

System Group	Section	Average thickness (feet)	Symbol on P. I.	Formation	Member	Description	Construction materials
QUATERNARY		20	Qal	Alluvium		Gray-brown to gray silt and clay; many lenses of chert and limestone gravel	Road metal, mineral filler, and fill material
		50	Qt	Terrace deposit		Gray to brown silt and clay; some lenses of subangular to rounded gravel-size chert and limestone fragments	Road metal, mineral filler, and fill material
		15	Qs	Sanborn		Gray to gray-brown silt and clay; many gravel-size particles of chert and limestone scattered throughout; lenses of chert gravel common in lower part	Road metal, mineral filler, and fill material
PERMIAN		30	Pw	*Wellington		Tan-gray to gray-green silty shale; gray to gray-brown hard crystalline Hollenberg limestone bed at or near top of exposures; other thin lenses of limestone commonly present below	Road metal and fill material
		7			Herington limestone	Gray-brown to tan fairly hard limestone, slightly dolomitic, massive; weathers blocky; occasional geodes; fossiliferous	
		15	Pn	Nolans limestone	Paddock shale	Tan, tan-gray to gray-green clayey shale with extensive bed of limestone in lower part; fossils locally abundant	
		1.1			Krider limestone	One or more beds of soft dolomitic gray to tan limestone	
		20			Odell shale	Beds of gray-green and maroon shale in upper part; beds of tan-gray to gray shale in lower part; predominantly silty and calcareous	Structural stone, road metal, aggregate, riprap, and fill material
		12	Pow		Cresswell limestone	Beds of light-gray to tan-gray limestone; platy in upper part, blocky in lower part; geodes abundant in upper part; fossiliferous in lower part	
		10			Winfield limestone	Silty calcareous tan-gray shale; usually fossiliferous in lower part	
		3-2.7			Stovall limestone	Gray massive hard limestone with numerous chert lenses and nodules	
		40			Gage shale	Tan to tan-gray clayey shale beds in upper part; gray-green and maroon silty shale in lower part; thin lens of tan fossiliferous limestone in upper part	
		11			Towanda limestone	Numerous beds of gray to tan-brown hard limestone; weathers blocky to platy	
		16			Holmesville shale	Beds of gray to gray-green shale which are clayey and calcareous in upper part, silty in lower part; thin bed of maroon shale in middle part; one or more lenses of gray, slightly dense limestone commonly present in lower part	
	37	Pdb		Fort Riley limestone	Thick massive beds of soft light-gray shaly limestone with one or more shale partings; two or more beds of limestone are more resistant than the others; hard massive ledge in lower part forms hillside exposure known as the "rimrock"	Structural stone, road metal, aggregate, and riprap	
	6			Barneston limestone	Oketo shale	Tan-gray silty calcareous shale with a thin lens of limestone commonly present in its upper part; very fossiliferous in places	
	25			Florence limestone	Thick beds of light-gray limestone which contain many nodules and bands of chert; thick beds of tan-gray silty calcareous shale in upper and lower parts; thin beds of shale present locally in middle and lower parts		

\*Subdivisions of Wellington formation modified from Ver Wiebe (1937, p. 4 and 5)

Section continued to right

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PERMIAN		34			Blue Springs shale	Predominantly maroon and gray-green shale, clayey in upper part, silty in lower part; some tan, purple, and gray beds; some thin limestone and fossiliferous shale in lower part		
		1-4		Matfield shale	Kinney limestone	Gray to tan-brown hard lenticular limestone; microfossils in upper part, megafossils in lower part		
		30	Pmw		Wymore shale	Tan-gray mostly silty calcareous shale, thin bedded in upper part and gray, green, maroon, and blocky in lower part; thin clayey limestone common in upper part	Structural stone, road metal, aggregate, and riprap	
		12			Schroyer limestone	Thick beds of gray limestone which contain numerous nodules and lenses of chert; local beds of tan silty shale in middle and lower part; fossils in lower part		
		6-12			Wreford limestone	Hovensville shale	Gray mostly silty calcareous shale; thick bed of limestone in upper part and thin lenses of limestone in middle and lower part; fossils in lower part	
		11-30			Threemile limestone	Light-gray massive beds of limestone which contain nodules and bands of chert; noncherty zone in upper part; extensive silty calcareous gray shale in lower part; local thick, massive beds of limestone in upper part, thin fossiliferous limestone bed in lower part. Reef-like limestone beds in northeastern outcrop area		
		5			Speiser shale	Varicolored silty calcareous shale; gray fossiliferous shale and thin bed of limestone in upper part		
		6-20	Psf		Funston limestone	Two or more beds of light-gray limestone separated by thin beds of shale; thick bed of tan-gray silty shale common in lower part; locally reef-like beds of very fossiliferous crossbedded limestone		
		26			Blue Rapids shale	Tan to gray-green silty calcareous shale; one or more beds of tan to gray hard limestone in upper part		
		16	Pbc		Crouse limestone	Thick beds of platy limestone in upper part; bed of clayey calcareous olive-drab shale in middle part; gray massive hard limestone in lower part		
		17			Eosly Creek shale	Olive-drab to gray-green silty calcareous shale; some maroon, tan, and green zones; one or more thin beds of lenticular fossiliferous limestone in middle and upper parts		
		7	Peb		Middleburg limestone	Two beds of tan-gray to gray-brown hard limestone separated by a black to dark-gray thin-bedded shale		
		6			Bader limestone	Hooser shale	Silty calcareous shale, tan-gray in upper part; gray-green, maroon, and purple in lower part	
	7			Eiss limestone	Upper limestone is hard, locally porous, gray, and massive; shale parting is clayey, calcareous, gray, and blocky; lower limestone is gray and weathers to chips; fossiliferous			
	35			Stearns shale	Predominantly gray-green silty calcareous shale; tan, tan-gray, blue-gray, brown, and black zones also present; numerous thin lenses of limestone			
	5	Psb		Morrill limestone	Tan-gray blocky to platy beds of soft limestone with a massive cavernous soft zone in lower part, separated by beds of tan-brown clayey shale	Aggregate, riprap, structural stone, and road metal		
	12			Beattie limestone	Florena shale	Tan-gray-green silty blocky shale in upper part; lower carbonaceous beds are silty, clayey, thin bedded, black to tan-gray, and fossiliferous		
	5.5			Cottonwood limestone	Light-gray hard massive limestone with nodules and lentils of chert; fusulinids abundant in upper part			
	25			Eskridge shale	Predominantly tan-gray to gray-green clayey calcareous shale; some maroon, green, and purple zones; several thin beds of fossiliferous limestone; local bed of coal in upper part contains fossil leaves			
	13	Peg		Neva limestone	Tan hard porous limestone in upper part; soft porous cavernous limestone in middle part; tan hard blocky limestone in lower part; thin-bedded gray-green to tan-gray shale parting in upper part, dark gray near base			
	12			Grenola limestone	Solem Point shale	Olive-drab to dark-gray silty calcareous shale in upper part; tan, gray, clayey, calcareous in lower part		
	8			Burr limestone	Tan-gray hard limestone; weathers platy; gray to tan-gray silty thin-bedded shale			
	7			Legion shale				
	0.5			Sallyards limestone				
	30			Roca shale	Predominantly tan-gray clayey calcareous thin-bedded shale; beds of green shale in middle and lower parts; thin beds of limestone in upper and lower parts			
	3	Prr		Howe limestone	Gray-orange porous limestone; microfossils in upper part. Celestite crystals on weathered surfaces			
	9			Red Eagle limestone	Bennett shale	Olive-drab silty calcareous thin-bedded fossiliferous shale		
	0.8			Glenrock limestone	Light-gray porous limestone, oolitic texture in lower part; some clay nodules; fusulinids in middle part			
	4	Pj		Johnson shale	Tan-gray silty calcareous thin-bedded shale			

OUTCROPPING STRATIGRAPHIC UNITS IN MORRIS COUNTY, KANSAS, AND THEIR CONSTRUCTION MATERIALS