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Geologic map of the Jamestown quadrangle, Independence County, Arkansas

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2026
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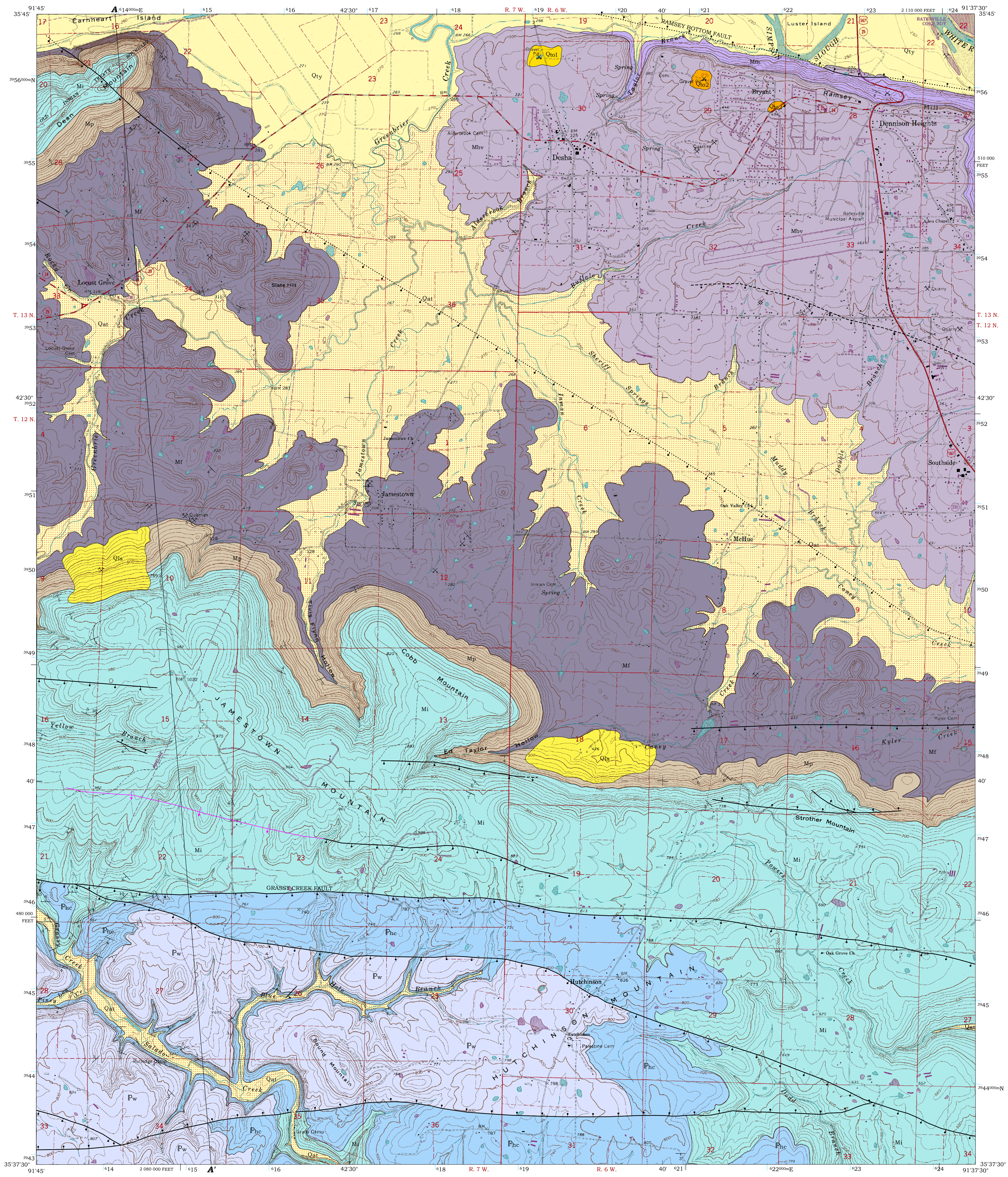


This topographic base is a Digital Raster Graphic (DRG). The DRG is a scanned image of a U.S. Geological Survey 7.5-minute series topographic map published in 1965 and photorevised in 1981.

10,000-foot grid based on Arkansas coordinate system, north zone.

1000-meter Universal Transverse Mercator grid ticks, zone 15. shown in blue. 1927 North American Datum.

Approximate mean declination 2026

SCALE 1:24 000

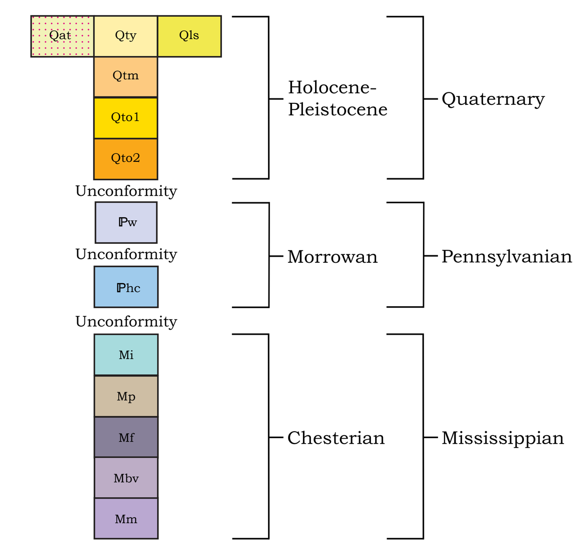
CONTOUR INTERVAL 20 FEET
DOTTED LINES REPRESENT 10-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

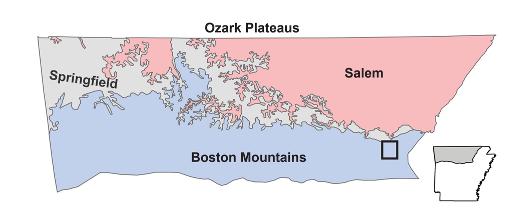
Quadrangle Location

Adjoining Quadrangles

ROAD CLASSIFICATION
Secondary highway
Light duty road
Unimproved road
U.S. route
State route

Correlation of Map Units





Location of the Jamestown quadrangle on the Boston Mountains Plateau in the Ozark Plateaus physiographic province.

Introduction

Approximately 1,250 feet (381 meters) of Upper Mississippian and Lower Pennsylvanian clastic and carbonate rocks are exposed in the area. Bedrock is commonly overlain by a thin veneer of unconsolidated alluvium, colluvium, or residuum. The area lies within the Boston Mountains Plateau, the highest and southernmost of the three major plateau surfaces that make up the Ozark Plateaus. Its surface is formed on the sandstone and shale of the Imo interval, Cane Hill Member of the Hale Formation, and Witts Springs Formation. The escarpment below the plateau surface is approximately 600 feet (182 meters) at its most prominent point and trends generally east to west, south of Jamestown. The steep slopes of the escarpment are formed on the Fayetteville Shale, Pitkin Limestone, and lower portion of the Imo interval. A secondary plateau surface and escarpment, about 250 feet (76 meters) at the most prominent point, occupy the northeast portion of the map and are formed on the Batesville Sandstone and Moorefield Shale. Dean Mountain, in the northwest corner of the map, is capped by sandstone of the Imo interval and stands out as a prominent outlying topographic feature above the White River Valley and Greenbrier Bottoms. The area sits within the White River watershed. Surface water either flows directly into the White River via Greenbrier Creek and Taylor Branch, or drains into Salado Creek, which meets the White River to the east.

Regional dip is generally less than two degrees to the south but varies locally due to normal faulting and folding. Several faults cross the map and generally trend east to west and display displacement primarily to the south. Displacement along the faults is generally 40 feet (12 meters) or less. Faults are identified through observed offset in bluff lines, deformation bands and inclined bedding. In the southern part of the map area, a graben has lowered the Witts Springs and Cane Hill to the level of Salado Creek.

The Batesville Sandstone has been quarried at several locations for dimension stone. The Fayetteville Shale and Pitkin Limestone have historically been quarried and marketed as the Arkansas Black Marble. Several small shale and gravel pits have been opened for material across the area.

The geology of the Jamestown quadrangle was previously mapped by LeBlanc (1970) as part of an unpublished master's thesis, and by Glick (1973) in preparation for the 1:500,000 scale Geologic map of Arkansas. Gordon and Kinney (1944) mapped the northern part of the area while investigating the Batesville District. Parks et al. (1932) reported on the geology and economic prospects of the black limestones found in the Fayetteville Shale and Pitkin Limestone. Easton (1942) recorded several measured sections in the Pitkin Limestone and discussed the structure and paleontology of the area. This map builds on the previous work and depicts the structure and stratigraphy in greater detail. Data was collected between August 2025 and April 2026. Representative rock samples were collected across the quadrangle and seventeen were used to make thin sections for petrographic study. Field station locations and descriptions were recorded on a portable GPS data collector and integrated into a Geologic Mapping Schema (GeMS) level three-compliant geodatabase.

Symbols

Contact

Line of cross-section

Normal fault - ball and bar on downthrown side. Arrow shows dip direction and angle of fault plane. Dotted where concealed. Dashed where inferred.

Monocline

Strike and dip

Mine or Quarry

Pit

Plugged or abandoned gas well

Description of Map Units

Qls — **Landslide deposits (Quaternary)** – a mass of rock and debris that has moved downslope due to gravity. Only the largest landslide deposits are depicted.

Qat — **Alluvium and terrace deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel including deposits on the modern floodplain and one or more terrace levels along larger tributaries. Approximately 20-40 feet (6-12 meters) thick.

Qty — **Young terrace and active channel deposits (Quaternary)** – unconsolidated clay, silt, sand, and gravel in gravel bars and sandy point bars along the White River. Includes youngest terraces above the river which are primarily clay, silt, and sand. Uppermost surfaces are generally flat but locally hummocky and dissected by tributaries. Approximately 20-30 feet (6-9 meters) thick.

Qto1 — **Old terrace and alluvial deposits (Quaternary)** – older terraces composed of unconsolidated clay, silt, sand, and gravel in a deposit approximately 200 feet (36-60 meters) above the White River. Ranges from 20-40 feet (6-12 meters) thick.

Qto2 — **Very old terrace and alluvial deposits (Quaternary)** – unconsolidated gravel deposits on ridges above the White River. Consists of coarse sand to cobble-sized sub-angular to rounded chert and sandstone. Base is approximately 240 feet (73 meters) above the White River. Preserved thickness is less than 3 feet (1 meter).

Pw — **Witts Springs Formation (Lower Pennsylvanian, Morrowan)** – consists of sandstone with lesser amounts of clay or silty shale and siltstone. Sandstone is fine to coarse and friable with iron case hardening. Locally, conglomeratic intervals contain milky quartz pebbles and granules, shale pebbles and molds, iron concretions, and fossil fragments and molds. Sandstone is typically thin to massive bedded and locally thin to medium bedded. Weathering commonly masks bedding, giving the sandstone a massive and rounded appearance. Reddish-orange to brown or buff on fresh surfaces. Weathers gray to brown or dark brown. A prominent bluff-former, it locally contains joint caves and bluff shelters. Typical sedimentary features include cut-and-fill structures, cross bed sets up to 6 feet (2 meters), ripple bedding, and soft sediment deformation. Liesegang banding, stylolites, and honeycomb weathering are common. Locally contains trace fossils and fossil wood prints and molds. Zones of limey sandstone are locally present and contain fossil fragments and molds, including crinoids, brachiopods, gastropods, and corals. Shale and siltstone units are light to dark gray or black on fresh surfaces and weather tan to light brown. Unconformable with the underlying Cane Hill Member of the Hale Formation. Thickness ranges from 80-300 feet (24-91 meters).

Hale Formation (Lower Pennsylvanian, Morrowan) – subdivided into two members, the Prairie Grove and the Cane Hill, only Cane Hill is present on this quadrangle.

Phc — **Cane Hill Member** – consists of sandstone interbedded with shale and siltstone. Sandstone is very thin to medium bedded, commonly ripple, flaser, or cross bedded, very fine- to fine- grained, and commonly silty and micaceous. A thick- to massive-bedded sandstone intervals up to 6 feet (2 meters) thick with cross beds and ripples is present locally. Buff to tan on fresh surfaces but weathers grayish brown to dark brown. Trace fossils and coalified fossil wood molds are common. Locally contains shale pebbles and partings. Shale is rarely exposed but is clay or silty, gray to black on fresh surfaces, and weathers brown to tan. Siltstone is tan to brown or gray on fresh surfaces and weathers dark brown or gray. Unconformable with the underlying Imo interval. Ranges from 80-120 feet (24-36 meters) thick.

Mi — **Imo interval (Upper Mississippian, Chesterian)** – consists primarily of sandstone with minor shale, siltstone, conglomerate, and limestone. Sandstone is very fine to medium grained and locally contains subangular to rounded milky quartz pebbles and granules. Bedding is commonly masked by iron case hardening but where visible, it is thin to thick bedded and commonly cross bedded, ripple bedded, or hummocky. Generally has a massive, rounded to blocky appearance with locally abundant liesegang banding, stylolites, and honeycomb weathering. On fresh surfaces it is buff to tan and weathers to light or medium gray. Sandstone units are typically 15-80 feet (5-24 meters) thick. The basal unit is black to dark gray, fossiliferous, concretionary, fissile clay shale with calcareous siltstone, conglomerate, and limestone lenses. Contains a wide variety of fossils including corals, bryozoans, ammonoids, nautiloids, crinoids, bivalves, and brachiopods. The sandstone units commonly have molds and casts of plants and scale trees, coalified wood fragments, and locally abundant trace fossils. Conformable with the underlying Pitkin Limestone. Thickness ranges from 300-420 feet (91-128 meters).

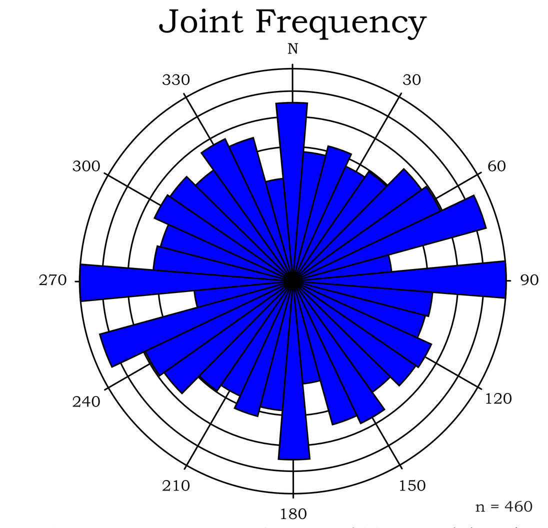
Mp — **Pitkin Limestone (Upper Mississippian, Chesterian)** – consists of fine- to coarse-grained, micritic, oolitic, and bioclastic limestone. Thin to thick bedded and locally cross bedded or hummocky. On fresh surfaces it is gray to dark gray and weathers light or bluish gray to brown. Calcareous shale intervals from partings up to 20 feet (6 meters) thick are interbedded with the limestone. A sandy limestone or calcareous sandstone with fine to medium quartz sand grains is locally present and interbedded with the limestone at or near the top of the formation. Locally contains black chert in small nodules or very thin beds. Contains fossils, primarily brachiopods, corals, crinoid stems, gastropods, and bryozoans including the characteristic *Archimedes*. Karst features are common and include springs, caves, sinkholes, and solutionally enlarged joints. Petroliferous on fresh surfaces. Dark gray to black, fine-grained limestone in the lower part was historically quarried and marketed as black marble. Conformable with the underlying Fayetteville Shale. Ranges from 260-320 feet (80-98 meters) thick.

Mf — **Fayetteville Shale (Upper Mississippian, Chesterian)** – fissile clay to silty shale that is black on fresh surfaces and weathers dark gray to tan. Interbedded micrite and shale occurs in the upper part of the formation. The micrite is black to dark gray and weathers light gray. Septarian concretions and concretionary siltstone beds are locally present within the shale. Fossils are typically sparse but locally abundant and include ammonoids, nautiloids, and brachiopods. Karst features including springs, caves, and sinkholes are common in the carbonate intervals. Commonly petroliferous on freshly broken surfaces. Dark gray to black, fine-grained to micritic limestone in the upper part was historically quarried as black marble. Conformable with the underlying Batesville Sandstone. Thickness ranges from 260-300 feet (80-90 meters).

Mbv — **Batesville Sandstone (Upper Mississippian, Chesterian)** – consists of fine- to medium-grained, subangular, moderately sorted, locally micaceous, iron- to calcite-cemented sandstone. Thin to thick bedded and commonly flat bedded or cross bedded. Trace fossils, calcareous intervals and limestone lenses are common. On fresh surfaces, it is white to buff or light brown but weathers light or dark gray and brown. Fossils are rare but locally abundant. Springs are common near the basal contact. Forms a plateau surface on the northeast part of the map, below and away from the main Boston Mountains escarpment. Conformable with the underlying Moorefield Shale. Thickness ranges from 10-80 feet (10-24 meters).

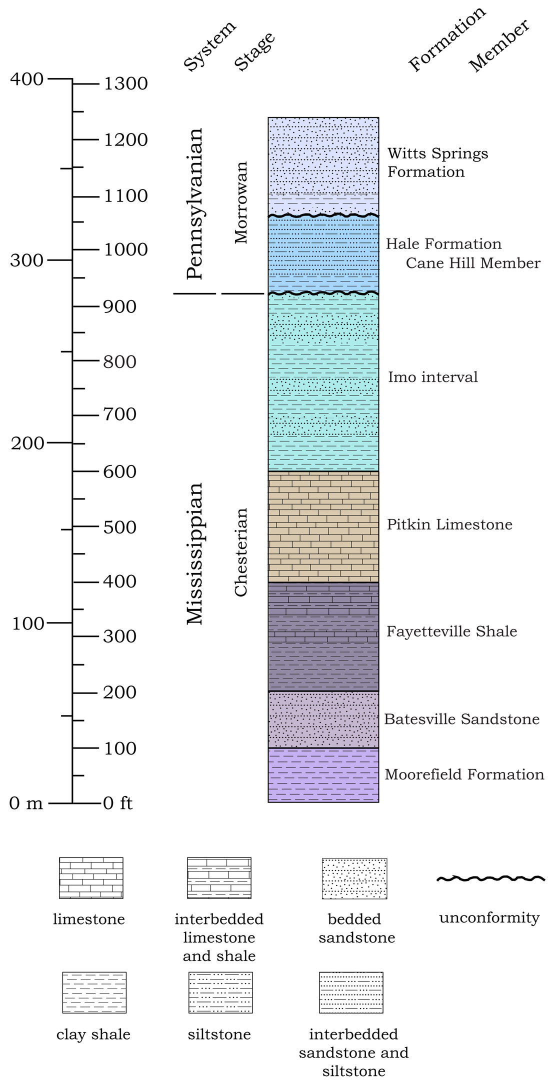
Mm — **Moorefield Shale (Upper Mississippian, Chesterian)** – consists of fissile clay shale interbedded with very thin- to thin-bedded siltstone and micritic limestone. Shale is dark gray to black on fresh surfaces and weathers gray to brown. Siltstone is dark gray to brown on fresh surfaces and weathers to light gray or buff. Sparsely fossiliferous with ammonoids found in the shale and concretions. Outcrops are confined to the north part of the map on the northern slopes of Ramsey Hill and Denison Heights where it forms a steep slope beneath the Batesville Sandstone. Thickness ranges from 20-160 feet (6-48 meters).

Joint Frequency

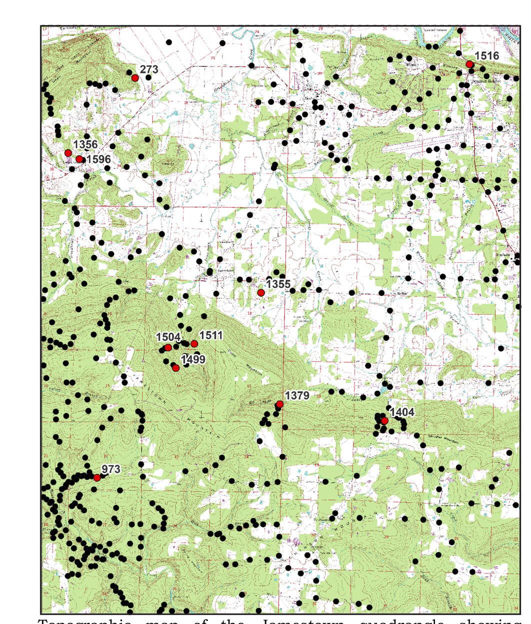


Rose diagram of the strike frequency of joints recorded on the Jamestown quadrangle.

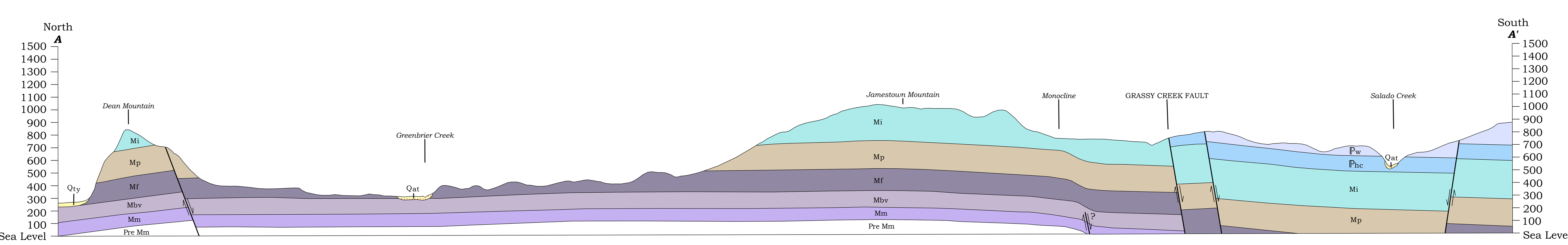
Stratigraphic Column



Bluff formed on the Cane Hill Member of the Hale Formation on Salado Creek.



Topographic map of the Jamestown quadrangle showing location of data collection points in black. The numbered points in red represent locations sampled for thin section analysis.



Scale:
Horizontal: 1 Inch = 2000 Feet
Vertical: 1 Inch = 500 Feet
(Exaggeration: 4x)

References

Easton, W.H., 1942, Pitkin Limestone of northern Arkansas: Arkansas Geological Survey, Bulletin 8, 115 p., 11 plates.

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LeBlanc, N.J., 1970, Geology of the Jamestown quadrangle, Independence County, Arkansas: Northwestern University, Unpublished M.S. Thesis, 32 p., 2 plates.

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Limitations: This map, like all geologic maps, is based on interpretations which were made from the data available at the time it was created. As new information is collected, the features depicted on this map may be changed.

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Map and cross section digitized by Brian Kehner.