

UNITED STATES DEPARTMENT OF THE INTERIOR  
GEOLOGICAL SURVEY

Engineering Geology of Surficial Materials in the Price 30' x 60' Quadrangle  
Carbon, Duchesne, Wasatch, and Utah Counties, Utah

By

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This map is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature.

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LIST OF MAP UNITS

Ef	ENGINEERED FILL
Md	MINE DUMPS
Ls	LANDSLIDE DEPOSITS
A1	ALLUVIAL DEPOSITS
Af	ALLUVIAL FAN DEPOSITS
Co1	COLLUVIUM
Rs	RESIDUUM FROM SHALE
Pd	PEDIMENT DEPOSITS
	COAL MINING AREAS
Bx	BEDROCK
22	SOIL SAMPLE LOCATION

## DESCRIPTION OF MAP UNITS

- Ef ENGINEERED FILL--Gravel, sand, silt, and clay. Includes compacted fill for buildings, railroads, and highway right-of-ways. Generally 1.5-6 m thick
- Md MINE DUMPS--Consists of refuse from mining operations, such as clinker and coke breeze from old mining and coking operations mixed with later debris consisting of bony coal, coaly shale, rock fragments, pieces of mine timber, and miscellaneous trash. Thickness as much as 20 m
- Ls LANDSLIDE DEPOSITS--Earth material ranging in size from clay particles to boulders larger than 1 m in diameter. Forms an unstable mass when initially deposited; may later be stable. Landslide activity may be reactivated by an increase in pore-water pressure, removal of supporting downslope material, addition of material upslope, or seismic disturbances. Thickness from 1 to 3 m; as much as 6.5 m thick in the Bookcliffs area
- A1 ALLUVIAL DEPOSITS--Light- to dark-grayish-brown sand, silt, and clay; local interbedded gravel in lower part of the unit. Occurs chiefly along the Price River and its tributaries, and other streams tributary to the Green River. Land with alluvial deposits used for pastures and hayfields. Commonly less than 1.5 m thick in beds of streams and washes; as much as 15 m thick along the Price River from the city of Price southward to Wellington
- Af ALLUVIAL-FAN DEPOSITS--Brown to light-brown, poorly sorted sand, silt, and gravel. Pebbles, cobbles, and small boulders more abundant within 1 km of the canyon mouths and in the central part of the fan than elsewhere. Fans are deposited in major valleys at the mouths of principal tributaries. Generally well drained, more permeable than nearby areas underlain by shale or by residuum derived from shale. A possible source of aggregate and road metal. Commonly 9-15 m thick in central part, thinning to a few meters at the edges and merging imperceptibly with other surficial units at the distal end
- Co1 COLLUVIUM--Gray, dark-gray, and brown to light-brown, sandy silt and clay. Developed on moderate to gentle slopes; generally transitional downslope to present-day stream deposits. Easily eroded by flash floods and rill wash on slopes greater than 10°. As much as 15 m thick along the Roan Cliffs

- Rs RESIDUUM FROM SHALE--Gray to grayish-brown silty clay, derived from underlying Mancos shale. Contains gypsum and sodium salts that inhibit plant growth. The silty clays undergo hydration and dehydration with changes in humidity and moisture content. Particles of sediment swell and contract, contributing to the weathering process. The mixed-layer clay allows only slight penetration of water below the surface and forces much of the precipitation to run off. During heavy rains, the residuum surfaces are impassable to vehicles due to formation of mud on the surface, although the material may be dry a few centimeters below. The surfaces generally dry out within a few hours after a drenching rainstorm
- As an engineering soil unit, the residuum is considered troublesome because of the moderate to high shrink-swell potential, moderate to high susceptibility to erosion on slopes, low permeability, and high salinity and pH
- Commonly a thin veneer overlying shale. Generally not more than 2 m thick
- Pd PEDIMENT DEPOSITS--Subrounded to subangular, crudely bedded pebbles, cobbles, and boulders in a sandy silty matrix that caps pediment surfaces cut in Mancos Shale. Pediments stand as isolated buttes and mesas as much as 90 m above surrounding lowlands, or as high-level, sloping plains as much as 10 km long and 5 km wide. They are generally well-drained, gently sloping planar surfaces with no adverse engineering characteristics. The surfaces trend toward ancestral drainage systems from sources in the Book Cliffs and Wasatch Plateau. Source of concrete aggregate and road metal. Thickness 2-3 m and as much as 15 m thick near the mountain front
-  COAL MINING AREA--Areas of land surface underlain by known active, inactive, and abandoned coal mines. Surface and subsurface effects of underground mining may occur during mining activity, or may not occur until many years after a mine has ceased operations. Some effects of underground coal mining include surface cracking and buckling, differential subsidence, disruption of surface and subsurface waterflow patterns and regimes, venting of noxious gases and underground fires
- Bx BEDROCK--Sandstone, coal, mudstone, and limestone forming cliffs, plateaus, cuervas, and bluffs. More resistant to erosion than the shale units

Table 1.--Selected surficial-materials test results

[NP, nonplastic; leaders (--), indicate no value]

Sample No.	Map unit (name and symbol)	Particle-size distribution <sup>1</sup> A.S.T.M classification (in millimeters)				Atterberg limits <sup>2</sup>			Reaction (10 percent HCl)	Unified soil classification
		Gravel (>4.76)	Sand (4.76- 0.075)	Silt (0.075- 0.005)	Clay (<0.005)	LL	PL	PI		
1	Residium	0	3	46	51	39	24	15	Strong-----	CL
2	from	0	2	35	63	46	25	21	---do-----	CL
3	shale.	0	16	53	31	27	19	8	---do-----	CL
4	(Rs)	0	3	58	39	27	17	10	---do-----	CL
5		0	8	74	18	24	17	7	---do-----	CL
6		0	5	68	27	26	19	7	---do-----	CL
7		0	1	29	70	52	20	32	---do-----	CH
8		0	0	46	54	50	20	30	---do-----	CH
9		0	3	45	52	36	20	16	---do-----	CL
10		0	4	48	48	34	20	14	---do-----	CL
11		0	29	50	21	22	21	1	---do-----	CL-ML
12	(Col)	0	27	50	23	24	20	4	---do-----	CL-ML
13		0	4	62	34	28	16	12	---do-----	CL-ML
14		0	24	58	28	22	17	5	Moderate----	CL-ML
15		0	2	47	51	28	16	12	---do-----	CL
16	Alluvium-----	0	29	62	9	--	--	NP	---do-----	SM
17	(Al)	0	30	56	14	--	--	NP	---do-----	SM
18		0	13	71	16	--	--	NP	---do-----	SM
19	Pediment	13	35	42	10	--	--	NP	---do-----	GM
20	deposit:	20	40	35	5	--	--	NP	---do-----	GM
21	(Pd)	17	31	43	9	--	--	NP	---do-----	GM
22		22	36	39	3	--	--	NP	---do-----	GM
23		25	26	36	13	--	--	NP	---do-----	GM

<sup>1</sup>American Society for Testing and Materials (1964).<sup>2</sup>U.S. Bureau of Reclamation (1974).