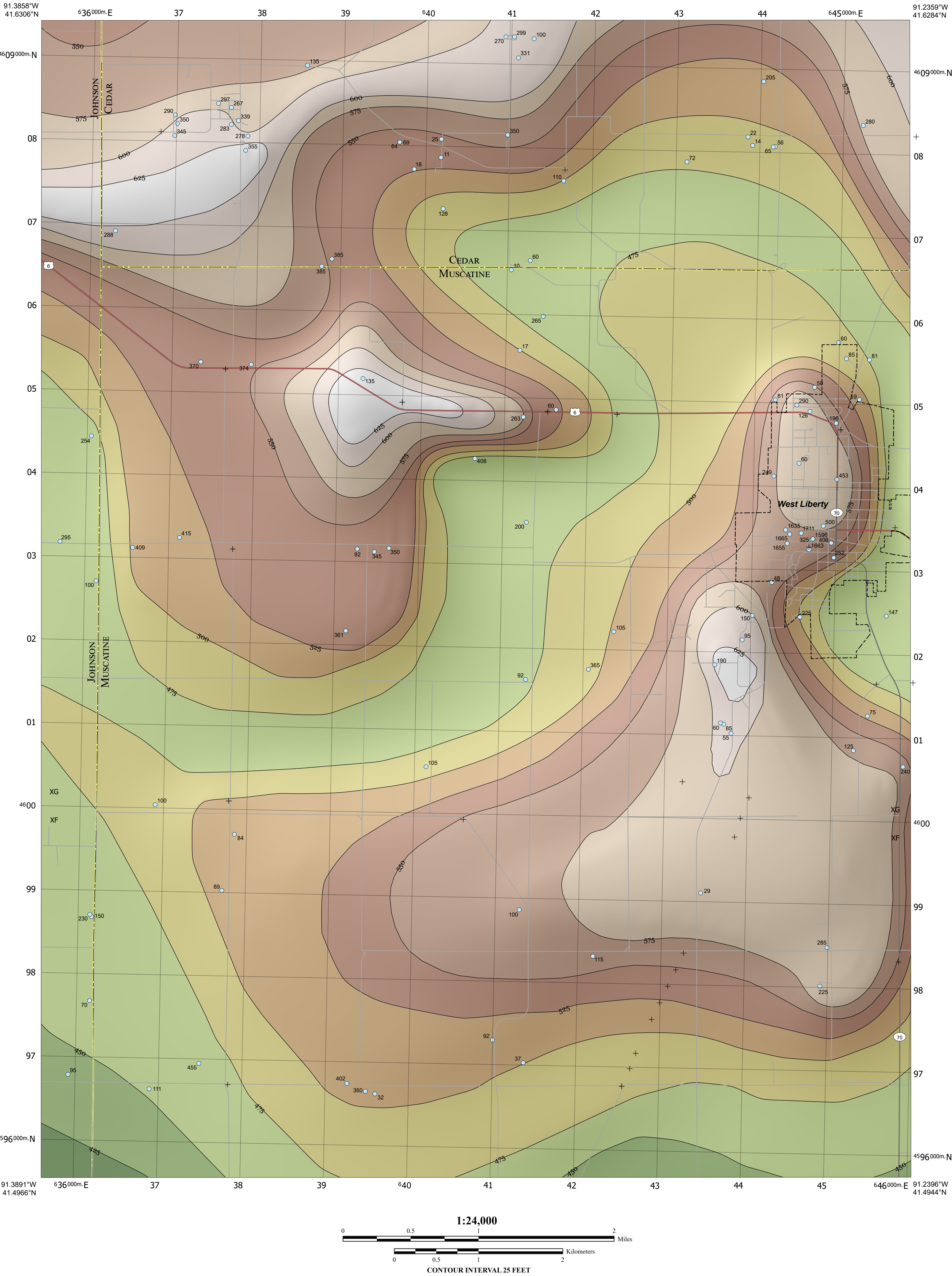


BEDROCK ELEVATION AND QUATERNARY THICKNESS MAPS OF THE WEST LIBERTY 7.5' QUADRANGLE, MUSCATINE, CEDAR, AND JOHNSON COUNTIES, IOWA

BEDROCK ELEVATION



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INTRODUCTION

The West Liberty 7.5' Quadrangle in Muscatine, Cedar, and Johnson counties, Iowa is located within the Southern Iowa Drift Plain (SIDP) and Iowa-Cedar Lowland (ICL) landform regions. The SIDP is an area with a topography defined by loess-mantled uplands and slopes, whereas the ICL is a low-relief floodplain consisting of sediment deposited by the Cedar River. The top of the till package of the SIDP in the map area is likely Pre-Illinoian-age diamicton of the Wolf Creek/Alburnett formations. The ICL is a broad, flat lowland that is full of outwash deposited during the Late Wisconsin Episode and the Cedar River has formed Holocene terraces in this valley. The shape of the ICL does not directly correspond with the underlying bedrock valley (Cleona Channel).

The Cleona Channel is a buried bedrock valley that trends northeast – southwest across Muscatine County, and this channel can be up to 325 feet deep below the modern land surface. However, the primary channel of this buried bedrock valley is just south of the map area. Although entirely buried by Quaternary deposits, the bedrock surface of the West Liberty 7.5' Quadrangle is dominated by Upper Devonian (Frasnian) strata of the Sweetland Creek Formation, as well as Middle Devonian (Givetian) strata of the Little Cedar Formation (Cedar Valley Group) and the Pinicon Ridge Formation (Wapsipicon Group). Just to the east of the mapping area these Paleozoic stratigraphic units are exposed in the Moscow Quarry (Wendling Quarries Inc., in the Wilton 7.5' Quadrangle; IGS Open File Maps OFM-24-01 and OFM-24-02).

The Bedrock Elevation and Quaternary Thickness Maps of the West Liberty 7.5' Quadrangle were produced concurrently with the Bedrock Geologic Map (IGS Open File Map OFM-25-04). Like much of Iowa, the bedrock surface within the quadrangle is entirely concealed by glacial deposits and further information about the Quaternary geology in the area can be found on the Surficial Geologic Map of the West Liberty 7.5' Quadrangle of Muscatine, Cedar, and Johnson Counties, Iowa (IGS Open File Map OFM-24-05). The boundary between Paleozoic bedrock and unconsolidated Quaternary deposits is likely just as irregular as the land surface itself, as a result, the thickness of the Quaternary varies widely across the quadrangle and ranges from 50 to 325 feet (15 to 100 m).

METHODOLOGY

The Bedrock Elevation and Quaternary Thickness Maps of the West Liberty 7.5' Quadrangle were constructed using the same datasets as the Bedrock Geologic Map (IGS Open File Map OFM-25-04). Geologic information from Muscatine County and the surrounding area was used, and this includes drilling records housed in the Iowa Geological Survey (IGS) Geologic Sampling Database (GeoSam), existing maps and technical reports, Iowa Department of Transportation (I DOT) data, horizontal-to-vertical spectral ratio (HVS) passive seismic geophysical data (collected using a Tromino®), and reports from engineering projects and quarry operators.

More than 100 boring records from the IGS GeoSam Database, including both lithologic descriptions of well cutting samples (striplugs) and driller's logs, were evaluated for the West Liberty 7.5' Quadrangle and the area surrounding the quadrangle. Each record was checked for locational accuracy using information from the driller's logs, historic plat books, county assessor information, and direct communication with landowners. The depth to the surficial-bedrock contact was determined for each well and assigned an elevation value by subtracting it from the surface digital elevation model (DEM). These data points provided the framework for the Bedrock Elevation Map. Additional information was gained from an assessment of the Natural Resources Conservation Service (NRCS) County Soil Survey by identifying soil series that indicate shallow bedrock.

To create the Bedrock Elevation Map, bedrock elevation contours (drawn at a 25-foot contour interval) were digitized manually onscreen using Esri ArcGIS Pro 3.0 software. The bedrock elevation raster was then generated using interpolations of the bedrock surface created with the 'Topo to Raster' geoprocessing tool (ArcGIS Pro 3.0). The Quaternary Thickness Map was created by subtracting the bedrock elevation raster values from the surficial DEM raster. The resulting surface was rounded to the nearest integer and contours were generated from this result and then smoothed.

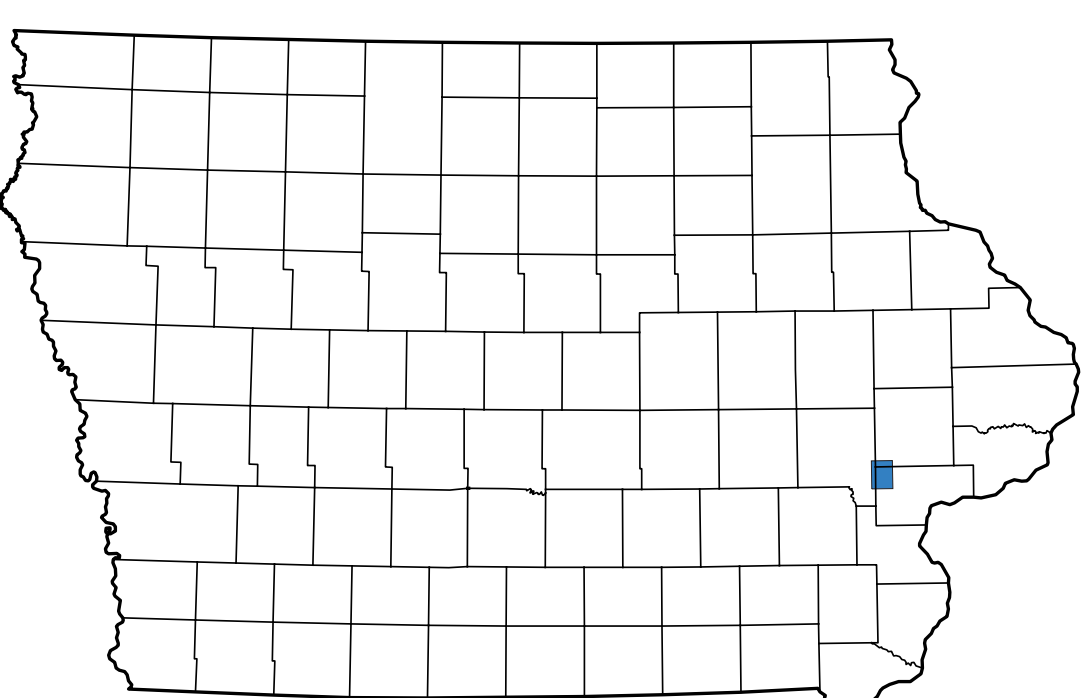
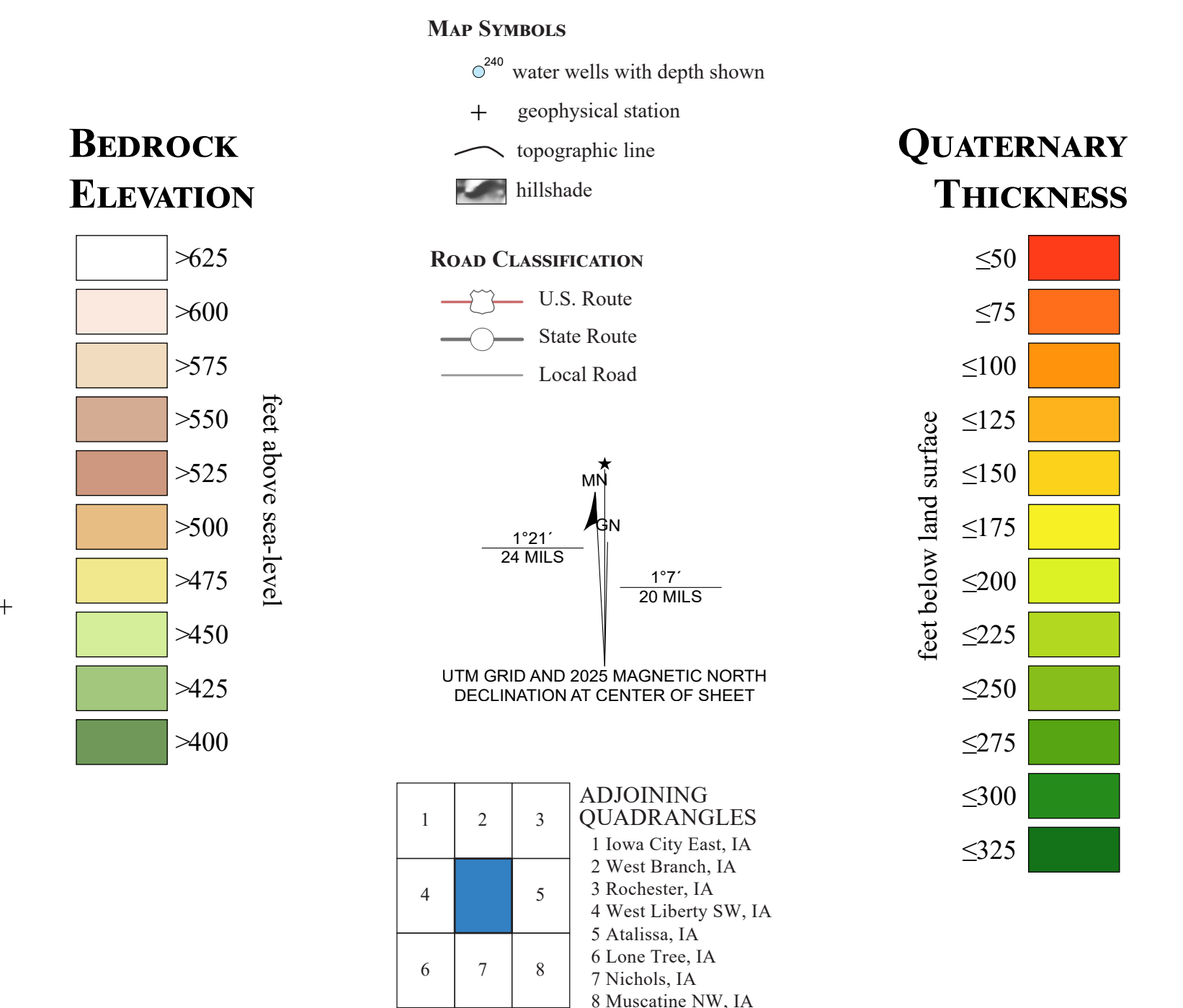


Figure 1. The location of the West Liberty Quadrangle in Iowa.

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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. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

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QUATERNARY THICKNESS

