

CUMBERLAND CITY QUADRANGLE

NEEDMORE QUADRANGLE



SYSTEM AND GROUP	FORMATION	LITHOLOGY	THICKNESS IN FEET
QUATERNARY	Alluvium		0-90
	Tuscaloosa Gravel		0-50
CRETACEOUS	Post-St. Genevieve Beds		100
	St. Genevieve Limestone		200
MISSISSIPPIAN	St. Louis Limestone		180
	Warsaw Limestone		90-150
	Fort Payne Formation		380-500
DEVONIAN	New Providence Shale		0-20
	Chattanooga Shale		15-58
SILURIAN	Camden and Harriman Formations		50-95
	Ross Formation		45
SILURIAN	Decatur Limestone		70
	Lobelville Member		15-46
	Bob Ls. Mbr.		10-20
	Beech River Member		14-35
	Dixon Formation		40-80
	Lego Ls.		16-40
	Waldron Shale		2-3
	Laurel Ls.		20-40
	Osgood Formation		20-43
	Brassfield Ls.		17-21
ORDOVICIAN	Fervale Limestone		28-44
	Hermitage Formation		200-300
SILURIAN	Stones River Group		1000
	Knox Dolomite		2000

**EXPLANATION**

**Aluvial Deposits**  
Flood plain deposits of the Cumberland River consist of clay and silt, light to medium-gray and yellowish-orange, with lenses of quartz sand and chert sand, gray to brownish-orange, fine to coarse-grained, chert and quartz gravel, gray to yellowish-orange and yellowish to reddish-brown. Thickness as much as 90 feet.

Flood plain deposits of the larger creeks are similar to those of the Cumberland River, except for a lack of quartz pebbles. They consist of unsorted, angular to subrounded chert gravel with clay, silt, and sand. Thickness highly variable. Higher level alluvial deposits are distinctly browner in color and may contain quartz pebbles.

**Tuscaloosa Gravel**  
Gravel, poorly sorted, light-gray but locally iron-stained, subrounded to well rounded, 1/4 inch to 4 inches in diameter, consisting mainly of chert; with lenses of white sandy silt and clay, commonly slumped into and mixed with angular fragments of chert residuum derived from underlying formations. The matrix of this gravel is widespread on the higher ridges but is mapped only where especially in place. Maximum preserved thickness about 50 feet.

**Post-St. Genevieve Beds**  
Beds younger than the St. Genevieve Limestone have been identified at only one locality, 1 mile south of the center of the map. Limited exposures make it impossible to accurately measure all the strata present.

The youngest beds contain limestone, light olive-gray, micrograined to coarse-grained (trinitoid), thin to medium-bedded, and light olive-gray shale and mudstone. Estimated thickness about 100 feet. Fossils in these beds have been identified by Benjamin Childers and Fred L. Shaw of the U.S. Geological Survey as diagnostic of the Paint Creek Limestone of Kentucky.

Beds of loose blocks of fine- to medium-grained sandstone, stained yellowish-brown, may be the equivalent of the Beitel Sandstone of Kentucky or possibly an older sandstone.

The Renault Limestone, which occurs between the St. Genevieve and Beitel formations in Kentucky, has not been recognized. If present it is not exposed or has been mapped with the St. Genevieve, to which it is in part lithologically similar.

**St. Genevieve Limestone**  
Limestone, light to dark-gray and light brownish-gray, fine to coarse-grained, medium- to thick-bedded, fossiliferous, locally oolitic. Contains a thin zone of light olive-gray with some grayish-red mottling and blocks of dense chert. Near the top, bumpy ovoid masses of mottled brown and cream chert are present. Large colonies of the coral "Lithothamnion" are common in middle part. Thickness about 200 feet.

**St. Louis Limestone**  
Upper part is limestone, light-gray to dark brownish-gray, very fine to medium-grained, thin to medium-bedded, fossiliferous, locally oolitic. Distinguished from lower part of St. Louis by yielding, upon weathering, "conglomerate" of concentric, spherical, medium-gray chert, walnut- to grapefruit-size, in a rubble of angular fragments and blocks of dense chert. Near the top, bumpy ovoid masses of mottled brown and cream chert are present. Large colonies of the coral "Lithothamnion" are common in middle part. Thickness about 130 feet.

Lower part is calcarenite, medium to dark brownish-gray, fine to medium-grained, poorly sorted, very thin to medium-bedded, fossiliferous. Distinguished from underlying Warsaw Limestone by brownish color, acid color, the presence of the coral "Lithothamnion", and the presence of blocks and masses of rounded and banded porous chert. Thickness about 50 feet.

**Warsaw Limestone**  
Calcarenite, light to dark-gray, fine to coarse-grained, with a white to light-gray chalky matrix, medium to very thick-bedded, cross-bedded, fossil-fragmental; some oolitic beds near top of formation, contains beds of brownish-gray to yellowish-brown, silty, fine-grained dolomite. Gradational with Fort Payne below and with St. Louis above. Two beds of silstone, containing very fine grained quartzites are present near the middle and top of the formation. Formation weathers to angular pieces and blocks of coarsely porous, granular, fossiliferous chert. Thickness 90 to 150 feet.

**Fort Payne Formation, New Providence Shale, and Chattanooga Shale**  
Fort Payne Formation  
Argillaceous or siliceous limestone and calcareous siltstone, brownish-gray to olive-gray, fine-grained, thin to thick-bedded. Weathers to two markedly different units, an upper scraggy chert and a lower bedded chert.

Upper scraggy chert consists of masses of banded, fine-grained, rough and porous, subconglomeratic, yellowish-brown chert. Upper part of this unit also may contain nodules of streaked, fossiliferous chert. Thickness about 100 feet.

Lower bedded chert consists of layers of dark-gray, streaked, nonfossiliferous chert, which breaks into a rubble of blocks. Partial weathering of the original calcareous siltstone in this zone yields blocks having a core of medium-gray siltstone surrounded by a yellowish-brown peripheral band, resembling weathered Hermitage Formation. Thickness about 280 to 400 feet.

Estimated thickness of formation 380 to 500 feet.

New Providence Shale  
Shale, medium-gray and greenish-gray with thin zones of reddish-brown, at base is olive-gray and light brownish-gray, fine-grained limestone. Thickness 0 to 20 feet. Beneath the New Providence, or at the base of the Fort Payne where the New Providence is absent, is greenish-gray shale or mudstone (Murray Shale), 1 to 4 feet thick, containing phosphatic nodules.

Chattanooga Shale  
Shale, carbonaceous, grayish-black, fissile, pyritic. Thickness 15 to 58 feet; averages 25 to 30 feet. Mapped separately as MD only in isolated areas outside Wells Creek Basin and in cross section.

Thickness of Fort Payne, New Providence, and Chattanooga 400 to 600 feet.

**Camden, Harriman, and Ross Formations**  
The Camden and Harriman Formations are lithologically identical, and not enough fossils are locally present to form a convenient basis for subdivision. Because exposures of the Ross Formation are scarce, it is mapped with the Camden and Harriman. Combined thickness of Camden, Harriman, and Ross about 100 feet.

Camden and Harriman Formations  
These formations consist of siliceous limestones which have been largely replaced by chert. Limestone is gray to light olive-gray, micrograined to fine-grained, thin to medium-bedded, siliceous and glauconitic. Chert is light-gray to white with light-gray, yellowish to grayish-brown, and yellowish-gray specks and mottlings (surfaces stained pale to dark yellowish-orange and yellowish-brown), bedded and blocky (beds 2 to 6 inches thick); dense and subconglomeratic, occasional fracture, with white to light-gray tripolitic clay.

Combined thickness of both formations 50 to 95 feet.

Ross Formation  
Bridgman Shale Member at top is calcareous shale with thin beds of argillaceous limestone, fine to coarse-grained, very thin to thin-bedded; both lithologies siliceous. Thickness 15 to 40 feet.

Rockhouse Limestone Member at base is limestone, light olive and greenish-gray to light brownish-gray with pink to reddish-brown grains, fine to coarse-grained and coarsely crystalline, medium-bedded, glauconitic, fossiliferous, with thin shale partings. Thickness 10 to 30 feet.

Thickness of formation about 45 feet.

**Devonian, Undifferentiated**  
Shown in cross section only.

**Decatur Limestone**  
Limestone, gray to light olive-gray, pale-olive, and yellowish to greenish-gray with varied concentrations of reddish-brown and reddish-orange grains, fine to coarse-grained; coarse grains predominate; medium- to thick-bedded. Shale, pale-olive, moderate to yellowish-brown, dark yellowish-brown, and grayish-orange, is present locally as thin partings. Thickness about 70 feet.

**Brownport Formation**  
Lobelville Member is argillaceous limestone, fine to coarse-grained, very thin to medium-bedded, and calcareous shale, both lithologies light olive-gray to yellowish-gray and dusky yellow with scattered streaks and mottlings of grayish red-purple, fossiliferous. Thickness 15 to 48 feet.

Bob Limestone Member is light olive-gray to light yellowish-gray, medium to coarse-grained, medium- to thick-bedded, with thin partings of light olive-gray argillaceous limestone and shale. Thickness 10 to 20 feet.

Beech River Member is argillaceous limestone, fine to medium-grained, thin to medium-bedded, and calcareous shale, both lithologies light olive-gray to yellowish-gray and dusky yellow with scattered streaks and mottlings of grayish red-purple, fossiliferous. Basal 10 feet consists of light olive-gray and greenish-gray to grayish red-purple, fine to medium-grained, medium-bedded limestone. Thickness of member 14 to 35 feet.

Thickness of formation about 55 to 75 feet.

**Wayne Group and Brassfield Limestone**  
The Wayne Group consists of the Dixon, Lego, Waldron, Laurel, and Osgood formations. The Dixon Formation is mapped separately. The Lego, Waldron, and Laurel formations are mapped together. The Osgood Formation and the underlying Brassfield Limestone are mapped together.

**Dixon Formation**  
Limestone, argillaceous, grayish-red to dark reddish-brown and grayish-olive to greenish-gray, fine to medium-grained, thin to medium-bedded, with shale and mudstone; shale zone at top about 3 feet thick, upper part light-gray, lower part dark reddish-brown. Formation grades into underlying Lego Limestone. Thickness 40 to 50 feet.

**Lego Limestone**  
Lego Limestone is pale to moderate reddish-brown with a few olive-gray and greenish-gray beds, fine-grained with medium to coarse calcite crystals, medium-bedded, evenly bedded. Shale interbeds near top. Thickness 15 to 40 feet.

**Waldron Shale**  
Waldron Shale is calcareous shale with thin beds of limestone, light olive-gray and greenish-gray, fossiliferous. Thickness probably 2 to 3 feet.

**Laurel Limestone**  
Laurel Limestone is light olive-gray to brownish and yellowish-gray, medium to coarse calcite crystals, medium-bedded, evenly bedded, contains some dark yellowish-orange argillaceous partings. Thickness 20 to 40 feet.

Thickness of map unit about 60 feet.

**Osgood Formation**  
Osgood Formation is calcareous shale with thin beds of argillaceous limestone, grayish-red to dark reddish-brown, light olive-gray and yellowish-gray. Thickness 20 to 45 feet.

**Brassfield Limestone**  
Brassfield Limestone is light-gray to light olive-gray and pale-olive to dusky yellow, fine to coarse-grained, thin to medium-bedded, glauconitic, medium-bedded, evenly bedded, contains thin partings of reddish-brown shale. Thickness 17 to 21 feet.

Thickness of map unit about 40 to 60 feet.

**Silurian, Undifferentiated**  
Shown in cross section only.

**Fervale Limestone and Hermitage Formation**  
Fervale Limestone  
Limestone, grayish-yellow and yellowish-orange with pale-orange and pink reddish-orange grains, fine to medium-grained, some beds coarsely crystalline, thin to medium-bedded, irregularly bedded. Thickness 25 to 44 feet.

Hermitage Formation  
Shale and limestone, sandy and silty, light to dark-gray (weathers to pale to dark yellowish-brown siltstone and sandstone); limestone is very fine to medium-grained, thin-bedded to laminated. Residuum includes large siliceous masses and fine-grained siliceous material. Thickness 200 to 300 feet.

Combined thickness of both formations about 225 to 340 feet.

**Stones River Group**  
In the Central Basin of Tennessee the Stones River Group is subdivided, largely on the basis of alternating sequences of thin-bedded and medium- to thick-bedded limestone, into the Carvers, Lebanon, Hilday, Pearce, and Marblecreek Limestones. In Wells Creek Basin the Stones River Group exhibits the usual alternation of lithologies, but the number and sequence of units are not the same and the individual formations cannot be recognized at many exposures.

Medium- to thick-bedded limestone is pale to dark yellowish-brown and yellowish to brownish-gray (weathers light to medium-gray), cryptograined to coarse-grained, with lenses of chert. Thin-bedded limestone is light- to medium-gray, pale to dark yellowish-brown and brownish-gray, cryptograined to coarse-grained, contains thin shale partings (in subsurface) that are not everywhere apparent in weathered surface exposures.

Thickness of Group about 1,000 feet.

**Knox Dolomite**  
Dolomite, yellowish- and brownish-gray to light olive-gray and dusky yellow, thin- to very thick-bedded, micrograined to coarse-grained, with a few partings of grayish-green shale, interbedded with limestone, pale-orange to brownish- and yellowish-gray and yellowish-brown, fine-grained. Formation strongly brecciated. Exposed thickness at least 600 and possibly 2,000 feet.

**Contact, dashed where approximate**  
**Fault, dashed where approximate, dotted where concealed, and upthrown side, D, downthrown side**  
**Fault, arrows indicate relative movement (shown in cross section only)**  
**Anticline, showing trace of axial plane and dip of limbs**  
**Syncline, showing trace of axial plane**  
**Strike and dip of beds**  
**Normal**  
**Overturned**  
**Vertical**  
**Horizontal**

