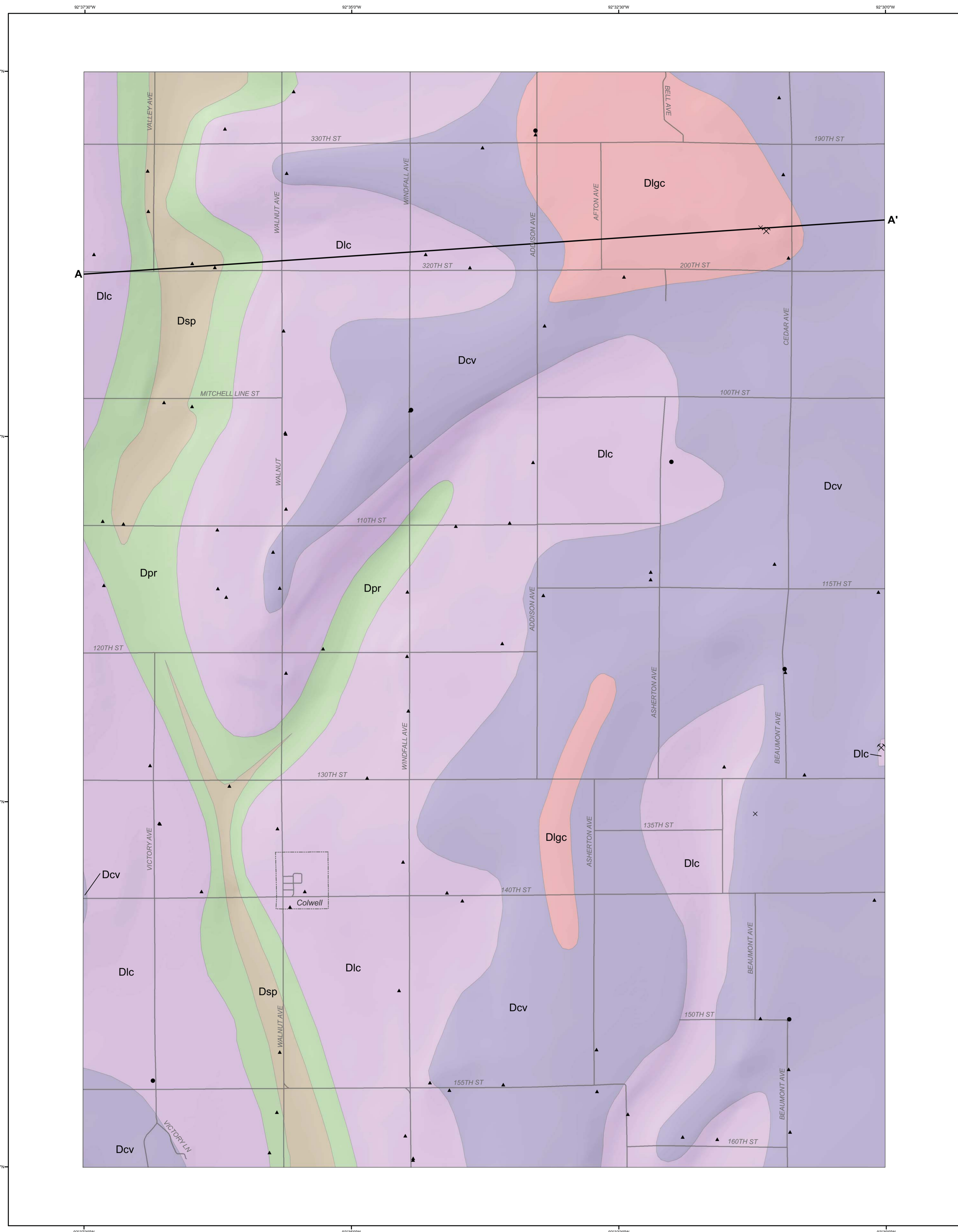


Bedrock Geologic Map of the Colwell (Iowa) 7.5' Quadrangle



LEGEND

CENOZOIC

QUATERNARY SYSTEM

Qu - Unconsolidated Unconsolidated Sediments (Quaternary System). The Quaternary deposits consist of loess, glacial till, and colluvium of variable thickness, and alluvial clay, silt, sand, and gravel. The Quaternary deposits cover almost all the mapping area with a thickness commonly more than 10 m (30 ft) and can be thicker than 60 m (200 ft) in a deep bedrock valley throughout the western part of the quadrangle. This unit is shown only on the cross-section, not on the map.

PALEOZOIC

DEVONIAN SYSTEM

Dlge - Limestone, Dolomite, and Shale (Lithograph City Formation) Middle Devonian. This unit occurs on the bedrock surface in the western part of the quadrangle. The thickness of this unit is around 21 to 39 m (70-130 ft) but is as thin as 10 m (30 ft) in the mapping area because of erosion. This unit consists of limestone, dolomite, limestone, dolomite, and minor shale. It is usually characterized by interbedded lithographic and sub-lithographic limestone and dolomite. Limestone, in part argillaceous, "blocky" structures, vugs and calcite vug-fills are common. Some intervals are fossiliferous and stratigraphically important.

Dcv - Limestone and Dolomite (Coralville Formation) Middle Devonian. This unit occurs on the bedrock surface in the east part and the southern corner of the quadrangle. The thickness of this unit varies between 12 and 21 m (40-70 ft) in the mapping area. It consists of limestone, dolomite limestone, and dolomite, in part laminated, argillaceous, or shaly. Brachiopods, trilobite stems, and corals usually occur in the limestone facies.

Dlc - Dolomite, Limestone, and Shale (Little Cedar Formation) Middle Devonian. This formation dominates the bedrock surface of the west part beyond the deep bedrock valley of the quadrangle. The thickness of this unit varies between 6 to 14 m (20-45 ft). Compared to the other Devonian units in the mapping area, this formation is usually unfossiliferous.

Dpr - Dolomite and Dolomitic Limestone (Pinicon Ridge Formation) Middle Devonian. This unit occurs on the bedrock surface along the deep bedrock valley throughout the western part of the quadrangle. The formation consists of dolomite and dolomitic limestone with varying textures (shaly, laminated, brecciated, sandy, and/or shaly). The thickness of this unit varies between 6 to 14 m (20-45 ft). Compared to other Devonian units in the mapping area, this formation is usually unfossiliferous.

Dsp - Dolomite (Spillville Formation) Middle Devonian. This unit is dominated by medium to thick bedded dolomite with scattered abundant fossil molds, with a maximum thickness of approximately 21 m (70 ft) in the mapping area. In local parts, where present, it is usually sandy, shaly, and/or conglomeratic with reworked Ordovician cherty clasts.

OTHER FEATURES

- New drill holes for this map project
- Bedrock outcrops
- IGS Geologic Data points - month available at www.iowageologic.com
- Interpreted city boundary
- Quarries
- Roads
- W56388
- With used for geologic cross-section
- Bedrock Hillshade - shades of gray show the bedrock surface as it would be illuminated by an artificial light source from the NW direction

BEDROCK GEOLOGIC MAP OF THE COLWELL 7.5' QUADRANGLE, CHICKASAW, FLOYD, HOWARD, AND MITCHELL COUNTIES, IOWA

Iowa Geological Survey
Open File Map OFM-17-3
June 2017

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IOWA GEOLOGICAL SURVEY

Iowa Geological Survey, Robert D. Lina, State Geologist

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STRATIGRAPHIC COLUMN

System	Series	Stage	Lithostratigraphic Unit	Map Symbol	Lithology	Thickness (in feet)	
Devonian	Upper	Frasnian	Lithograph City Formation	Dlge	[Symbol]	0-20	
			Coralville Formation	Dcv	[Symbol]	40-70	
			Little Cedar Formation	Dlc	[Symbol]	80-100	
			Pinicon Ridge Formation	Dpr	[Symbol]	20-45	
			Spillville Formation	Dsp	[Symbol]	40-70	
	Middle	Givetian	Cedar Valley Group				
Lower	Eifelian	Wapsipinicon Group					

Introduction to the Bedrock Geologic Map of the Colwell 7.5' Quadrangle, Chickasaw, Floyd, Howard, and Mitchell Counties, Iowa

The Colwell 7.5' Quadrangle is located in the connection area of Floyd, Mitchell, Howard and Chickasaw counties in north-central Iowa. In terms of landforms, this quadrangle lies in the Iowa Surface landform region where the land surface has been modified by various episodes of erosion before and during the Wisconsin-age glacial events (Prior, 1991). Due to extensive glacial and erosional activities, the landscape of this area is characterized by relatively low topographic relief and commonly features large fieldstones of glacial origin known as glacial erratics.

The land surface of this mapping area is mostly covered by Quaternary sediments, including loess, glacial sediments, colluvium and alluvial deposits. Thickness of the Quaternary is commonly more than 18 m (60 ft) in most of the mapping area except the far eastern portion of the quadrangle, and it reaches a maximum thickness of more than 90 m (295 ft) in a bedrock valley located in the western part of the mapping area. For the detailed Quaternary stratigraphy and distribution, see the surficial geologic map of this quadrangle (Kerr et al., 2017).

Only two rock quarries and no natural bedrock exposures are found in this quadrangle. Therefore, subsurface bedrock geologic information was mostly derived from the analysis of water well data stored in the IGS GeoScan database and the soil maps from the digital soil surveys in related counties (Buckner and Highland, 1974; Voy, 1995; Voy and Streeter, 1996; Wilson, 1996). Within the mapping area, a total of 87 private and public wells were studied including 6 new drill holes for this project. Among these wells, 49 have descriptive stratigraphies with cutting samples which are deposited at the IGS Chalkdale Rock Library. Twenty-six of these stratigraphies were newly logged for this bedrock geologic mapping task. Bedrock stratigraphic information from the surrounding area, including bedrock outcrops, quarries, and well information, was also studied and utilized for this bedrock geologic map.

The bedrock surface of the Colwell 7.5' Quadrangle is completely occupied by the Devonian strata deposited from Eifelian through early Frasnian. Paleogeographically, the mapping area is within the northern portion of the Devonian Iowa Basin, a region of thickened shelf carbonate, shale and minor others deposited from the Eifelian through part of the Frasnian stage (Witzke et al., 1988; Witzke and Bunker, 2006; Day, 2006; Day et al., 2008). The Middle and lower Upper Devonian carbonate rocks form the important upper bedrock aquifer in the mapping area (Libra et al., 1984, 1994). This Devonian aquifer becomes vulnerable when it is shallow, and carbonate rocks, especially relatively pure limestones, are easily karstified (Moore, 1995). Due to its complex sedimentary lithology and depositional environments, the geology, paleoenvironments, paleontology and stratigraphy of the Devonian Iowa Basin have been intensively studied. Early studies include the publications of Belanski (1927, 1928) and Koch (1970). Recent studies of the Devonian Iowa Basin are represented by Witzke and Bunker (1984), Anderson (1984), Bunker and others (1986), Bunker (1995), Anderson and Bunker (1998), Witzke and others (1988), Groves and others (2008), McKay and Liu (2012), and Day and others (2006, 2008, 2013). Geologic mapping projects at 1:24,000 scale in north-central Iowa have been undertaken by the IGS since 2009. In addition to 7.5' quadrangle maps, 1:100,000 scale bedrock geologic maps have been recently completed for Bremer County (McKay et al., 2010), Worth County (Liu et al., 2012), Black Hawk County (Rowden et al., 2013), Cerro Gordo County (Liu et al., 2015), and Mitchell County (Clark et al., 2016) in the Devonian Iowa Basin. The Bedrock Geologic Map of Iowa (1:500,000) was completed by Witzke and others (2010). Results from these geologic studies and bedrock geologic mapping projects provide significant regional geologic information and new data for the present bedrock map.

The bedrock surface of the map is comprised of five Devonian formations. They are (in descending order) the Lithograph City, Coralville, Little Cedar, Pinicon Ridge and Spillville formations. Among them, the carbonate Coralline and Little Cedar formations dominate most of the bedrock surface of the quadrangle, and the Pinicon Ridge and Spillville formations only occur in a deep bedrock valley throughout the western part of the mapping area. The bedrock stratigraphic nomenclature and correlation of the Devonian strata for this map follow the stratigraphic framework proposed by Witzke and others (1988). The general lithologic features and thickness of each map unit are shown in the Stratigraphic Column and described in the Legend section of this map.

References:

Anderson, W.I. (ed.), 1984. General Geology of north-central Iowa. Guidebook for the 48th Annual Tri-State Geol. Field Conf., 150 p.

Anderson, R.R., and Bunker, B.J. (eds.), 1998. Fossil shells, glacial wells, piggy smelts, and drainage wells: the geology of the Mason City, Iowa, area. Geol. Soc. of Iowa Guidebook No. 65, 171 p.

Belanski, C.H., 1927. The Shelburn Stage of the Devonian. American Midland Naturalist, v. 10, p. 316-370.

Belanski, C.H., 1928. The Shelburn Stage of the Devonian. American Midland Naturalist, v. 11, p. 165-212.

Bunker, B.J., and Highland, J.D., 1974. Soil Survey of Howard County, Iowa. U.S. Dept. of Agriculture, Soil Conservation Service, 195 p. with 79 map sheets.

Bunker, B.J., Witzke, B.J., and Day, J.E., 1986. Upper Cedar Valley Stratigraphy, North-Central Iowa, Lithograph City Formation. Geol. Soc. of Iowa Guidebook No. 44, 4 p.

Bunker, B.J. (ed.), 1995. Geology and hydrogeology of Floyd-Mitchell counties, north-central Iowa. Geol. Soc. of Iowa Guidebook No. 62, 269 p.

Clark, R., Liu, H., Kerr, P., Tassier-Sartre, S., Rowden, R., and Streeter, M., 2016. Bedrock geologic map of Mitchell County, Iowa. Iowa Geological Survey Open File Map OFM-16-1.

Day, J., 2006. Overview of the Middle-Upper Devonian sea level history of the Wapsipinicon and Cedar Valley Groups, with discussion of new contour data from the subsurface Cedar Valley Group of southeastern Iowa. In Day, J., Laczaj, J., and Anderson, R. (eds.), New Perspectives and Advances in the Understanding of Lower and Middle Paleozoic Epicontinental Depositional Systems of the Iowa and Illinois Basins. Iowa Geological Survey Guidebook Series No. 25, p. 3-21.

Day, J., Witzke, B., and Bunker, B.J., 2008. Overview of Middle and Upper Devonian Cedar Valley Group and Lime Creek Formation carbonate platform facies, faunas, and event stratigraphy of northern Iowa. In Groves, J.R., Walters, J.C., and Day, J. (eds.), Carbonate platform facies and faunas of the Middle and Upper Devonian Cedar Valley Group and Lime Creek Formation, northern Iowa. Iowa Geological Survey Guidebook No. 28, p. 13-39.

Day, J., Witzke, B., and Lundy, S., 2013. Aspects of the Paleozoic history of epicontinuous sea of the Iowa Basin. Iowa Geological and Water Survey Guidebook No. 29, 118 p.

Groves, J.R., Walters, J.C., and Day, J. (eds.), 2008. Carbonate platform facies and faunas of the Middle and Upper Devonian Cedar Valley Group and Lime Creek Formation, northern Iowa. Iowa Geological Survey Guidebook No. 28, 96 p.

Kerr, P., Tassier-Sartre, S., Liu, H., and Clark, R., 2017. Surficial geologic map of the Colwell 7.5' Quadrangle, Floyd, Mitchell, Howard and Chickasaw counties, Iowa. Iowa Geological Survey Open File Map OFM-17-4.

Koch, D.L., 1970. Stratigraphy of the Upper Devonian Shell Rock Formation of north-central Iowa. Iowa Geological Survey Open File Report 10, 121 p.

Libra, R.D., Halberg, G.R., Rossmeyer, G.G., and Hoyer, R.E., 1984. Groundwater quality and hydrogeology of Devonian-Carboniferous aquifers in Floyd and Mitchell counties, Iowa. Iowa Geological Survey Open File Report 84-2, 1-106.

Libra, R.D., Quade, D.J., Halberg, G.R., and Link, J.P., 1994. Groundwater quality, hydrogeology, and agricultural drainage wells, Floyd and Mitchell counties, Iowa. Iowa Geological Survey Technical Information Series 25, 64 p.

Liu, H., McKay, R., Rowden, R., Quade, D., Tassier-Sartre, S., and Gaglianone, J., 2012. Bedrock Geology of Worth County, Iowa. Iowa Geological and Water Survey Open File Map OFM-12-1.

Liu, H., Clark, R., Fields, C., McKay, R., Rowden, R., Tassier-Sartre, S., Kerr, P., and Streeter, M., 2015. Bedrock Geology of Cerro Gordo County, Iowa. Iowa Geological Survey Open File Map OFM-15-1.

McKay, R.M., Liu, H., and Gaglianone, J.D., 2010. Bedrock Geology of Bremer County, Iowa. Iowa Geological and Water Survey Open File Map OFM-10-10.

McKay, R.M. & Liu, H., 2012. Cedar Valley Group: the Lithograph City - Shelburn Formation contact at Mason City, Iowa. Geol. Soc. of Iowa Guidebook No. 90, 12 p.

Moore, F., 1995. Floyd County groundwater protection project and sinkhole cleanup. In Bunker, B.J. (ed.), Geology and Hydrogeology of Floyd-Mitchell counties, north-central Iowa. Geol. Soc. of Iowa Guidebook No. 62, p. 75.

Prior, J.C., 1991. Landforms of Iowa. University of Iowa Press, Iowa City, 154 p.

Rowden, R., McKay, R., Liu, H., Quade, D., Tassier-Sartre, S., and Gaglianone, J., 2013. Bedrock Geology of Black Hawk County, Iowa. Iowa Geological and Water Survey Open File Map OFM-13-3.

Voy, K.D., 1995. Soil Survey of Floyd County, Iowa. U.S. Dept. of Agriculture, Soil Conservation Service, 260 p. with 63 map sheets.

Voy, K.D. and Highland, J.D., 1975. Soil Survey of Mitchell County, Iowa. U.S. Dept. of Agriculture, Soil Conservation Service, 125 p. with 79 map sheets.

Wilson, J.H., 1996. Soil Survey of Chickasaw County, Iowa. U.S. Dept. of Agriculture, Soil Conservation Service, 182 p. with 74 map sheets.

Witzke, B.J. and Bunker, B.J., 1984. Devonian stratigraphy of north-central Iowa. Iowa Geological Survey Open File Report 84-2, p. 107-149.

Witzke, B.J. and Bunker, B.J., 2006. Middle shelf facies of the Cedar Valley Group (Devonian) and their stratigraphic relationships in eastern Iowa. In Day, J.E., Laczaj, J., and Anderson, R. (eds.), New Perspectives and Advances in the Understanding of Lower and Middle Paleozoic Epicontinental Depositional Systems of the Iowa and Illinois Basins. Iowa Geological Survey Guidebook Series No. 25, p. 23-40.

Witzke, B.J., Anderson, R.R., and Pope, J.P., 2010. Bedrock geologic map of Iowa (1:500,000). Iowa Geological and Water Survey Open File Map OFM-10-1.

Witzke, B.J., Bunker, B.J., and Rogers, F.S., 1988. Eifelian through lower Frasnian stratigraphy and deposition in the Iowa area, central midcontinent, U.S.A. In McMillan, N.J., Finley, A.F., and Glass, D.J. (eds.), Devonian of the World. Canadian Soc. of Petroleum Geologists, Memoir 14, vol. 1, p. 221-250.

Lithology Key

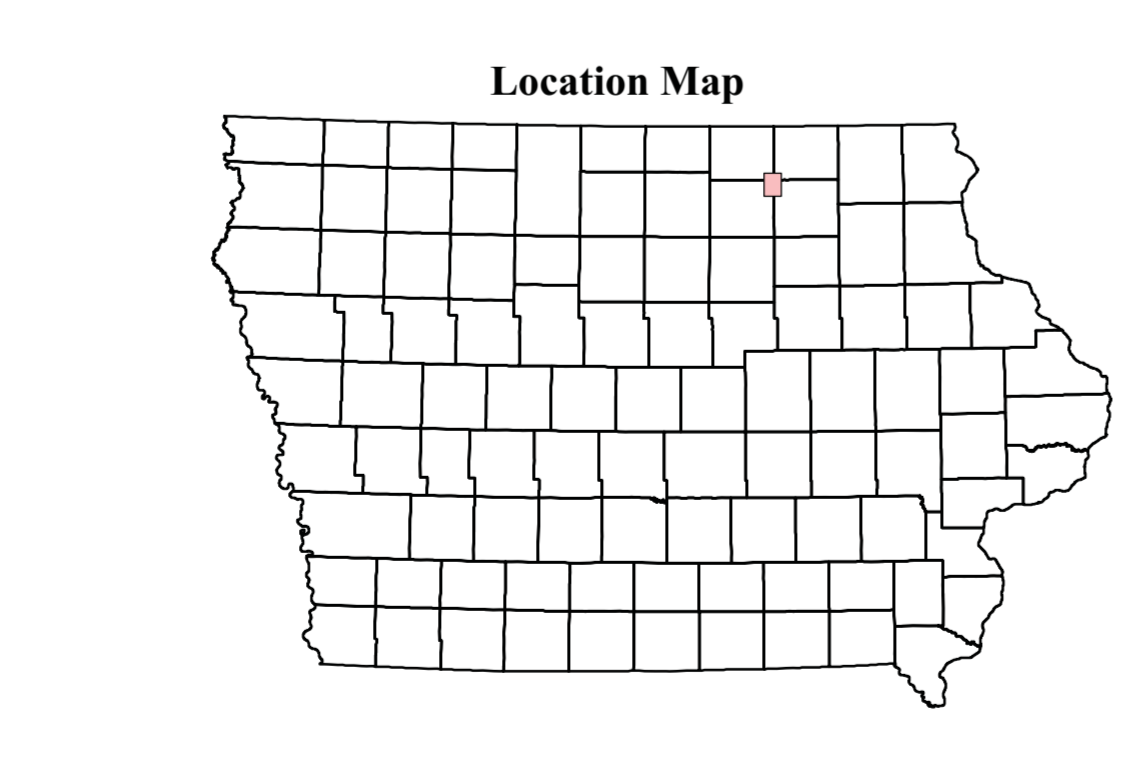
- Conglomerate
- Dolomitic limestone/calcitic dolomite
- Dolomite
- Limestone
- Fine grained sandstone
- Shale
- Lithographic limestone
- Breccia

Symbol Key

- Dolomitic
- Chert
- Sandy
- Shaly
- Stromatoporoids
- Unconformity
- Vugs

Adjacent 7.5' Quadrangles

NEW HAVEN	RIEVEILLE	SARATOGA
FLOYD	COLWELL	ELMA
CHARLES CITY	BASSETT	IOWA



GEOLOGIC CROSS-SECTION A-A'

