick. The most extensive deposit of alluvium on the map is along the Connecticut River where the texture is predominantly fine to very fine sand and silt; here and along other larger rivers, it may be as much as 25 ft thick. Alluvium typically overlies thicker glacial stratified deposits, the general texture of which is indicated by various line patterns.

▤ **Alluvium overlying undifferentiated coarse deposits**

▨ **Alluvium overlying sand**

▤ **Alluvium overlying fines**

▨ **Alluvium overlying undifferentiated coarse deposits overlying fine deposits**

▨ **Alluvium overlying undifferentiated fine deposits overlying coarse deposits**

sw **Swamp deposits**—Muck and peat that contain minor amounts of sand, silt, and clay, accumulated in poorly drained areas. Most swamp deposits are less than about 10 ft thick; they are shown on the map only where they are more than about 25 acres in area. Swamp deposits are underlain by glacial deposits or bedrock. They are often underlain by glacial till even where they occur within glacial meltwater deposits. Where swamp deposits are known or inferred to be underlain by sand and/or fines, they are shown on the map by various line patterns

▨ **Swamp deposits overlying sand**

▤ **Swamp deposits overlying fines**

▨ **Swamp deposits overlying sand overlying fines**

▤ **Swamp deposits overlying fines overlying sand**

sm **Salt-marsh and tidal-marsh deposits**—Peat and muck interbedded with sand and silt, deposited in environments of low wave energy along the coast and in river estuaries. Marsh deposits are dominantly peat and muck, generally a few feet to 35 ft thick; they are shown on the map only where greater than about 25 acres in area. In the major estuaries marsh deposits may overlie estuarine deposits which are sand and silt with minor organic material as much as 40 - 90 ft thick. These deposits are generally underlain by the glacial material shown adjacent on the map; either till or sand and gravel. Where they are known or inferred to be underlain by sand or fines, they are shown on the map by various line patterns

▨ **Salt-marsh and tidal-marsh deposits overlying sand**

▤ **Salt-marsh and tidal-marsh deposits overlying fines**

ta **Talus**—Loose, angular blocks (mostly boulders) accumulated by rockfall at the bases of steep bedrock cliffs. Talus forms steep unstable slopes and is generally less than 10 ft thick. It occurs most extensively along the linear basalt and diabase ridges within the central lowland.

b **Beach deposits**—Sand and gravel deposited along the shoreline by waves and currents and by wind action. The texture of beach deposits varies over short distances and is generally controlled by the texture of nearby glacial materials exposed to wave action. Beach deposits are generally well sorted and rarely more than a few feet thick. Many sand beaches along the Connecticut coast have been "restored"; these have not been distinguished from natural beaches on this map; however, extensive beaches that consist totally of "made-land" are mapped as artificial fill

af **Artificial fill**—Earth materials and manmade materials that have been artificially emplaced. Artificial fill is common throughout the map area but has been shown on this map only where extensive areas of "made land" occur, principally along the coast.

PARTICLE DIAMETER										
10	2.5	.16	.08	.04	.02	.01	.005	.0025	.00015	in.
256	64	4	2	1	.5	.25	.125	.068	.004	mm

Boulders	Cobbles	Pebbles	Granules	Very coarse sand	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay
GRAVEL PARTICLES				SAND PARTICLES				FINE PARTICLES		

Grain-size classification used in this report (modified from Wentworth, 1922)

SURFICIAL MATERIALS MAP OF CONNECTICUT

By

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1992

Base from U.S. Geological Survey, 1965
Revised as of 1974
25,000-foot grid based on Connecticut coordinate system

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(SHEET 2 OF 2)

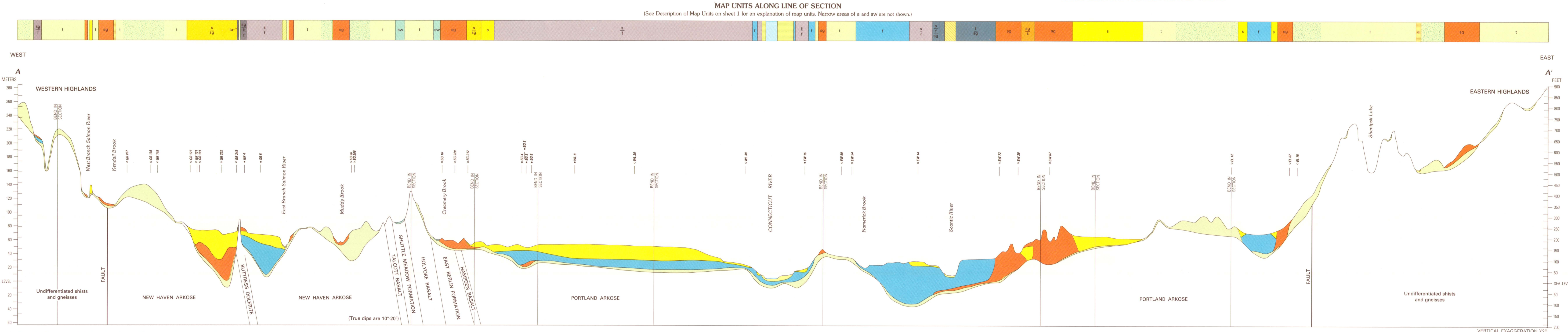


Figure 1.—Cross-section *A–A′* through north-central Connecticut with accompanying bar showing units along line of section. Section transects the Central Lowland where surficial materials are relatively thick and extends into the Eastern and Western Highlands where surficial materials in smaller valleys are generally thinner. The extensive bodies of sand and fine-grained deposits in the Central Lowland (east and west of the Connecticut River) are deltaic and lake-bottom sediments of glacial Lake Hitchcock, the largest and longest-lived glacial lake in Connecticut. The Lake Hitchcock deposits in the vicinity of the present-day Scantic River occupy the ancestral valley of the Connecticut River, which today is superimposed on a higher bedrock surface to the west. Locations of wells (open circles) and test holes (closed circles) used to construct the section are indicated above the section (letter and number designations are as used in Ryder and Weiss, 1971). This figure illustrates that some subsurface units have not been mapped. The bar showing "map units along line of section" does not reflect all subsurface units. See text for further explanation. Exaggeration of the vertical scale in relation to the horizontal scale causes slopes to appear steeper and deposits to appear thicker. The true dip of interbedded basalts and sedimentary rocks west of center on the section is 10°–20°.

EXPLANATION OF CROSS-SECTION UNITS

- Fine deposits
- Sand deposits
- Sand and gravel deposits
- Till
- Alluvium
- Swamp deposits
- Talus

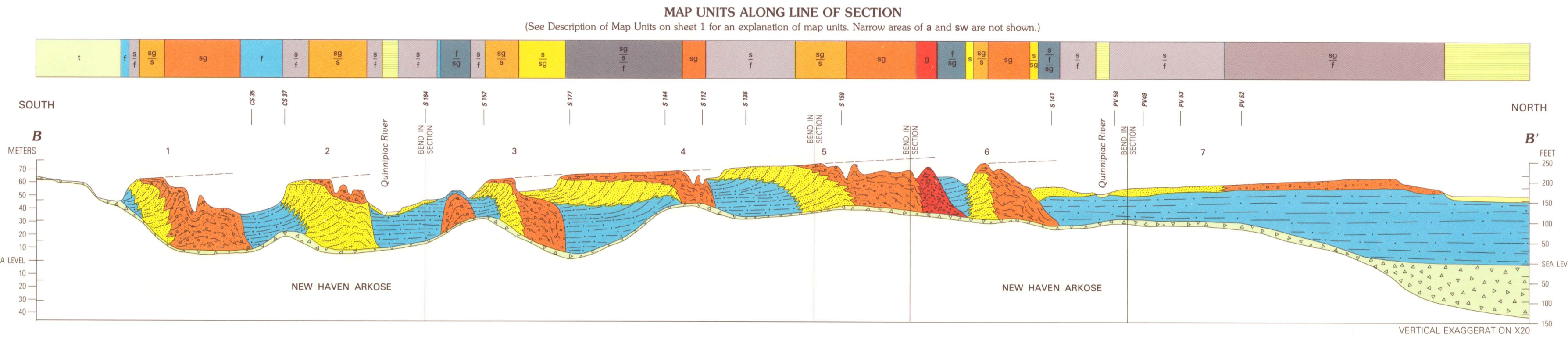
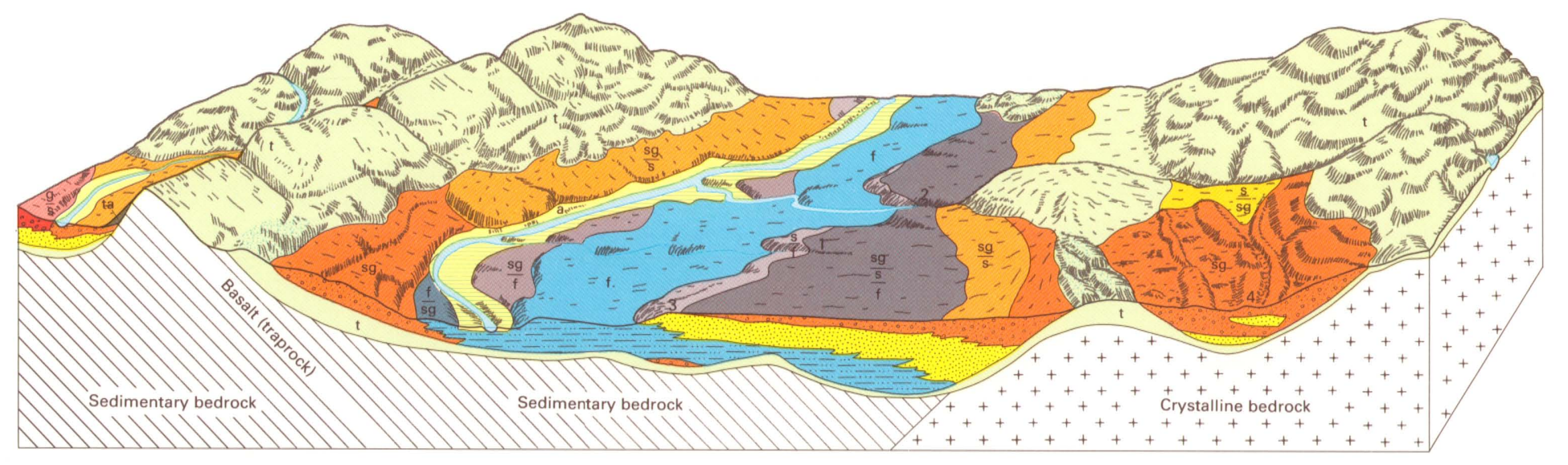


Figure 2.—Longitudinal-section *B–B′* along the Upper Quinnipiac River Valley with accompanying bar showing map units along line of section. The distribution of subsurface textures in this valley is based on closely spaced point-data control from more than 150 test hole and well logs; locations of those which fall on or near the line of section are indicated above the section (letter and number designations are as used in Haeni and Anderson, 1980; Mazzaferro, 1973). This section crosses six deltaic morphosequences (numbered in chronologic order of deposition from south to north) deposited in a glacial lake. Each deltaic unit exhibits collapsed ice-contact forms and structure at its north or iceward side, and a delta foreset slope that built into open water on its south side. Each delta grades from coarser material at the ice-contact head to finer material southward. This series of deltas records a progression of depositional events during which sediment was supplied from the northward-retreating ice margin. Horizontal dashed lines extend the glaciofluvial topset surfaces to their probable positions before collapse. Fine-grained lake-bottom deposits occur in front of and beneath the deltas. The seventh morphosequence is a non-ice-contact glaciofluvial terrace deposit which overlies lake-bottom sediments.

EXPLANATION OF LONGITUDINAL SECTION UNITS

- Fine deposits
- Sand deposits
- Sand and gravel deposits
- Gravel deposits
- Till
- Alluvium



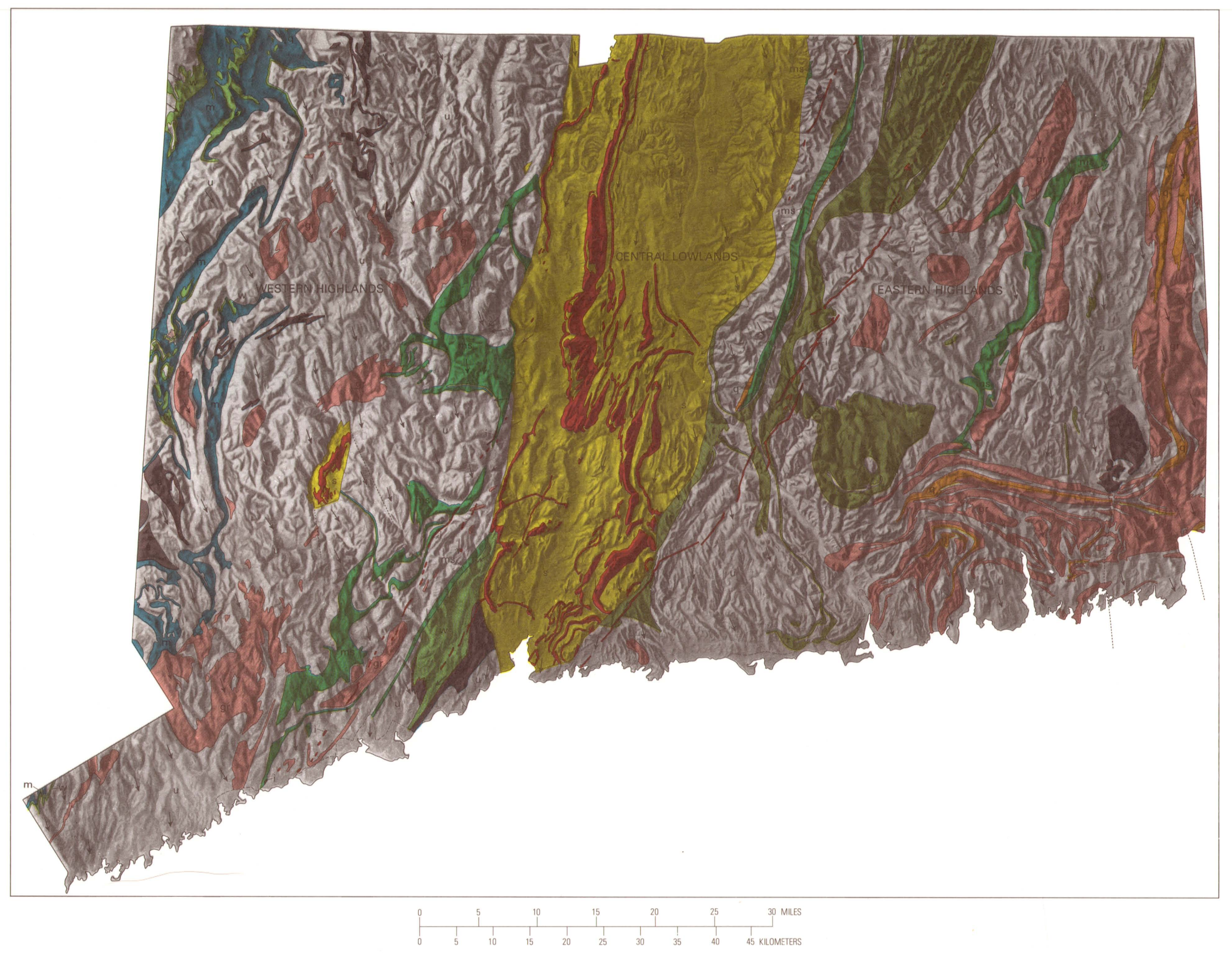
EXPLANATION OF CROSS-SECTION VIEW

- Gravel deposits
- Sand and gravel deposits
- Sand deposits
- Fine deposits
- a Alluvium
- t Till
- ta Talus

EXPLANATION OF SURFACE VIEW

- sg Sand and gravel deposits
- f Fine deposits
- g/s Gravel overlying sand
- sg/s Sand and gravel overlying sand
- s/sg Sand overlying sand and gravel
- sg/s/f Sand and gravel overlying sand overlying fines
- sg/f Sand and gravel overlying fines
- s/f Sand overlying fines
- f/sg Fines overlying sand and gravel
- a Alluvium
- Alluvium overlying fines
- t Till and bedrock
- Thick till

Figure 3.—Block diagram illustrating the relationship of map units (shown on the surface view) to the subsurface distribution of materials over the bedrock surface (shown on the cross-section view). Conditions at numbered localities are described in the map text (sheet 1).



EXPLANATION

Most of the geologic contacts on this map and all the rock names and ages in the explanation are derived from the Bedrock Geological Map of Connecticut at 1:125,000 scale compiled by John Rodgers (1985). Generalization of lithology at the 1:500,000 scale of this figure means that areas mapped as one rock type generally include rocks of other types, in bodies too small or too poorly known to show on the map. The lithologic units emphasized here are not everywhere coextensive with the stratigraphic units of Rodgers (1985) or of the more detailed studies on which his map is based. The shaded relief base of this figure shows the form of the landscape. The rock types of Connecticut, because of their different resistances to weathering and erosion, affect landscape form. The central lowlands are low because the area is underlain by the easily eroded sedimentary rocks. The marbles of western Connecticut generally underlie deep valleys.

s **Sedimentary rocks**—Brown, reddish-brown, and gray sandstone, siltstone, and conglomerate of the Connecticut and Pomperaug valleys. Portland Arkose and East Berlin and Shuttle Meadow Formations (Jurassic); New Haven Arkose (Triassic)

i **Basalts and dolerites**—"Traprock"; lava flows and intrusive igneous bodies in and near the sedimentary rocks of the Connecticut and Pomperaug valleys. Hampden, Holyoke, and Talcott Basalts and West Rock and Buttress Dolerites (Jurassic)

q **Quartzites**—Mostly clean and light-gray to yellowish-gray. In eastern Connecticut, quartzite of the Plainfield Formation (Late Proterozoic); in central Connecticut, one small body of Cheshire Quartzite (Cambrian)

m **Marbles**—Mostly very light gray or yellowish-gray to nearly white. In western Connecticut, Stockbridge Marble (including Inwood Marble) and basal marble member of Walloomsac Schist (Ordovician and Cambrian)

w **Schists and phyllites**—Mostly fine-grained and dark-gray or greenish-gray. Walloomsac Schist (Ordovician) in belts adjacent to marble; Wepawaug Schist (Devonian and Silurian) west of New Haven

ms **Muscovite schists**—Gray schists that contain abundant fine to coarse muscovite (white mica). In western Connecticut, Straits Schist; in eastern Connecticut, Littleton Formation and Scotland Schist (Devonian and Silurian)

r **Sulfidic schists and gneisses**—Strongly rusty weathering. In eastern Connecticut, lower member of Bigelow Brook Formation, Collins Hill Formation (not including metavolcanic member), Brimfield Schist, and lenses of sulfidic schist in Tatnic Hill Formation (Silurian and Ordovician)

gr **Granitic rocks**—Light-colored (light-gray to reddish), relatively low in dark minerals (commonly 3–10 percent biotite); mostly gneissic; include some quartz monzonites. In western Connecticut, Pinewood Adamellite, Nonewaug Granite, Shelton Member of Trap Falls Formation, and Ansonia and other gneisses, (Permian to Ordovician). In eastern Connecticut, Narragansett Pier Granite, Canterbury Gneiss, Stony Creek Granite Gneiss, and felsic gneisses of Sterling Plutonic Group (Permian to Late Proterozoic)

a **Mafic and ultramafic rocks**—Dark-gray and greenish-gray to nearly black; rich in dark minerals such as amphiboles. In western and eastern Connecticut, amphibolite and hornblende gneiss (Ordovician and Proterozoic); west of New Haven, the Allingtown and Maltby Lakes Metavolcanics (Ordovician); in southeastern Connecticut, Preston Gabbro (Ordovician)

u **Undivided schists and gneisses**—Mostly light-gray to medium-gray; metasedimentary and metaigneous; wide variety of aluminous, felsic, intermediate and mafic rocks (Devonian to Proterozoic)

——— Contact between bedrock lithologic units

- - - - - Boundary of coastal area where bedrock outcrops are rare or absent and lithologic units are not known

.... Margin of indicator fan composed of fragments of distinctive rock type transported by ice

← Generalized direction of ice movement, based on orientation of bedrock striations and drumlins

Figure 4.—Generalized bedrock lithologic map of Connecticut. The color and composition of glacial (surficial) materials is a result of the lithologic characteristics of subjacent and northerly adjacent rock types. Arrows indicate direction of glacial-ice movement across the State (see Discussion of Mineral Composition of Surficial Materials).

DISCUSSION OF MINERAL COMPOSITION OF SURFICIAL MATERIALS

The character of the surficial materials of Connecticut is very much determined by the physical characteristics and mineral composition of the source rocks. This is conspicuously true of glacial deposits, and also of alluvium and stream-terrace deposits, which are largely derived from nearby glacial deposits. The relationship holds not only in areas directly underlain by specific rocks, but also "downstream" in the direction the glacier was moving. The directions of movement were south to southeast in most of Connecticut, but southwest to nearly west on the west side of the Connecticut Valley glacier lobe, as is shown by the arrows on the map. Abundant fragments of a particular rock generally occur no more than a few miles downstream from the source area, but scattered fragments, particularly of hard rocks, may occur tens of miles away. In the Glastonbury area of central Connecticut, till that is largely derived from Jurassic sedimentary rocks was deposited 0.2–1.0 mi downstream on metamorphic rocks (Langer, 1977). Fragments of distinctive rock types downstream from restricted source areas form indicator fans, two of which are shown in figure 4. The indicator fan in western Connecticut is derived from the sedimentary and igneous rocks of the Pomperaug Valley; the fan in southeastern Connecticut is derived from the Preston Gabbro.

The following comments about the effects of specific rocks are based mostly on general impressions rather than detailed studies. These comments apply most strongly to glacial tills; the removal of fine particles from glacial and alluvial sands and gravels diminishes some of the contrasts in texture and color.

The sedimentary rocks of central Connecticut produce surficial deposits that are commonly reddish brown; siltstones contribute considerable fine-grained material; and conglomerates contribute rounded pebbles and cobbles that have been broken out of matrix. Basalt and dolerite are relatively hard rocks; fragments are abundant near the sources, and occur mainly in the reddish-brown deposits derived from the adjacent sedimentary rocks.

Deposits derived from quartzites contain abundant quartz sand grains and quartzite fragments. Quartzites, because of their hardness, occur as very widespread erratic fragments. Marbles produce fine-grained, light-colored, highly calcareous glacial deposits. Dark schists and phyllites (Walloomsac and Wepawaug) produce fine-grained, dark-colored deposits. Abundant flakes of muscovite are very conspicuous in deposits derived from muscovite schists. The weathering of iron sulfides in sulfidic schists and gneisses produces very rusty or iron-cemented deposits. Granitic rocks that are low in dark minerals produce light-colored deposits, with abundant quartz and feldspar in the sand and coarse silt sizes. Dark mafic and ultramafic rocks produce dark-colored deposits that contain abundant dark iron minerals.

The undivided light-gray to medium-gray schists and gneisses underlie more than half of Connecticut; they are the source rocks for the widespread sandy-silty tills of various shades of light and medium gray and yellowish gray. Associated sands and gravels are generally yellowish to light brownish gray. These common deposits show considerable range of composition, color and texture, but lack the distinctive lithologic effects produced by the other rock types mentioned above.

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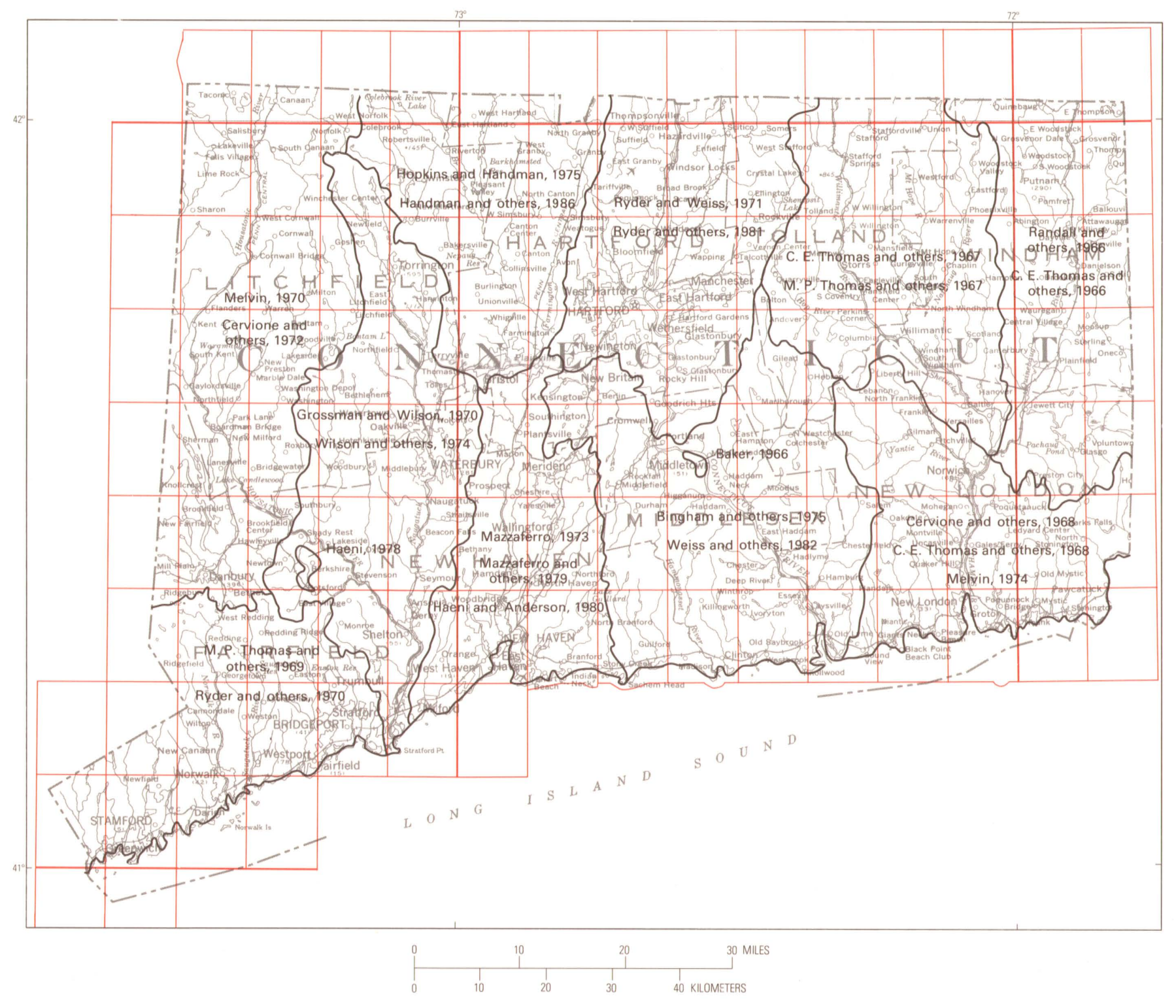

Figure 5.—Index map to sources of point data in Connecticut. References are in accompanying list. Quadrangles boundaries are shown in red. For quadrangle names, see figure 6.

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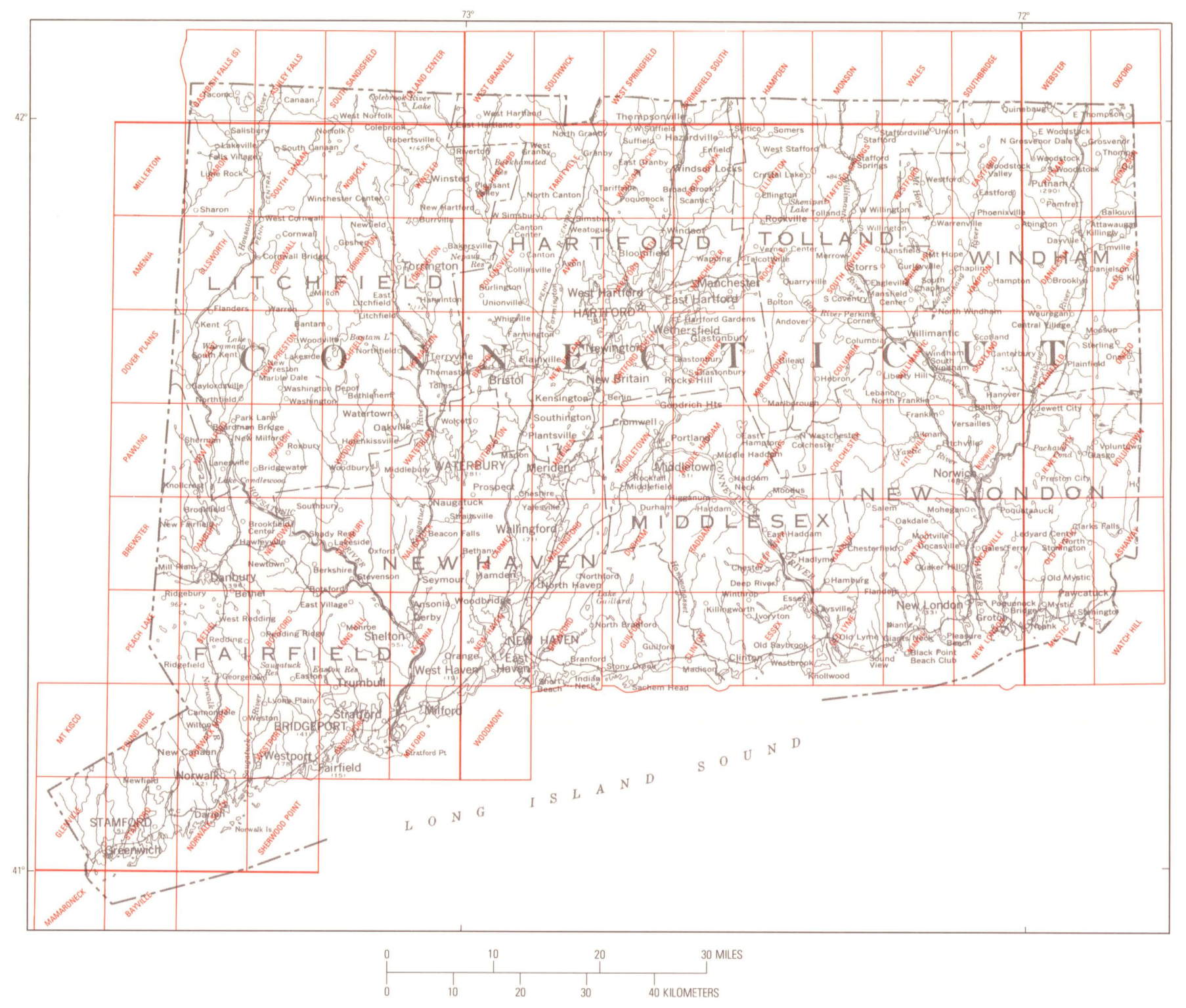

Figure 6.—Index map of 1:24,000-scale surficial geologic quadrangle maps. References are to accompanying list.

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SURFICIAL MATERIALS MAP OF CONNECTICUT

By

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