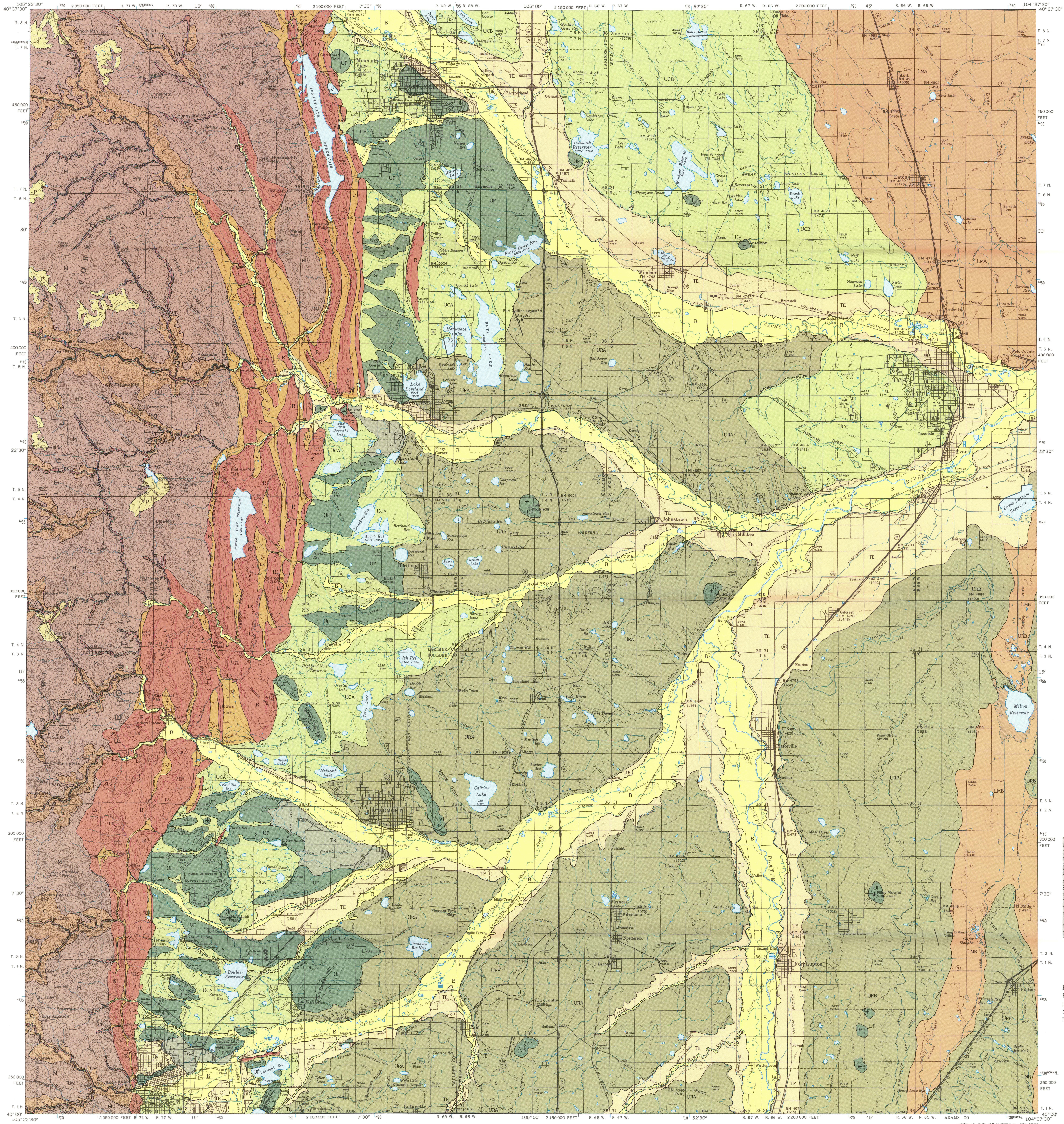
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY



Base compiled by U.S. Geological Survey in 1972 from 1:24,000 quadrangles dated 1949–1968. Limited revision from aerial photographs taken 1969 and 1971
50,000-foot grid based on Colorado coordinate system, north zone
5000-meter Universal Transverse Mercator grid ticks, zone 13, shown in blue
Metric elevations are shown in parenthesis

APPROXIMATE MEAN DECLINATION, 1978

SCALE 1:100 000

CONTOUR INTERVAL 100 FEET
DOTTED LINES REPRESENT 50-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

LANDFORMS IN THE BOULDER-FORT COLLINS-GREELEY AREA, FRONT RANGE URBAN CORRIDOR, COLORADO

By
Eleanor J. Crosby
1978

EXPLANATION

Landforms are described on sheet 2

LANDFORM UNITS AND COMPONENTS

PIEDMONT SECTION OF GREAT PLAINS PROVINCE

UPLAND SUBSECTION

- UF — UPLAND, FLAT-TOPPED—benches, mesas, buttes. Slope component (S) shown locally
- UCA, UCB, UCC — UPLAND COMPLEX. UCA, UCB, and UCC are variants of upland complex, described on sheet 2
- URA, URB — UPLAND, ROLLING. URA AND URB are variants of rolling upland, described on sheet 2. Slope component (S) shown locally

LOWLAND SUBSECTION

- TE — TERRACE. Slope component (S) shown locally
- B — BOTTOMLAND. Extends into Hogback system
- LMA, LMB — LOWLAND, MANTLED. LMA and LMB are variants of mantled lowland, described on sheet 2. Slope component (S) shown locally
- TR — TRANSITIONAL UNIT. Slope component (S) shown locally

FRONT RANGE SECTION OF SOUTHERN ROCKY MOUNTAINS PROVINCE

HOGBACK SUBSECTION

- R — RIDGE. Landslide component (LS) shown locally
- V — VALLEY

LOWER-MOUNTAINS SUBSECTION

- C — CANYON WALL
- VF — VALLEY FLOOR
- P — PARK
- M — MOUNTAIN COMPLEX

BOUNDARY BETWEEN LANDFORM SUBSECTIONS AND UNITS

BOUNDARY OF LANDFORM COMPONENT WITHIN LANDFORM UNIT—Hachured on slope components (S) where slope angle exceeds 8 percent in most of the component area. Hachures without boundary line are on flanks of small buttes for which the butte top is shown by + symbol

CREST OF RIDGE—Dots are on the steeper side of an asymmetric ridge

+ TOP OF BUTTE—Used where flat upper surface of butte is too small to show clearly at scale of map

DISCUSSION

Uplift of the earth's surface combined with the downward pull of gravity and the erosive and constructive actions of weathering, wind, and water through, long intervals of geologic time have shaped the surface of the earth into the distinctive features called landforms. This map shows an interpretation of landforms in the northern part of the Front Range Urban Corridor of Colorado (see index map). The mountains of the Front Range and their bordering high ridges of sandstone are large and well known features of the region. The character of the Piedmont area that lies between the Front Range mountains and the High Plains to the east beyond the mapped area is, in some respects, less easily defined. Differences of elevation on the Piedmont are small in comparison with those of the mountains. The landforms are generally low and broadly rounded, and the surface of a hill may pass almost imperceptibly into the surface of a valley. In both Piedmont and Front Range, an abrupt change in surface slope may locally provide a mappable boundary between two adjoining landforms; but because there are few sharply defined natural boundaries, many lines on landform maps represent gradations. Both the placement of boundaries and the definition of landforms for this map, therefore, are in some degree subjective.

The landforms of the northern Front Range Urban Corridor are here divided into provinces, sections, subsections, units, and components, in decreasing order of magnitude. The divisions shown by related colors on the map are the upland and lowland subsections of the Piedmont section, Great Plains province, and the hogback and lower-mountains subsections of the Front Range section, Southern Rocky Mountains province. Within the subsections, units represent simple recurring forms, such as terraces, mesas, ridges, and canyon walls. Throughout each section or subsection, units have approximately the same geographic relation to each other. For example, in the Piedmont section, the sequence from bottomland to terrace to upland is repeated in many places, although in other places the terrace unit is absent from the sequence. Components are parts of units, such as marginal slopes, dunes, or wind-scoured depressions in the land surface. At the 1:100,000 scale of this map, however, many components are too small to be shown. Exceptions are marginal slopes, where they are of mappable width, and some wind-scoured depressions that are now occupied by small reservoirs and stock ponds. Some landslide components also can be shown. At a scale larger than that used here, for example 1:24,000, components could be further subdivided in some cases; individual gullies and hillocks could be identified and mapped.

The landforms map of the northern part of the Front Range Urban Corridor has been prepared from air photographs, topographic and geologic maps, and, for parts of the area, inspection in the field. Preliminary compilations were made on 1:24,000-scale topographic quadrangle maps (see index of topographic maps); contour intervals on these maps are 10 feet (about 3 m) or 40 feet (about 12 m), the latter in quadrangles containing mountainous areas. These maps were photoreduced and recompiled at a publication scale of 1:100,000 on a map base showing 100 (about 30 m)- and a few 50 (about 15 m)-foot contour intervals. Many landforms that were mapped on the basis of contour lines on the 1:24,000-scale maps will not, of course, show a close relationship to the more widely spaced contour lines of the 1:100,000-scale map.

Nearly all of the terms used in describing landforms are familiar to most people or are explained in unit definitions (sheet 2). A few, perhaps, need further explanation. These include:

Alluvium—The sediments (clay, silt, sand, and gravel) deposited by a stream in its channel or, in times of bank overflow, on its flood plain.

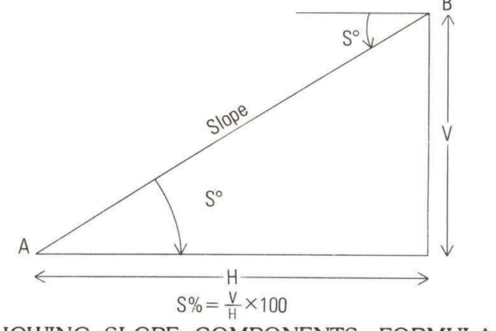
Colluvium—Loose, unconsolidated rock debris and soil on a slope. This material is gradually moved downward by rain and snowmelt and accumulates at the base of a slope.

Deflation basins—Hollow depressions formed by the erosive power of strong, persistent winds. Soils are usually most susceptible, but when the wind carries an abrasive sand load, scour may occur in nonresistant bedrock. In the Piedmont section of the Front Range Urban Corridor, some shales and poorly cemented sandstones are especially vulnerable to this type of erosion.

Dip slope and scarp slope—Where ridges are composed of tilted layers (beds) of hard rock, such as sandstone or limestone, the upper surface of the topmost layer is called the dip slope. The scarp slope is the commonly steeper face of the ridge, opposite to the dip slope, in which the edges of the beds are exposed.

Park—In the forested mountains of the Rocky Mountain region, a grassy valley or open space, nearly level or at least much less steeply sloping than the surrounding mountains, is called a park.

Percent slope—The slope of a land surface may be expressed as percent slope (S%), which is defined as the difference in elevation (V) between two points on the ground divided by the horizontal distance between the two points (H) and multiplied by 100 (see percent slope diagram); for example, a 3-foot (1 m) rise in a 50-foot (15 m) horizontal distance produces a 6 percent slope. Percent slope has been used in describing some landform units or components of units. Gentleness or steepness of a slope may also be indicated by the slope angle (S°)—the angle between a sloping surface and a horizontal plane expressed in degrees. The relation of percent slope and slope angle to terms used to describe slopes of differing steepness is graphically shown in an accompanying diagam.



$$S\% = \frac{V}{H} \times 100$$

DIAGRAM SHOWING SLOPE COMPONENTS, FORMULA USED TO CALCULATE PERCENT SLOPE (S%), AND MEASUREMENT OF SLOPE ANGLE (S°).
V, vertical difference in elevation of ground points A and B; H, horizontal distance between A and B; S%, percent slope; S°, slope angle in degrees.

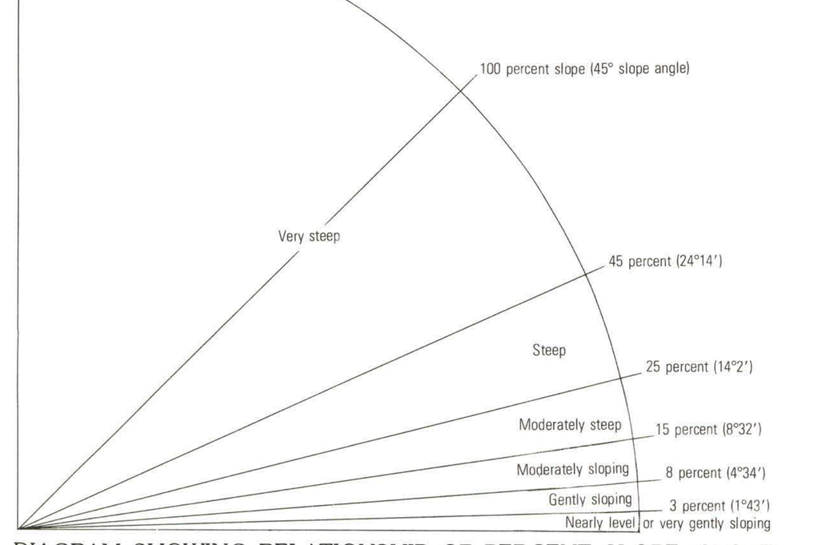


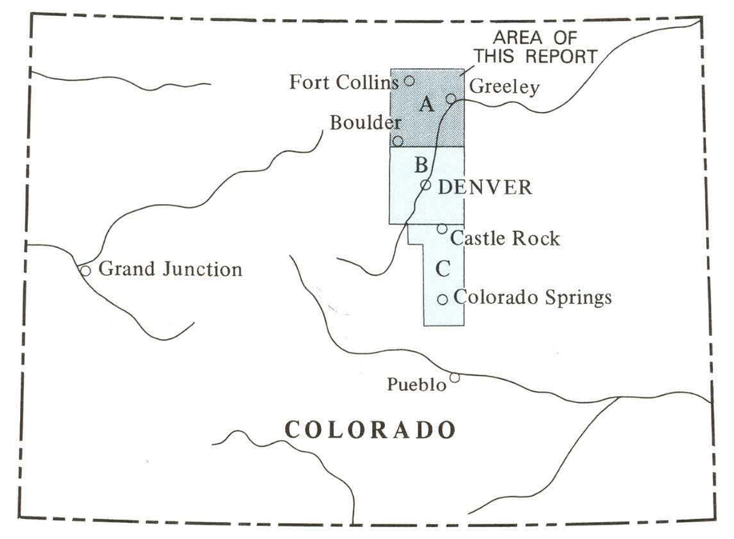
DIAGRAM SHOWING RELATIONSHIP OF PERCENT SLOPE, SLOPE ANGLE, AND TERMS USED TO DESCRIBE SLOPES OF DIFFERING STEEPNESS
Categories are adapted from those used by the U.S. Department of Agriculture (Mott and Fuller, 1967) in soils mapping.

REFERENCES

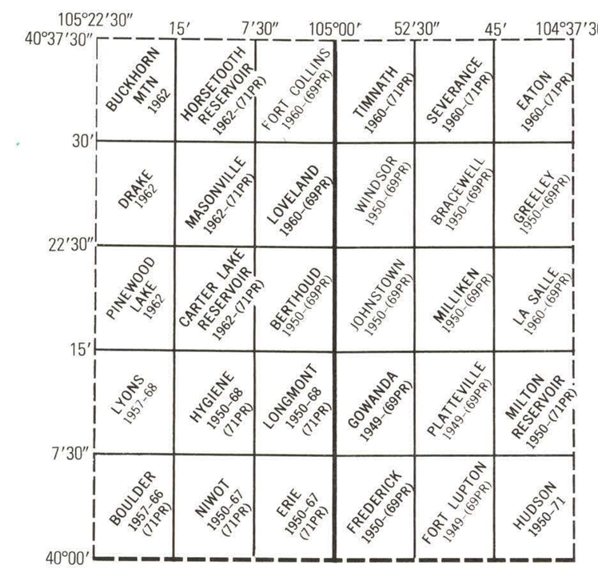
Colton, R. B., Holligan, J. A., and Anderson, L. W., 1975, Preliminary map of landslide deposits, Greeley 1°×2° quadrangle, Colorado: U.S. Geol. Survey Misc. Field Studies Map MF–704.

McCain, J. F., and Hotchkiss, W. R., 1975, Map showing flood-prone areas, Boulder-Fort Collins-Greeley area, Front Range Urban Corridor, Colorado: U.S. Geol. Survey Misc. Inv. Map I–855–E.

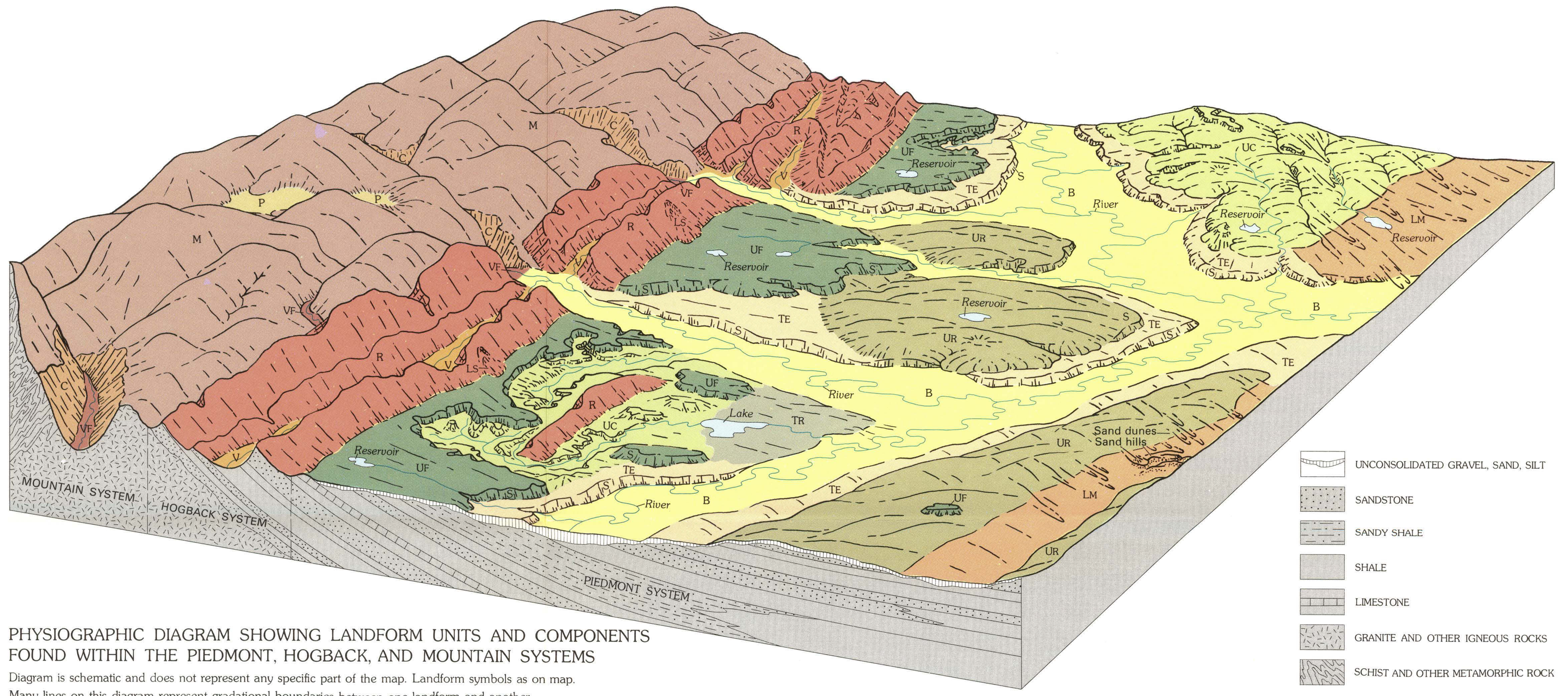
Mott, J. R., and Fuller, D. C., 1967, Soil survey, Franklin County, Massachusetts: U.S. Dept. Agriculture, Soil Conservation Service, in cooperation with Massachusetts Agricultural Experiment Station, 204 p.



MAP SHOWING AREA OF FRONT RANGE URBAN CORRIDOR



INDEX OF 1:24,000-SCALE TOPOGRAPHIC QUADRANGLE MAPS IN THE BOULDER—FORT COLLINS—GREELEY AREA



PHYSIOGRAPHIC DIAGRAM SHOWING LANDFORM UNITS AND COMPONENTS FOUND WITHIN THE PIEDMONT, HOGBACK, AND MOUNTAIN SYSTEMS
Diagram is schematic and does not represent any specific part of the map. Landform symbols as on map.
Many lines on this diagram represent gradational boundaries between one landform and another.
Not drawn to scale.

For sale by Branch of Distribution, U.S. Geological Survey, Box 25286, Federal Center, Denver, CO 80225