

Map Unit Properties Table

Period	Unit Name (Symbol)	Description	Topographic Expression	Erosion Potential	Hazard Potential	Paleontologic Resources	Cultural and Mineral Resources
Quaternary	Alluvium deposits (Qal)	Sand, silt, & gravels deposited mainly in stream beds & flood plains; soil, sand, & gravel of alluvial origin; variable thickness	Associated with stream topography	Depends on grain size & process	Low	Holocene insect fossils from a number of Ancestral Puebloans archeological sites (Scott et al., 2001)	Sand & gravel
	Colluvium deposits (Qls)	Irregular, heterogeneous deposits of boulders, gravel, sand & silt derived mostly from talus & landslides; variable thickness	Hummocky landslide topography	Depends on depositional slope	Low		Sand & gravel
	High level terrace gravels (Qtg)	Alluvial gravel and boulder deposits on mesa tops in Mancos Valley. Qtgt: high- level terrace gravels with travertine cement.	Define old stream terraces	Low on mesa tops	Low		Sand & gravel
	Travertine (Pleistocene) (Qtr)	Calcium carbonate deposits, often associated with major joints & faults. Possibly the result of hot spring activity. Age uncertain (2003). No age- dating research on these deposits.	Variable	High	Low		
Tertiary	Minette (Oligocene: 32- 27 Ma) (Ti)	Igneous plugs & dikes, light gray to almost black biotite & olivine- rich lamprophyric rocks containing abundant breccias & locally rounded cobbles of basement rocks; variable thickness.	Dikes	Less resistant to erosion than sandstone	Low		
Unconformity							
Cretaceous	Mesaverde Group: Cliff House Sandstone (Kch)	White to red- brown, pale to dark yellowish- orange, fine to medium grained sandstones interbedded with sandy shales; upper & lower units of massive sandstones separated by a unit of thinner bedded sandy shales; cliffs are generally over 30 m (100 ft) thick; sandstone is cross- bedded; intertongues toward base with Menefee Fm. & includes locally an upper tongue, a middle tongue (Barker Dome tongue) & a lower tongue; 61 - 91 m (200- 300 ft.)	Cliff former; sandy shale unit is recessive beneath upper sandstone cliff	Sandstone is resistant to erosion; middle shale unit is less resistant	Potential cliff collapse if middle shale unit and Menefee shale erode and cliffs are undercut	<u>Invertebrates:</u> Ammonites: <i>Baculites maclearni</i> Landes; fragments of <i>Placentoceras sp.</i> ; Bivalves: <i>Ethmocardium whitei</i> , <i>Cymbophora</i> , <i>Modiolus</i> , <i>Dosinopsis</i> , <i>Inoceramus</i> ; echinoids; sea star; <u>Vertebrates:</u> jaw, fins, teeth from bony fish <i>Enchodus</i> , shark teeth; amphibians, reptiles (mosasaurs, plesiosaurs, turtles). <u>Trace fossils:</u> burrows of Crustacean <i>Ophiomorpha</i>	Puebloan cliff dwellings in large alcoves; Puebloan sites on mesa top. Potential hydrocarbon reservoir rock in the subsurface
	Mesaverde Group: Menefee Formation (Kme)	Dark gray & brown carbonaceous shales, thin siltstones & thin coal beds in upper & lower units; middle sandy unit of poorly sorted, irregular bedded sandstones, sandy shales & bentonite beds; lower coal member about 28 m (93 ft) thick with individual coal beds ranging from 0.1- 0.4 m (0.4- 1.2 ft) thick; coal beds are lenticular and extend several miles across Mesa Verde area; middle member is 30 m (100 ft) thick in park. Coal seams in upper member range from 0.1- 0.5 m (0.3- 1.6 ft) thick. Lenticular sandstone is cross- bedded. Intertongues with Cliff House sandstone & Point Lookout Sandstone; total thickness: 104- 244 m (340- 800 ft)	Sandstones form benches & cliffs, shales form slopes; two sandstone units 6 m (20 ft) thick in middle member form ledges along East Rim.	Sandstone is resistant to erosion; shale is less resistant	Unknown	No invertebrate or vertebrate fossils. Fossil plants: petrified wood (conifer); <i>Auricularia</i> ; palms <i>Sabal</i> & <i>Sabalites</i> ; grass blades, crushed stem of <i>Calamites</i> ; twig of <i>Sequoia</i> , unknown fern; monocot <i>Brachyphyllum</i> , leaves from <i>Sycamore</i> , <i>Theaceae</i> , <i>Laurel</i> , <i>Camelia</i> , <i>Ficus</i> trees; flower bud from <i>Paleoaster iniqueriende</i>	Thin coal seams
	Mesaverde Group: Point Lookout Sandstone (Kpl)	White to yellow to yellowish- orange, fine to medium grained sandstone with shaly sandstone breaks, highly cross- bedded; 88- 147 m (290- 480 ft). Upper member is massive, cross- bedded sandstone; massive sandstone is a series of overlapping sandstone wedges; individual beds range from 30 cm (1 ft) to over 100 cm (3 ft) thick; total thickness: 70- 104 m (230- 340). Lower member is alternating sandstone & shale; beds are 3 cm (1 in) to 30 cm (1 ft) thick and interlayered with dark olive- gray shale containing fossil debris; shale contains gypsum; total thickness: 25- 38 m (80- 125 ft).	Upper member is a cliff former: Lower unit forms ledges and slopes	Sandstone is resistant to erosion; shale is less resistant	Cliff/ledge collapse if shale erodes and sandstone is undercut	Few identifiable fossils; trace fossils are common; large <i>Baculites cf haresi</i> , broken inoceramids, drift wood	Small alcoves in the massive upper sandstone Potential hydrocarbon reservoir rock in the subsurface
	Mancos Shale: Cortez Member (Km)	Cortez Member: Dark gray to black; transitional from calcareous silty shale & marlstone at the base to interbedded sandstone and shale at the gradational upper contact with the Point Lookout Sandstone; primarily dolomitic mudstone with little bentonite; almost 396 m (1300 ft) thick	Slope former	High	Erosion may cause slope to fail	Invertebrates: baculites, scaphites, <i>Placentoceras planum</i> Hyatt, crinoid <i>Uintacrinus</i>	Mancos Shale is a potential hydrocarbon source rock in the subsurface

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Cretaceous	Mancos Shale: Smokey Hill Member (Kms)	Smokey Hill Member: Dark gray to black, calcareous shale & marlstone; minor bentonite; located about 274 m (900 ft) above the base of the Mancos Shale; about 91 m (300 ft) thick; also referred to as the <i>Niobrara</i> member	Prominent oyster bench about 274 m (900 ft) above base of Mancos; forms prominent benches around north edge of the Mesa Verde	High except for oyster bench	Erosion may cause slope to fail	Oyster <i>Pseudoperna congesta</i> ; <i>Scaphites depressus</i> ; <i>Baculites codyensis</i> ; Inoceramids <i>Inoceramus (Platyceramus) platinus, I. (Endocostea) balticus, I. (Magadiceramus) subquadratus</i> ; ammonites <i>Desmoscaphites bassleri</i> , <i>Scaphites hippocrepis</i>	
	Mancos Shale: Montezuma Valley Member (Km)	Montezuma Valley Member: Dark gray, calcareous shale & marlstone; contains concretions; thin unit about 15 m (50 ft) thick.	Slope former	High	Bentonite may cause building & maintenance problems	Numerous prionocyclids, scaphites, baculites, bivalves, inoceramids, oysters	
	Mancos Shale: Juana Lopez Member (Kmj)	Dark, silty shale with numerous beds of orange weathering calcarenite & thin limestone; shales contain bentonite; highly fossiliferous; located about 150 m (500 ft) above base of Mancos Shale; 43 m (140 ft) thick; oldest member of Mancos to crop out within the park.	Limestone ridges separated by shale units;	Relatively resistant to erosion	Bentonite may cause building & maintenance problems	Highly fossiliferous; ammonites and bivalves are common & well preserved. Ammonites: <i>Prionocyclus macombi</i> Meek, <i>P. wyomingensis</i> Meek, <i>P. novimexicanus</i> , <i>P. Quadratus</i> Cobban; <i>Scaphites warreni</i> , <i>S. whitfieldi</i> ; <i>Baculites undulatus</i> d'Orbigny, <i>B. yokoyami</i> ; Bivalves: <i>Inoceramus dimidius</i> White, <i>I. Perplexus</i> Whitfield, <i>Nacaisolopha lugubris</i>	
	Mancos Shale: Blue Hill Member (Km)	Dark gray, noncalcareous shale or mudstone with some interbedded sandstones; contains bentonite, but not as much as Fairport member; about 76 m (250 ft) thick; not exposed in MEVE; not easily recognized topographically	Slope former	High	Bentonite may cause building & maintenance problems	Sparsely fossiliferous	
	Mancos Shale: Fairport Member (Km)	Dark gray, very calcareous, bentonitic shale; about 28 m (92 ft) thick. Not exposed in MEVE.	Slope former	High	Bentonite may cause building & maintenance problems	Ammonites: juvenile <i>Collignonicerus woollgari</i> ; also small oysters, fragments of inoceramids, barnacle fragments, shark teeth	
	Mancos Shale: Bridge Creek Member (Kmb)	Light gray limestone & calcareous shale about 24 m (80 ft) above Dakota- Mancos contact; 15 m (50 ft) thick; also referred to as the <i>Greenhorn</i> member; crops out north of MEVE capping small erosion remnants of soft Graneros Shale and is about 3- 4 m (10- 14 ft) thick.	Topographic limestone bench surrounded by recessive shale units	High except for limestone bench	Bentonite may cause building & maintenance problems	Varied molluscan fauna: inoceramids of genus <i>Mytiloides</i> ; ammonites of genera <i>Mammites</i> , <i>Watinoceras</i> , <i>Baculites</i> , <i>Kamerunoceras</i> , and others; pyritized clams	Mancos Shale is a potential hydrocarbon source rock in the subsurface
	Mancos Shale: Graneros Member (Km)	Dark gray calcareous bentonitic shale about 24 m (79 ft) thick; not exposed in MEVE but found a short distance to the north. Total thickness of Mancos: 609- 700 (2000- 2300)	Slope former	High	Bentonite may cause building & maintenance problems	Lowest part has limited fauna; upper part is an almost solid bed of small oysters, <i>Pycnodonte newberryi</i>	
	Dakota Sandstone (Kd)	Dark brown, gray to yellowish- orange, medium to coarse grained sandstone; cross- bedding; contains shale lenses & coal beds; not exposed in MEVE; 30 +/- (100 +/-)				Specimens of <i>Tempskya</i> sp. were collected adjacent to the park	Coal