

Surficial Geology of the New Haven (Iowa) 7.5' Quadrangle

LEGEND

CENOZOIC

QUATERNARY SYSTEM

HUDSON EPISODE

- Qal** - **Albion** (DeForest Formation/Undifferentiated) - Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, micaceous to calcareous, massive to stratified silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hilltops and in closed depressions. May overlie Noah Creek, Sheldon Creek, Wolf Creek or Albion Formation or fractured Devonian carbonate bedrock. Associated with low-relief modern floodplains, closed depressions, modern drainage ways or topographic positions on the landscape. Seasonal high water table and potential for frequent flooding.
- Qalb** - **Albion Shallow to Bedrock** (DeForest Formation/Undifferentiated) - Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, micaceous to calcareous, stratified silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hilltops and in closed depressions. May overlie the Noah Creek Formation or Devonian carbonate bedrock. Bedrock surface is within 5 m (16 ft) of the land surface. Associated with low-relief modern floodplains, closed depressions, modern drainage ways or topographic positions on the landscape. Seasonal high water table and potential for frequent flooding.

HUDSON and WISCONSIN EPISODES

- Qdlgc** - **Loamy Sediments Shallow to Limestone, Dolomite, and Shale** (Lithograph City Formation) - 1 to 2 m (3-7 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty alluvial sediments that occur in the Middle to Upper Devonian bedrock surface. The Lithograph City Formation attains a maximum thickness of up to 14 m (46 ft) within the mapping area. It consists of dolomite and dolomitic limestone, in part argillaceous or with thin shale "bedrock," silt and calcite vugs, thin and common. Some interbeds are fossiliferous and straggle northward. Outcrops of this unit are primarily found in the northern part of the mapping area along the banks of Burr Oak Creek and in the southeastern area along the Little Cedar River.
- Qdcv** - **Loamy Sediments Shallow to Limestone, Dolomite, and Shale** (DeForest, Noah Creek, and Lithograph City Formations) - 1 to 2 m (3-7 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty alluvial sediments that occur in the Middle Devonian bedrock surface. The thickness of the Corville Formation varies between 12 and 18 m (39-59 ft) within the mapping area. It is dominated by limestone, dolomite, limestone, and dolomite, in part argillaceous or with thin shale "bedrock," silt and calcite vugs, thin and common. Some interbeds are fossiliferous and straggle northward. Outcrops of this unit are primarily found in the west central part of the mapping area along the banks of Burr Oak Creek and in the southeastern area along the Little Cedar River.

WISCONSIN EPISODE

- Qnw2** - **Sand and Gravel** (Noah Creek Formation) - 2 to 12 m (7-39 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine siliceous, quartz sand, pebbly sand and gravel. May be overlain by up to 2 m (7 ft) of silty alluvial sediments. In places mantled with fine to medium well-sorted dolomitic quartz and derived from wind reworking of the alluvium. Fractured carbonate bedrock is less than 2 m (6 ft) below the land surface. The unit encompasses deposits that accumulated in low-relief stream valleys during the Wisconsin and Hudson episodes. Seasonal high water table and potential for flooding.
- Qnw3** - **Sand and Gravel Shallow to Bedrock** (Noah Creek Formation) - 1 to 3 m (3-10 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine siliceous, quartz sand, pebbly sand and gravel. May be overlain by up to 2 m (7 ft) of silty alluvial sediments. In places mantled with fine to medium well-sorted dolomitic quartz and derived from wind reworking of the alluvium. Fractured carbonate bedrock is less than 2 m (6 ft) below the land surface. The unit encompasses deposits that accumulated in low-relief stream valleys during the Wisconsin and Hudson episodes. Seasonal high water table and potential for flooding.

PRE-ILLINOIS EPISODE

- Qsc2** - **Limestone and Dolomite** (Corville Formation) Middle Devonian - The thickness of this unit varies between 12 and 18 m (39-59 ft) within the mapping area. It is dominated by limestone, dolomite, limestone, and dolomite, in part, laminated and argillaceous. Bedrock, ochreous debris and corals locally occur in the limestone facies. Sparse outcrops can be found along parts of the Little Cedar River and Beaver Creek. This unit is shown only on the cross-section.
- Qsc3** - **Limestone and Dolomite** (Corville Formation) Middle Devonian - The thickness of this unit varies between 12 and 18 m (39-59 ft) within the mapping area. It is dominated by limestone, dolomite, limestone, and dolomite, in part, laminated and argillaceous. Bedrock, ochreous debris and corals locally occur in the limestone facies. Sparse outcrops can be found along parts of the Little Cedar River and Beaver Creek. This unit is shown only on the cross-section.
- Qsc** - **Glacial Till** (Sheldon Creek Formation/Undifferentiated) - Generally 2 to 15 m (6.5-50 ft) of yellowish brown to gray, claystone facies to massive clay loam, at depth this unit can be variably sorted and contain significant sand and gravel bodies. The upper 3 to 5 m (10-16 ft) may be periglacially altered. This unit overlies Peoria formation or Devonian carbonate bedrock. This unit is only shown on the cross-section.

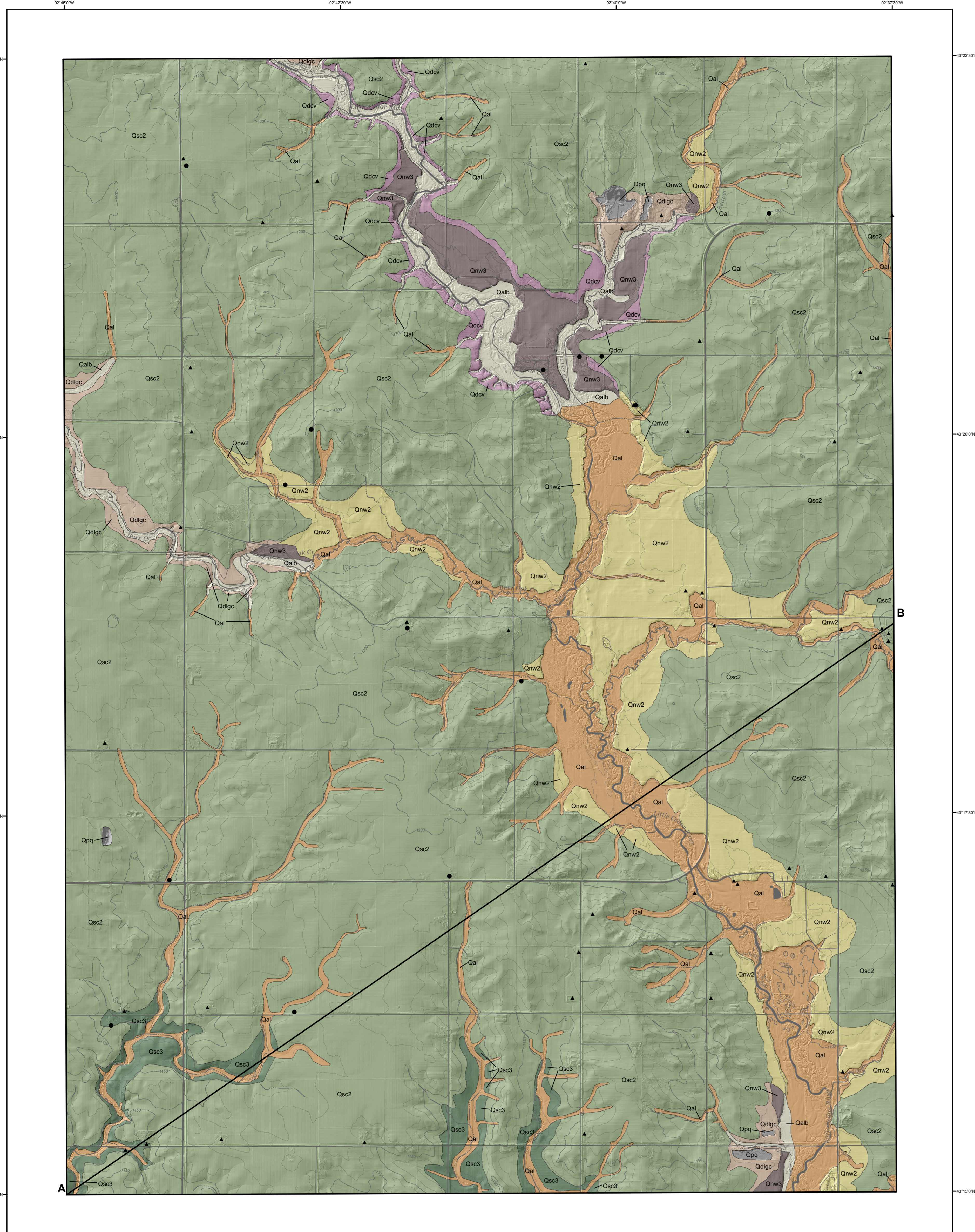
PALEOZOIC

DEVONIAN SYSTEM

- Dlgc** - **Dolomite, Limestone, and Shale** (Lithograph City Formation) Middle to Upper Devonian - This unit attains a maximum thickness of up to 14 m (46 ft) within the mapping area. It consists of dolomite and dolomitic limestone, partially characterized by micaceous to argillaceous and siliceous dolomite and dolomitic limestone, in part argillaceous or with thin shale "bedrock," silt and calcite vugs, thin and common. Some interbeds are fossiliferous and straggle northward. Outcrops of this unit are primarily found in the northern part of the mapping area along the banks of the Little Cedar River and Burr Oak Creek, and in otherwise restricted quarries in the mapping area. This unit is shown only on the cross-section.
- Dcv** - **Limestone and Dolomite** (Corville Formation) Middle Devonian - The thickness of this unit varies between 12 and 18 m (39-59 ft) within the mapping area. It is dominated by limestone, dolomite, limestone, and dolomite, in part, laminated and argillaceous. Bedrock, ochreous debris and corals locally occur in the limestone facies. Sparse outcrops can be found along parts of the Little Cedar River and Beaver Creek. This unit is shown only on the cross-section.
- Dlc** - **Dolomite and Limestone** (Little Cedar Formation) Middle Devonian - Approximately 37 m (120 ft) thick. This unit is dominated by argillaceous to argillaceous dolomite and limestone, usually very and partially laminated and shaly, with a moderately continuous shale unit occurring within the upper half of the formation. It is commonly fossiliferous, especially in the lower portion. This unit occurs at the bedrock surface within an east-west trending bedrock valley near the middle of the quadrangle and along the slope of a prominent bedrock valley along the eastern margin of the mapping area. This unit is shown only on the cross-section.
- Dpr** - **Dolomite and Limestone** (Pimlico Ridge Formation) Middle Devonian - Ranges from 9 to 15 m (30-50 ft) in thickness. This formation consists of argillaceous dolomite and limestone of varying degrees of tabular, laminated, fringed, sandy, and shaly cherty. This unit occurs at the bedrock surface near the base of the slope of the prominent bedrock valley along the eastern margin of the mapping area. This unit is shown only on the cross-section.
- Dsp** - **Dolomite** (Spillville Formation) Middle Devonian - Maximum thickness of approximately 24 m (80 ft). This unit is dominated by medium to thick bedded dolomite with scattered to abundant fossil molds. The basal unit, where present, is variably sandy, shaly, and argillaceous with reworked bedrock chert clasts. This formation only occurs at the bedrock surface within the steeper parts of the prominent bedrock valley along the eastern margin of the mapping area. This unit is shown only on the cross-section.

OTHER FEATURES

- Qpq** - **Pit and Quarry** - Sand and gravel pits and rock quarries. Extent mapped as shown on the county well survey and as identified on aerial imagery.
- - **New Well Holes for this map project**
- ▲** - **IGS GEONAM Data Points** - records available at www.iowageologicalsurvey.com

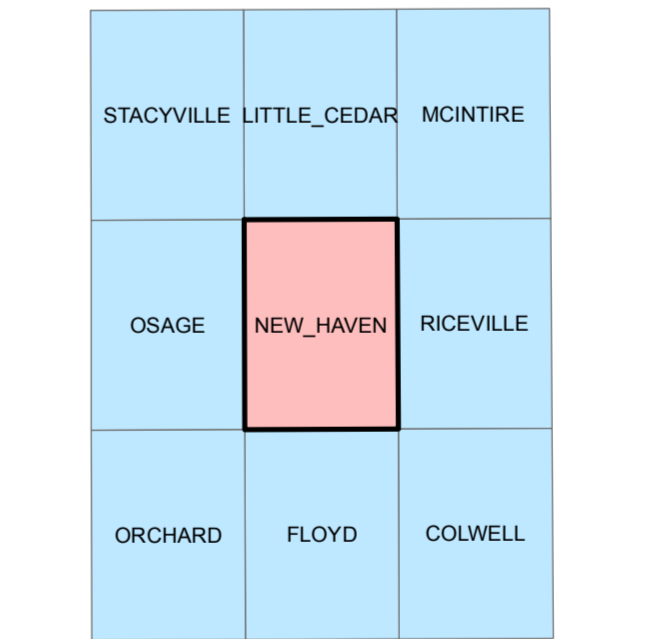


CORRELATION CHART

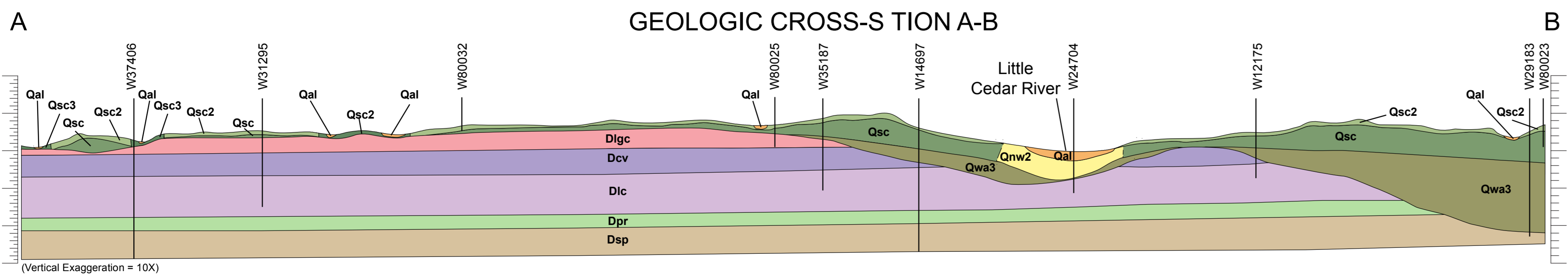
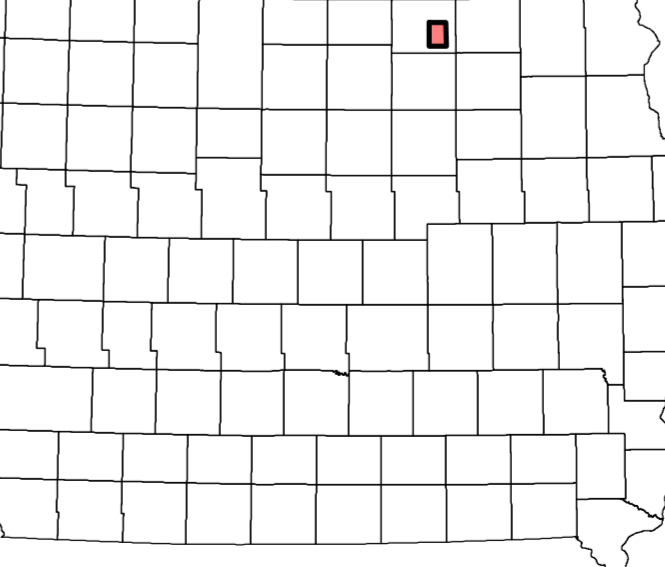
	Iowan Surface		Shallow Rock		
	Qal	Qalb	Qnw2	Qnw3	Qsc2
Alluvium	Qal	Qalb			
Colluvium	Qnw2	Qnw3			
Erosion Surface	Qsc2	Qsc3			
Glacial	Qnw3*				
	Dlgc*	Qdlgc			
	Dcv*	Qdcv			
Bedrock		Dlc*			
		Dpr*			
		Dsp*			

*Units only shown on cross section

Adjacent 7.5' Quadrangles



Location Map



SURFICIAL GEOLOGY OF THE NEW HAVEN 7.5' QUADRANGLE, MITCHELL COUNTY, IOWA

Iowa Geological Survey
Open File Map OFM-15-4
June 2015

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IOWA GEOLOGICAL SURVEY
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Introduction to the Surficial Geology of the New Haven 7.5' Quadrangle, Mitchell County, Iowa

The New Haven Quadrangle is located in Mitchell County in north-central Iowa. The quadrangle is located on the Wisconsin-age Iowan Surface landform region (Prior and Kohrt, 2006). Quaternary deposits in this quadrangle generally vary in thickness from 0 to 14 m (45 ft), but there are several bedrock valleys with the largest being up to 83 m (275 ft) below the surface on the eastern edge of the quadrangle. The map area is dominated by loamy sediments (unnamed erosion surface sediment) of variable thickness overlying Wisconsin-age Sheldon Creek Formation glacial sediments, Pre-Illinoian glacial sediments, or shallow rock. These deposits are regionally extensive as shown on the Des Moines 4° x 6° Quadrangle at a scale of 1:1,000,000 (Hallberg et al., 1991). Areas of bedrock outcrops or areas with less than 4.5 m (15 ft) of loamy material over rock are present, especially along the Little Cedar River and its tributaries: Beaver Creek, Burr Oak Creek, and Fish Creek.

Calvin (1902) described and mapped the Quaternary and Paleozoic bedrock geology of Mitchell County. He noted the extreme variability of the till units in Mitchell County and also the presence of significant sand and gravel bodies. Statewide bedrock geologic maps by Hershey (1969), and most recently by Witzke, Anderson, and Pope (2010), depict increased understanding of the complex distribution of geologic units at the bedrock surface across northeast Iowa, including Mitchell County. Previous surficial geologic mapping completed as part of the STATEMAP program near the project area includes Surficial Geology of Worth County, Iowa (Quade et al., 2012), Surficial Geology of the Clear Lake East Quadrangle (Quade et al., 2013), Surficial Geology of the Osage Quadrangle (Tassier-Surine, et al., 2014a), and Surficial Geology of the St. Ansgar Quadrangle (Tassier-Surine, et al., 2014b).

The map region has a rich and complex geologic history punctuated by at least seven periods of glaciation between 2.6 million to 500,000 years before present (Boellstorff, 1978a, b; Hallberg, 1980, 1986). In this area, Pre-Illinoian glacial deposits and associated buried soils are overlain by much younger Wisconsin-age glacial deposits. During the earlier and mid Wisconsin-age, ice advances dating from approximately 40,000 to 26,000 years before present deposited glacial materials throughout the map area. In Iowa, this glacial deposit is formally recognized as the Sheldon Creek Formation (Bettis et al., 1996; Bettis, 1997) and in earlier literature is referred to as the "Tazewell till" (Ruhe, 1950). Results from this mapping program and others in Worth and Cerro Gordo County indicate that the Sheldon Creek glacial materials extend much farther east than was previously thought.

A period of intense cold occurred during the Wisconsin full glacial episode from 21,000 to 16,500 years before present (Bettis, 1989). This cold episode and ensuing upland erosion led to the development of the distinctive landform recognized as the Iowan Surface (Prior, 1976). A periglacial environment prevailed during this period with intensive freeze-thaw action, solifluction, strong winds, and a host of other periglacial processes (Walters, 1996). The result was that surface soils were removed from the Iowan Surface, and the Sheldon Creek and Pre-Illinoian till surface was significantly eroded, resulting in the development of a region-wide colluvial lag deposit referred to as a "stone line." Thick packages of stratified loamy and sandy sediments located low in the upland landscape and adjacent to streams are remnants of solifluction lobes associated with the formation of the Iowan Surface. These materials can be found along the Little Cedar River, Beaver Creek, and Burr Oak Creek.

Surficial deposits within the map area are composed of six formations: DeForest, Noah Creek, Peoria, Sheldon Creek, Wolf Creek, and Albion formations, as well as unnamed erosion surface sediments. Hudson-age DeForest formation deposits include fine-grained alluvial, organic, and colluvial sediments that are subdivided into the Camp Creek, Roberts Creek, Gunder, Corrington, Flack, and Woden members. The Noah Creek Formation includes coarse sand and gravel to finer grained fluvial deposits associated with local stream and river valleys. Unnamed erosion surface sediments consist of reworked till and slopewash deposits associated with periglacial activity during the Wisconsin ice advance. Areas of Peoria Formation colluvial materials are intermittently present mantling most other mapping units, and are more abundant near stream valleys. Sheldon Creek Formation glacial deposits are undifferentiated and occur in northwest and north-central Iowa. The maximum extent of these deposits is still not fully understood. Pre-Illinoian glacial deposits in Iowa consist of two formations: the younger Wolf Creek Formation and the Albion Formation. The Wolf Creek Formation is divided into the Winthrop, Aurora, and Hickory Hills members (oldest to youngest). The Albion Formation consists of several "undifferentiated" members.

Five bedrock mapping units (the Lithograph City, Coralville, and Little Cedar formations of the Cedar Valley Group and the Pimlico Ridge and Spillville formations of the Wapsipicon Group) are present at the bedrock surface in the quadrangle, with the Lithograph City, Coralville and Little Cedar formations occurring at the bedrock surface over most of the mapping area. Twelve outcrops and three quarries are located in the map area. The Devonian rocks are dominated by carbonates varying between limestone and dolomite, accompanied by minor shale.

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