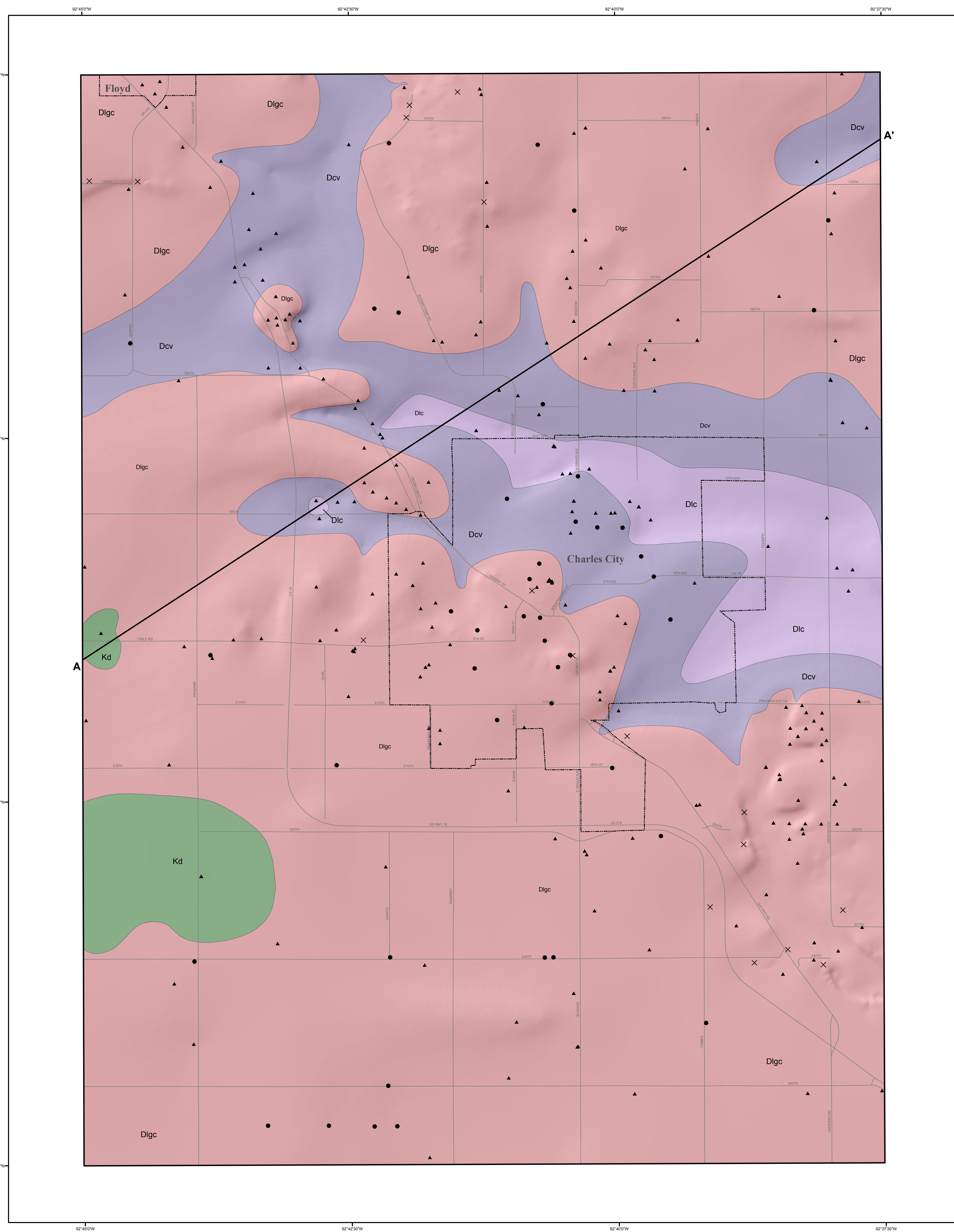


Bedrock Geologic Map of the Charles City (Iowa) 7.5' Quadrangle



LEGEND

CENOZOIC
QUATERNARY SYSTEM

MESOZOIC
CRETACEOUS SYSTEM

PALEOZOIC
DEVONIAN SYSTEM

OTHER FEATURES

- New drill holes for this map project
- Bedrock outcrops
- IGS GEOSAM data points - records available at www.iowageologic.gov
- Incorporated city boundary
- Roads
- Wells used for geologic cross-section

BEDROCK GEOLOGIC MAP OF THE CHARLES CITY 7.5' QUADRANGLE, FLOYD COUNTY, IOWA

Iowa Geological Survey
Open File Map OFM-16-5
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IOWA GEOLOGICAL SURVEY
Iowa Geological Survey, Robert D. Libra, State Geologist

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Introduction to the Bedrock Geologic Map of the Charles City 7.5' Quadrangle, Floyd County, Iowa

The Charles City 7.5' Quadrangle is located in Floyd County, north-central Iowa. In terms of landforms, this quadrangle lies in the Iowan Surface landform region where the land surface had been modified by various episodes of erosion before and during Wisconsin-age glacial events (Pior, 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 deposits with a thickness commonly varying between 0 and 27 m (30-90 ft), and it can reach a maximum thickness of 71 m (235 ft) in bedrock valleys occurring in the east-central and northeast parts of the mapping area. These unconsolidated Quaternary sediments are undifferentiated in this map. For the detailed Quaternary stratigraphy, see the surficial geologic map of this quadrangle (Streeter et al., 2016). Although Quaternary deposits are commonly thick, some bedrock outcrops and rock quarries occur in this map area, mostly along the Cedar River and its tributaries. During the field investigations, shallow bedrock information from the digital soil survey in Floyd County (Voy, 1995) was used for delineating potential bedrock outcrops. In this mapping area, 17 bedrock outcrops including a few quarries were accessed and studied, which provided important regional stratigraphic information for the bedrock geologic map. Subsurface geologic information was mainly derived from the analysis of water well data stored in the Iowa Geological Survey (IGS) GEOSAM database. Within the mapping area, a total of 238 private and public wells were studied, including 44 shallow drill holes which were completed for this mapping project. Among these wells, 59 have descriptive striplogs with cutting samples reported at the IGS Oakdale Rock Library, 15 of which 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 mapping project.

The bedrock surface of the Charles City 7.5' Quadrangle is dominated by Devonian strata, with scattered Cretaceous deposits. 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 Famennian age (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, many richly fossiliferous units, and groundwater and environmental issues, the geology, paleoenvironments, paleontology and stratigraphy of the Devonian Iowa Basin have been intensively studied (e.g., Belanski, 1927, 1928; Koch, 1970). Recent important studies of the Iowa Basin include Witzke and Bunker (1984), Anderson (1984), Bunker and others (1986), Bunker (1995), Anderson and Bunker (1998), Groves and others (2008), McKay and Liu (2012), and Day and others (2008, 2013). Geologic mapping projects at 24,000 and 1:100,000 scales 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 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 mapping projects provide significant regional geologic information and new data for the present bedrock map.

Four bedrock formations, in descending order, the Cretaceous Dakota/Window Formation, the Devonian Lithograph City, Coralville, and Little Cedar formations comprise the bedrock surface of the map area. Two other formations, the Devonian Pinicon Ridge and Spillville formations, are found in wells only and do not occur at the bedrock surface. 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.

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STRATIGRAPHIC COLUMN

System	Series	Stage	Lithostratigraphic Unit	Map Symbol	Lithology	Thickness (in feet)
Cretaceous	"Middle"	Dakota/Window Formation		Kd	[Pattern]	5-20
		Devonian	Upper	Frasnian	Lithograph City Formation	Dlgc
Middle	Givetian		Cedar Valley Group	Dev	Coralville Formation	40-70
		Little Cedar Formation	Dlc		85-130	
Eifelian	Wapispinnon Group	Pinicon Ridge Formation	Dpr	15-45		
					Spillville Formation	Dsp

Lithology Key

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

Symbol Key

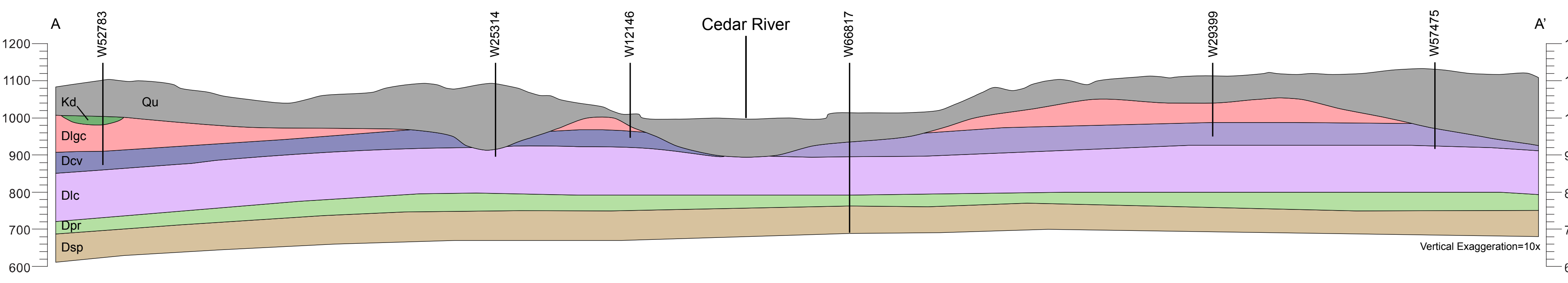
- Dolomitic
- Chert
- Sandy
- Shaly
- Stromatoproids
- Unconformity
- Vugs

Adjacent 7.5' Quadrangles

ORCHARD	FLOYD	COWELL
ROSEVILLE	CHARLES CITY	BASSETT
GREENE	NASHUA	NASHUA

Location Map

GEOLOGICAL CROSS-SECTION A-A'



Base map from Iowa DOT Road map Layers 2006. Bedrock topography raster created internally for this map project.
Iowa Geological Survey digital cartographic file Charles_City_BedrockGeology.mxd, version 6/30/16 (ArcGIS 10.3)
Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15, datum NAD83.
The map and cross-section are based on interpretations of the best available information at the time of mapping. Map interpretations are not a substitute for detailed site specific studies.
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