COLUMNAR SECTION

GENERALIZED SECTION FOR THE ENGINEER MOUNTAIN QUADRANGLE.

SCALE: 1 INCH = 1000 FEET.

System.	Series.	Formation.	Symbol.	Columnar Section.	Thickness in Feet.	Character and Distribution of Formations.
CRETACEOUS	UPPER CRETACEOUS	Mancos shale.	Km		0–300	Soft dark-gray or almost black carbonaceous clay shale containing thin lenses or discontinuous layers of impure limestone. Embraces the Colorado group and a part of the Pierre division of the Montana. Fossils more or less abundant in the limestone layers.
		Dakota sandstone.	Kd		100–150	Gray or rusty brown quartzose sandstone or quartzite with a variable conglomerate, containing small chert pebbles at or near base. Carbonaceous shale partings at several horizons and low-grade coal. Some indistinct fossil leaves.
JURASSIC		McElmo formation	Jme		400–500	A complex of alternating friable fine-grained yellowish or grayish sandstones and shales. The sandstones are rarely over 20 feet thick. In many places they include flakes of greenish clay or shale. The shales are chiefly green but are locally pink, dark red, or chocolate-brown. Some shale layers are sandy; others highly calcareous. No fossils.
		La Plata sandstone.	Jlp		250–400	Principally two massive friable white sandstone beds, with a narrow band of dark limestone or calcareous shale between them. The sandstones are quartzose, of even grain, cross-bedded, and form massive cliffs. The limestone or calcareous shale is locally brecciated and recemented. No determinable fossils.
		UNCONFORMITY				
TRIASSIC		Dolores formation.	Trd		150–400	Fine-grained bright-red sandstone and shale. Near the base is a fine limestone conglomerate containing teeth of a crocodile (*Belodon*) and of a megalosauroid dinosaur; also rare Triassic gasteropod shell similar to *Viviparus*.
		UNCONFORMITY				
CARBONIFEROUS	PERMIAN?	Cutler formation.	Cc		1000–2000	A complex of bright-red sandstones and lighter-red or pinkish grits and conglomerates alternating with sandy shales and earthy or sandy limestones of several shades of red.
	PENNSYLVANIAN	Rico formation.	Cr		200–350	Dark reddish-brown sandstone and pink grit, with intercalated greenish or reddish shale and sandy fossiliferous limestone.
		Hermosa formation.	Ch		2000–2200	Series of limestones, grits, sandstones, and shales of variable distribution and development. Limestone in thick, massive blue-gray beds predominates in the middle and upper parts of the section, the lower portion being mainly greenish sandstone and shale, with a few limestone layers. Numerous invertebrate fossils occur in shales and limestones.
		Molas formation.	Cm		0–75	Red calcareous shale and sandstone, containing pebbles of Mississippian chert and limestone and limestone lenses with Pennsylvanian fossils.
		UNCONFORMITY				
	MISS.	Ouray limestone.	DCo		100–300	Buff or white limestone, compact above, thin-bedded below, with shale and quartzitic partings. Mississippian fossils in upper third: Devonian in lower portion.
DEVONIAN		Elbert formation.	De		80±	Thin-bedded limestone, sandstone, and shale containing casts of salt crystals. Devonian fish remains occur rarely near top.
		UNCONFORMITY				
CAMBRIAN	UPPER CAMB.?	Ignacio quartzite.	Ci		0–80	Massive quartzite, conglomerate locally near base, thin-bedded with shaly partings in middle portion.
		UNCONFORMITY				
ALGONKIAN		Uncompahgre formation, with shale members.	Au (Aus)			Massive and some thin-bedded quartzites and occasional bands of shale or slate. Quartzites range in color from white through pink, brown, and purple to black. Shales are rusty brown or black.
ARCHEAN		Schist and gneiss.	Ars			Quartz-mica and amphibolite schist and less prominent granite gneiss, much crumpled and contorted.
		Granite and gabbro, intrusive in pre-Cambrian rocks.				

ILLUSTRATIONS I

FIGURE 2.—SCARP OF HERMOSA FORMATION EAST OF ENGINEER MOUNTAIN.
Illustrates the manner in which massive limestone and sandstone beds alternate with soft shale. Looking north. Pass of Coalbank Hill on the right. Mountains near Silverton in the distance.

FIGURE 3.—SLIDEROCK RIDGE FROM THE EAST, LOOKING ACROSS CASCADE CREEK.
Shows a characteristic rock stream of trachytic debris from a sill in Cretaceous beds forming the crest of the ridge.

FIGURE 4.—HERMOSA CLIFFS SEEN FROM LILY POND IN AREA NOW COVERED BY IGNACIO RESERVOIR.
Shows relation of the broad bench occupied by Ignacio Reservoir to the scarp of Hermosa Cliffs, which rise 1800 feet above the bench.

FIGURE 5.—WESTERN SAN JUAN MOUNTAINS FROM BLACKHAWK PEAK.
Shows the character of the country between the San Juan Mountains, in the distance, and the Rico Mountains. On the right is Hermosa Peak; in Section Point the white La Plata sandstone and red Dolores beds dip away from the point of view under the influence of the Rico Mountains uplift.

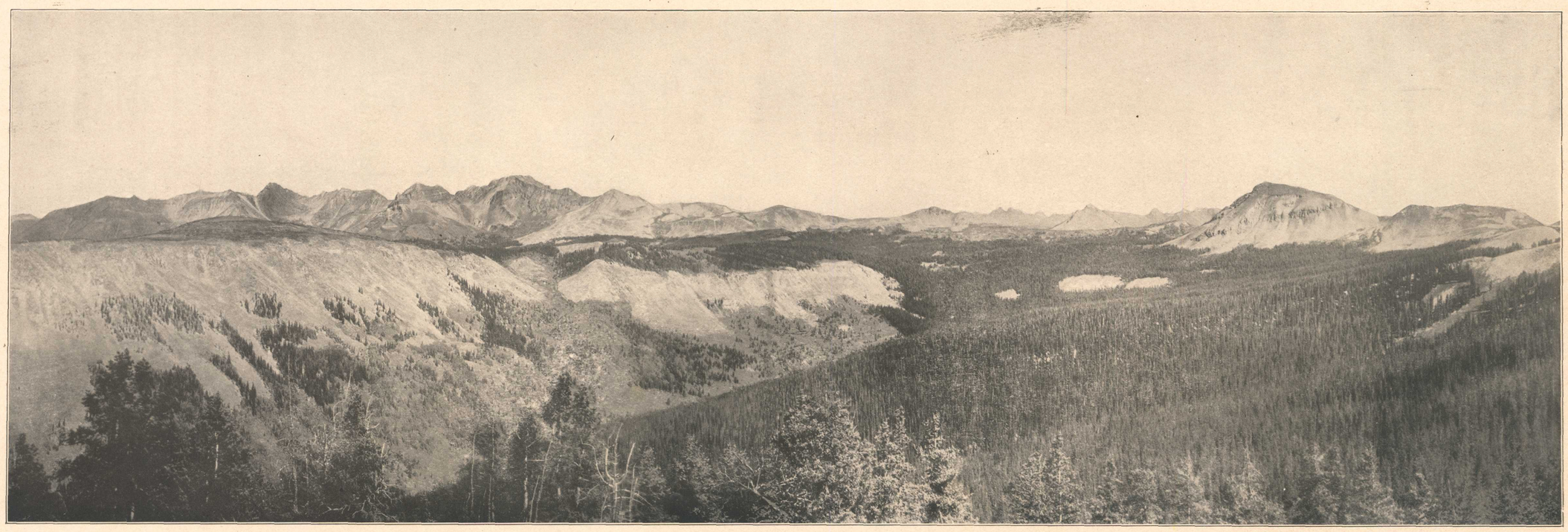

FIGURE 6.—VIEW LOOKING EASTWARD ACROSS BARLOW CREEK TOWARD FLATTOP, THE WESTERN PEAKS OF THE SAN JUAN MOUNTAINS, AND HERMOSA PEAK.
Barlow Creek valley in the foreground; beyond it, on the left, the porphyry laccolith of Flattop, capped by Cretaceous beds. The highest summit, in the distance, is Grizzly Peak, carved in a monzonite stock; to the right of it is Sliderock Ridge, with a great rock stream of quartz trachyte debris. On the right is Hermosa Peak, the upper part of which is intrusive monzonite porphyry; the lower slopes are of quartz trachyte belonging to a sill which extends from the ridge on the extreme right to the white cliffs in the middle ground. On the left of Hermosa Peak is the bare peak of Engineer Mountain, and the quartzite peaks of the Needle Mountains in the distance.

ILLUSTRATIONS II

FIGURE 7.—ENGINEER MOUNTAIN FROM THE EAST.
The basal contact of the quartz trachyte laccolith is at the top of the talus slope. Shows the columnar structure of the quartz trachyte and the absence of rock streams on this side.

FIGURE 8.—ENGINEER MOUNTAIN FROM THE NORTH.
Shows cliffs of columnar quartz trachyte, inclined strata at the base of the intrusion, and a rock stream of quartz trachyte debris with characteristic surface details.

FIGURE 9.—ENGINEER MOUNTAIN FROM THE WEST.
Shows a rock stream descending from the quartz trachyte laccolith of the summit.

FIGURE 10.—HORNBLENDE SCHIST IRREGULARLY INTRUDED BY TWILIGHT GRANITE, LITTLE CASCADE CREEK.

FIGURE 11.—HORNBLENDE SCHIST SPLIT INTO SLABS BY TWILIGHT GRANITE, LITTLE CASCADE CREEK.

FIGURE 12.—HORNBLENDE SCHIST IRREGULARLY INTRUDED BY TWILIGHT GRANITE, LITTLE CASCADE CREEK.

FIGURE 13.—ENGINEER MOUNTAIN AND POTATO HILL FROM RIDGE NORTH OF LITTLE CASCADE CREEK.
View looking diagonally across the canyon of Cascade Creek toward Potato Hill on the right and Engineer Mountain on the left. On the extreme right the slope rises to the West Needle Mountains. The roche moutonnee forms in the middle and foreground were produced by the west lobe of the Animas Glacier.

FIGURE 14.—VIEW LOOKING UP ANIMAS VALLEY FROM THE EAST SIDE NEAR CARSON CREEK, DURANGO QUADRANGLE.
Shows the long line of Hermosa Cliffs in the Engineer Mountain quadrangle in relation to the broad Animas Valley. The ledge and bench of Ouray limestone are visible at the base of the cliffs. On the right is the pre-Cambrian area; the gorge of the Animas near its mouth appears on the left.

FIGURE 15.—VIEW LOOKING WESTWARD ACROSS NORTHERN PART OF ENGINEER MOUNTAIN QUADRANGLE FROM NORTH END OF WEST NEEDLE MOUNTAINS.
Shows the structure of the Carboniferous beds in the middle ground. . At the right the Telluride conglomerate rests unconformably on the Paleozoic beds. The dark point on the left is Jura Knob.