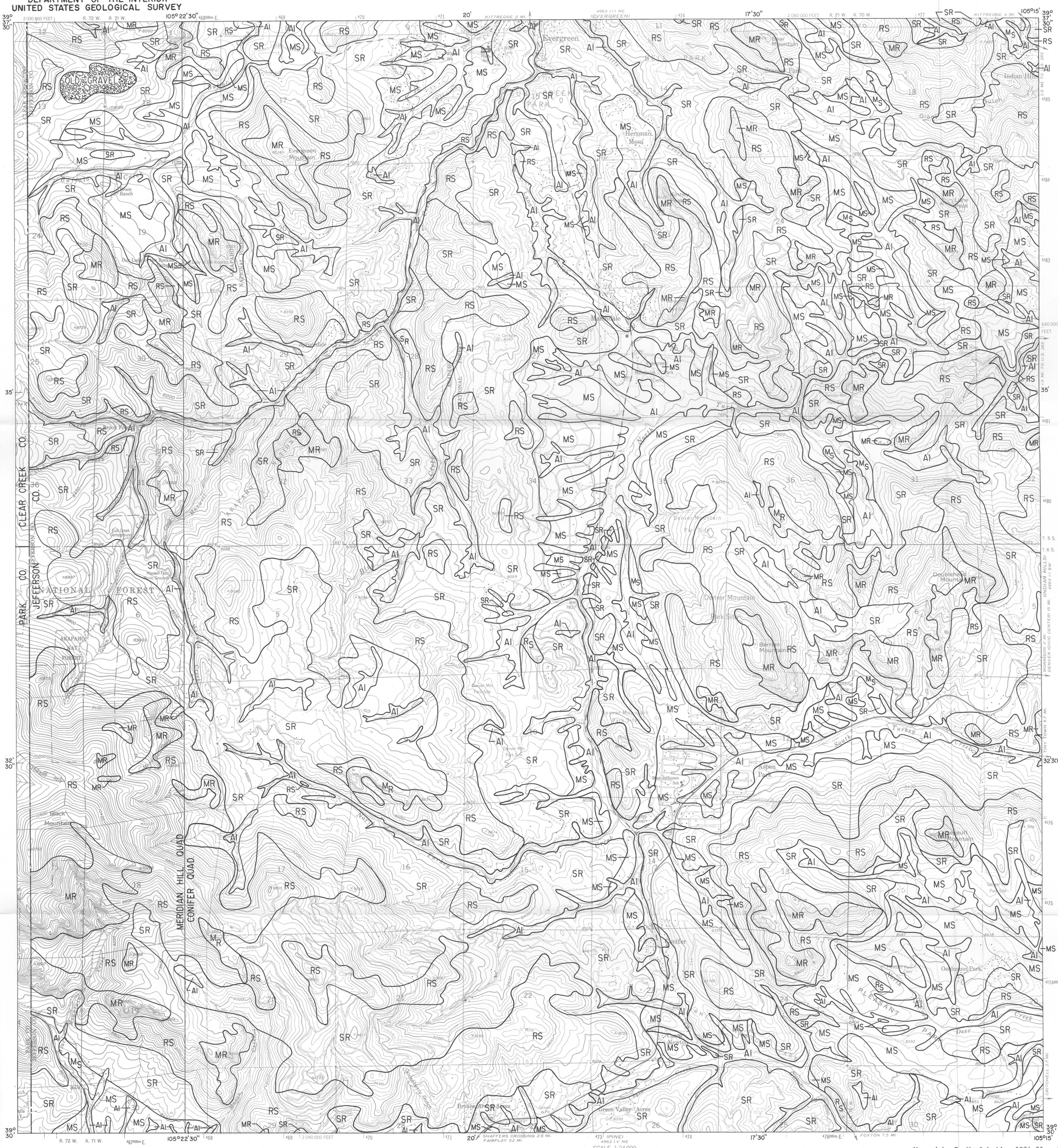
DEPARTMENT OF THE INTERIOR
UNITED STATES GEOLOGICAL SURVEY

MISCELLANEOUS FIELD STUDIES
MAP MF-770
CONIFER QUAD., COLO.



Base from U.S. Geological Survey
Meridian Hill, 1957, and Conifer,
1965, photorevised 1971

Mapped by P. W. Schmidt, 1974-75

PREPARATION AND USE OF THIS MAP

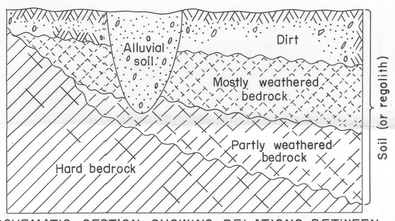
This map shows the relative amounts of soil and hard bedrock within the upper 6 feet (1.8 m) of the land surface. (See schematic section.) It provides information useful for broad-scale land-use decisions. The map is based on reconnaissance field studies and aerial-photograph interpretation. The depth of soil and partly weathered rock was measured directly in roadcuts and other excavations and was estimated from seismic profiles in areas of few or no excavations or outcrops. Secondary characteristics of map units, such as percentage of outcrop in a given area, steepness of slope, type and amount of vegetation cover, and general appearance of the landscape, were used in drawing the boundaries between map units. Localities were assigned to the different map units by field inspection; lines separating the different map units were then drawn by aerial-photograph interpretation and were transferred photogrammetrically to the base map.

The bedrock geology of this area, including bedrock types and orientation of structural features, is shown on the reconnaissance geologic map of the Conifer quadrangle by Bryant (1974). The old gravel deposit shown in the northwest corner of the map (patterned) is also from Bryant (unpub. data).

This map is not intended to replace on-site inspection of individual sites for specific purposes.

The readability of this map can be enhanced by coloring the different map units: Al-yellow, MS-brown, SR-orange, RS-green, and MR-red.

The U.S. Geological Survey has initiated a program of geologic and hydrologic studies of the Front Range Urban Corridor. This study of mountain soils is part of that ongoing program.



SCHEMATIC SECTION SHOWING RELATIONS BETWEEN DIFFERENT SURFICIAL MATERIALS AND BEDROCK

"Soil" is used here to include all unconsolidated or partly weathered material over hard bedrock.

"Dirt" is the upper part of the "soil" and here refers to an amorphous mixture of sand, silt, clay and rock fragments above weathered bedrock. The upper part of the dirt commonly contains organic matter.

Mostly weathered bedrock is "rotted," and fragments of it can be crushed or broken by hand. Weathered bedrock still retains its original structure including such features as foliation, layering, and minor folds. Chemical weathering has produced moderate yellowish- or reddish-brown colors.

Partly weathered bedrock is firm but can be dug with a pick. Fragments can be broken with considerable effort by hand. When hit with a hammer makes a thud rather than a metallic ring like that of fresh rock. In areas underlain by Silver Plume Quartz Monzonite (see sketch map) the bedrock may be more resistant and intact than other rock types. Chemical weathering has produced light-brown and yellow colors.

REFERENCES

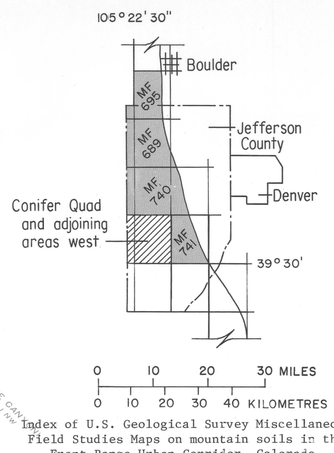
Bryant, Bruce, 1974, Reconnaissance geologic map of the Conifer quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Field Studies Map MF-597.

Pierce, K. L., and Schmidt, P. W., 1975a, Reconnaissance map showing relative amounts of soil and bedrock in the mountainous part of the Eldorado Springs quadrangle, Boulder and Jefferson Counties, Colorado: U.S. Geol. Survey Misc. Field Studies Map MF-695.

Pierce, K. L., and Schmidt, P. W., 1975b, Reconnaissance map showing relative amounts of soil and bedrock in the mountainous part of the Ralston Buttes quadrangle and adjoining areas to the east and west in Jefferson County, Colorado: U.S. Geol. Survey Misc. Field Studies Map MF-689,

Schmidt, P. W., 1976a, Reconnaissance map showing relative amounts of soil and bedrock in the mountainous part of the Morrison-Evergreen quadrangles and adjoining areas to the west in Jefferson County, Colorado: U.S. Geol. Survey Misc. Field Studies Map MF-740 (in press).

Schmidt, P. W., 1976b, Reconnaissance map showing relative amounts of soil and bedrock in the mountainous part of the Indian Hills quadrangle, Jefferson County, Colorado: U.S. Geol. Survey Misc. Field Studies Map MF-741 (in press).



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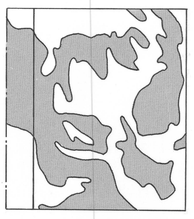
AREA UNDERLAIN BY SILVER PLUME QUARTZ MONZONITE



About half of the map area is underlain by Silver Plume Quartz Monzonite as shown in the shaded area of the sketch map. This rock type has been singled out due to its weathering characteristics. After partial weathering, the mineral grains forming the rock are still interlocking, and thus holding the rock together. This results in a firm but partly weathered bedrock at or near the ground surface. Removal of the partly weathered bedrock can be difficult. During excavation the bedrock often breaks into blocks, which can then be crushed into grus with effort. The distinction locally between the partly weathered bedrock and hard bedrock is hard to make, resulting in local difficulties in mapping the units, especially the RS-SR boundary. Some special aspects of the regolith formed from Silver Plume Quartz Monzonite are noted in the text.

MAP UNIT	DESCRIPTION	LANDSCAPE CHARACTERISTICS	RELATIVE CONSTRAINTS REGARDING SEPTIC SYSTEMS WITH LEACH FIELDS	RELATIVE EASE OF EXCAVATION IN UPPER 6 FT (1.8 M) [Roads, utility corridors, foundations]
AL Alluvial soil	More than 85 percent of area is covered by alluvial soil 5 ft (1.5 m) to more than 10 ft (3 m) thick with variation in average grain size depending on topographic position. In small upland basins consists primarily of silt, sand, and clay, which grades laterally into colluvium containing angular rock fragments. Beneath valley floors along major drainages, the upper 1-4 ft (0.3-1.2 m) generally is silty sand which overlies coarse sand and gravel, and at the base of valley slopes commonly includes colluvium with angular rock fragments. Fine-grained alluvium is commonly rich in organic matter. Areas underlain by Silver Plume Quartz Monzonite commonly have a high content of coarse sand and may include boulders	In upland areas, gently sloping valley bottoms are cut locally by small steep-walled gullies; lush grassy vegetation. On valley floors adjacent to larger drainages, narrow sinuous flats support coniferous and deciduous trees, shrubs, and grasses	WATER-TABLE CONSTRAINTS--Although the unconsolidated materials in this area are easily excavated for septic systems with leach fields, the seasonal rise of the water table and occasional local inundation of the surface make this area one of high potential constraint. Slopes are gentle. Only after careful site evaluation, especially during infiltration of the spring snowmelt, can this area be considered safe for septic systems with leach fields. Along major valleys, septic systems with leach fields may drain through highly permeable alluvial gravels and contaminate nearby streams	EASY--Hard bedrock absent at or near the surface, making most shallow excavations easy. Machinery can get mired in areas of seasonally wet ground, especially in humus-rich sediment
MS Mostly soil	More than 70 percent of area is covered by dirt and weathered bedrock to a depth of at least 6 ft (1.8 m). The dirt at the surface averages 2-4 ft (0.6-1.2 m) in thickness. It generally overlies at least 3 ft (0.9 m) of mostly weathered bedrock which, in turn, overlies at least 2 ft (0.6 m) of partly weathered bedrock, which grades down into hard bedrock. This map unit includes scattered outcrops of hard bedrock; in areas underlain by Silver Plume Quartz Monzonite scattered or concentrated residual boulders are common, with local areas of shallow depths to partly weathered bedrock	Gently rolling to nearly flat slopes covered mostly by grass and, locally widely spaced coniferous trees. Scattered sparse bedrock outcrops, mostly pegmatite dikes, locally protrude through the vegetation	FEWEST CONSTRAINTS--Fewest geologic constraints for septic systems with leach fields, except for possible water-table situations where sites near local drainages may be seasonally saturated, especially following spring snowmelt. Detailed site study should be made to determine if seasonal saturation will be a problem. Constraints are fewest because hard bedrock is only locally present within 6 ft (1.8 m) of ground surface and because slopes are gentle. With proper planning, this area can accommodate the greatest, but still limited, density of septic systems with leach fields	EASY--Hard bedrock generally absent at or near the surface, making most shallow excavations easy
SR Soil with subordinate rock	From 40-70 percent of area is covered by dirt and weathered bedrock to a depth of at least 6 ft (1.8 m). The dirt at the surface averages 1-3 ft (0.3-0.9 m) in thickness. It generally overlies at least 4 ft (1.2 m) of mostly to partly weathered bedrock. At a depth of 6 ft (1.8 m), partly weathered bedrock is more common than mostly weathered bedrock. Hard bedrock is at or just beneath the ground surface in about 10-30 percent of the area. In hilly terrain underlain by Silver Plume Quartz Monzonite, firm but partly weathered bedrock is common at shallow depths	Gentle to moderate slopes covered by grass or open coniferous forests. Slopes locally are steep; north-facing slopes have dense coniferous forests and south-facing slopes have scattered coniferous trees and shrubs. Bedrock outcrops are commonly small and scattered	FEW CONSTRAINTS--Few geologic constraints because hard bedrock is at or near the surface in less than 40 percent of the area and because slopes are mostly gentle to moderate. With proper planning, can accommodate a moderate density of septic systems with leach fields	MODERATELY EASY--Hard bedrock at or near the surface only locally, making most shallow excavations moderately easy if such hard bedrock areas are avoided. In areas underlain by Silver Plume Quartz Monzonite, resistant partly weathered bedrock is locally encountered at shallow depths
RS Rock with subordinate soil	From 10-50 percent of area is covered by dirt and weathered bedrock to depths of 6 ft (1.8 m). Where soil is 6 ft (1.8 m) deep, the dirt at the surface is commonly about 1 ft (0.3 m) thick but may be as much as 4 ft (1.2 m). Much of this dirt has moved downslope and concentrated in pockets. This dirt generally overlies a few feet of partly weathered bedrock. The areas with soil as thick as 6 ft (1.8 m) commonly occur in pockets between rock outcrops or locally as thick colluvium along drainages at the base of steep slopes. Hard bedrock is at or very near the ground surface in more than 30 percent of the area	Moderate to steep slopes covered with a dense to scattered coniferous forest. Rubbly surfaces covered by shrubs and sparse grass are common on south-facing slopes, whereas very dense coniferous forests that often mask the soil and bedrock surface are common on north-facing slopes. Bedrock outcrops are generally extensive, locally with large knobs or pinnacles	MANY CONSTRAINTS--Many geologic constraints because of the large amount of hard bedrock at or near the ground surface and because slopes are mostly moderate to steep. With proper site evaluation, this area can accommodate only a limited density of septic systems with leach fields	DIFFICULT--Hard bedrock common at or near the surface, making most shallow excavations difficult. Many hard bedrock areas may be avoided if local conditions are carefully studied and development is limited
MR Mostly rock	Less than 10 percent of area is covered by dirt and partly weathered bedrock to a depth of 6 ft (1.8 m). Soil, where present, fills small pockets where dirt and rock rubble have been concentrated by downslope movement. More than 50 percent of the area is hard bedrock outcrops; much of the remainder consists of rock fragments underlain by hard bedrock at shallow depths. Generally occurs on ridge crests and very steep slopes	Mostly rock outcrops on ridge crests and cliffs, covered with scattered trees and shrubs growing in cracks between rocks and on pockets of soil. Rock fragments mantle the slopes between outcrops	MOST CONSTRAINTS--Most geologic constraints because hard bedrock or coarse rock rubble is common at or near the ground surface and because slopes are mostly steep. Septic systems with leach fields should be restricted to those few areas where acceptable amounts of unconsolidated material can be located on suitable slopes or where pervious fill can be added	VERY DIFFICULT--Hard bedrock and rock fragments are nearly continuous at or near the surface, making most shallow excavations very difficult

RECONNAISSANCE MAP SHOWING RELATIVE AMOUNTS OF SOIL AND BEDROCK IN THE CONIFER QUADRANGLE AND ADJOINING AREAS TO THE WEST IN JEFFERSON COUNTY, COLORADO

By
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1976

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