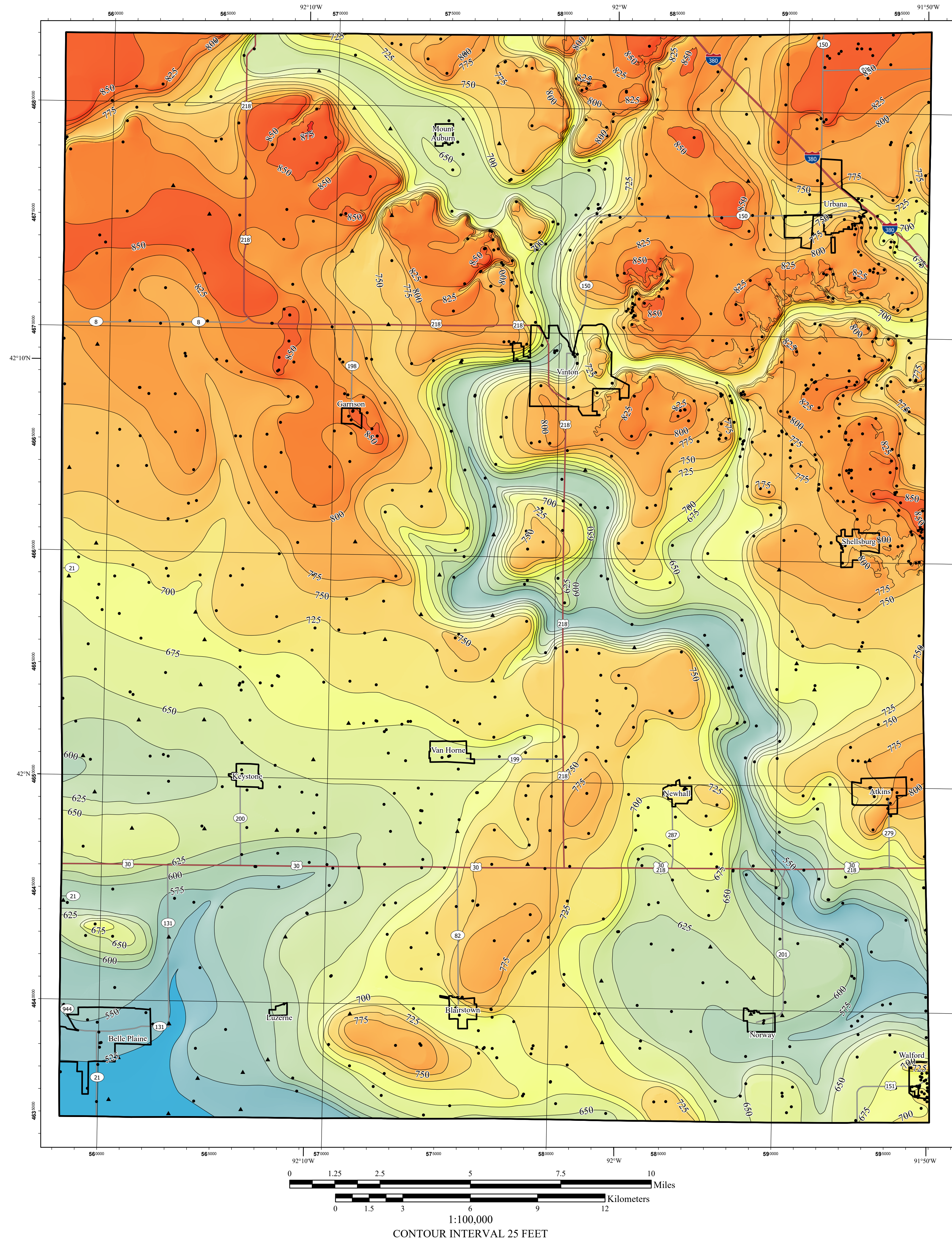


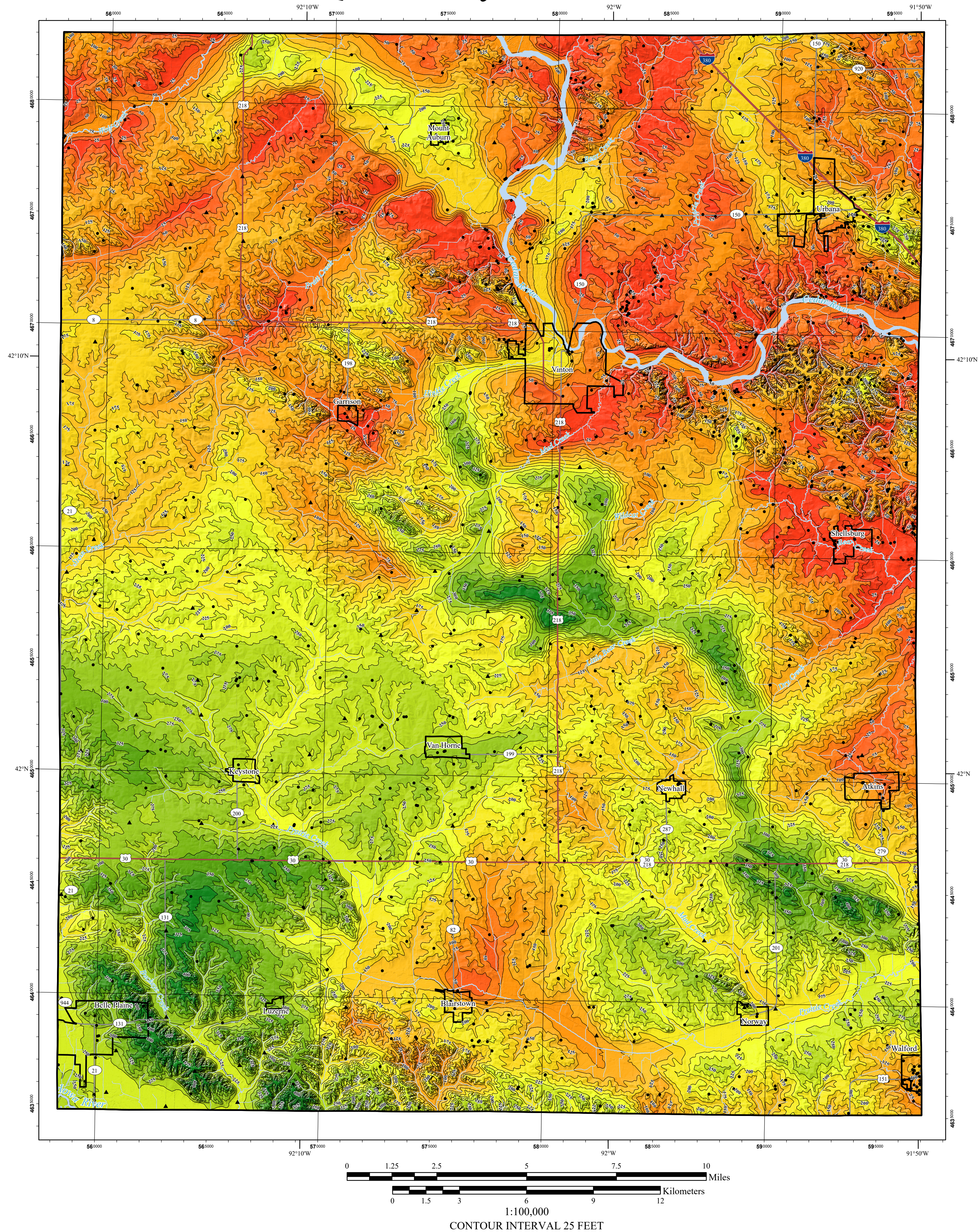
Bedrock Elevation and Quaternary Thickness Maps of Benton County, Iowa

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Open File Map: OFM-21-2

Bedrock Elevation



Quaternary Thickness



INTRODUCTION

The Bedrock Elevation and Quaternary Thickness maps of Benton County were produced in conjunction with the surficial and bedrock geologic maps. The bedrock surface within the county, like much of Iowa, is mostly concealed by glacial deposits. The boundary between Paleozoic bedrock and unconsolidated Quaternary materials is likely just as irregular as the land surface itself. Therefore, the thickness of Quaternary deposits varies widely across the county. There are some bedrock exposures along the Cedar River near Vinton, though generally bedrock depth ranges from 15 to 45 m (50 - 150 ft). The maximum depth of 122 m (400 ft) occurs in the southwestern portion of the mapping area along the Iowa River Valley.

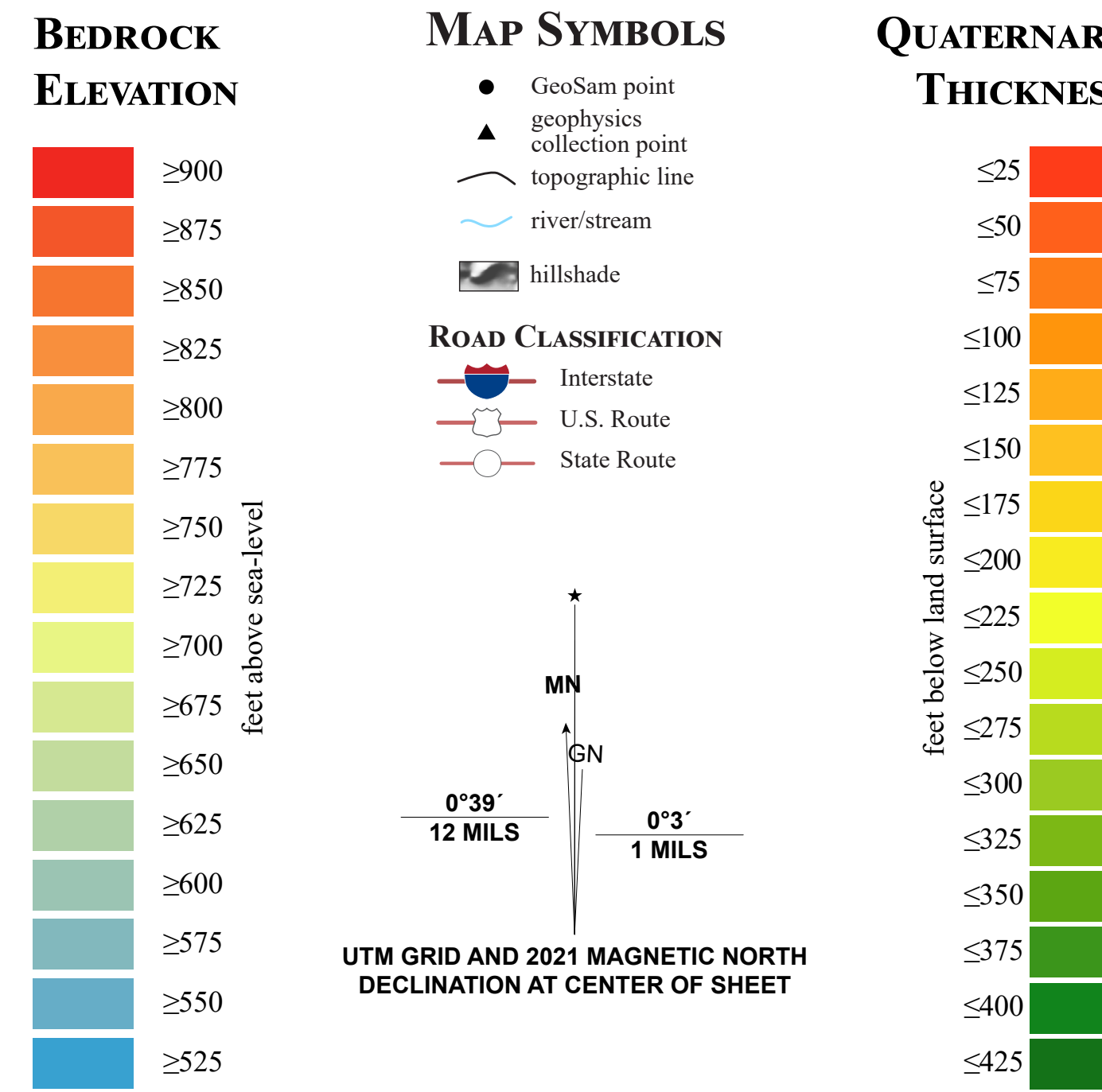
Bedrock topographic lines were drawn based on borehole data coupled with identifiable bedrock outcrop occurrences. Where the bedrock surface is exposed or lies within a few feet of the land surface, the bedrock topography essentially mirrors the land surface topography, such as along parts of the Cedar River and its tributaries in the northeast of the map area. Bedrock topographic detail is muted where bedrock is deeper and borehole data is scarce which is across most of the map. The thickness of Quaternary materials was generated by subtracting the elevation of the bedrock surface from the land surface elevation. The Surficial Geologic Map of Benton County (OFM-21-1) provides further information regarding the nature and extent of Quaternary deposits within the mapping area.

METHODOLOGY

The Bedrock Elevation and Quaternary Thickness maps of Benton County were constructed using the same datasets as the surficial and bedrock geologic maps. Geologic information utilized included drilling records housed in the Iowa Geological Survey (IGS) GeoSam database, existing maps and technical reports, Iowa Department of Transportation data, and reports from engineering projects and quarry operators. Field reconnaissance of three bedrock outcrops and one of the five abandoned quarries was completed, as well as the collection of 66 passive seismic data points.

More than 1,250 boring records from the IGS GeoSam database, including both driller's logs and lithologic descriptions of well cutting samples (strip logs), were evaluated for the project. 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 county soil survey by identifying soil series that indicate shallow bedrock.

Bedrock elevation contours were digitized manually using ArcGIS software at a 25-foot contour interval. The bedrock elevation raster was generated using interpolations of the bedrock surface created with the "Topo to Raster" and "Empirical Bayesian Kriging" tools in ArcMap 10.8 or ArcGIS Pro 2.8. 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.



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Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 18N, datum NAD83. The maps 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. Supported in part by the U.S. Geological Survey Cooperative Agreement Number G20AC00043 National Cooperative Geologic Mapping Program (STATE-MAP). This work was partially supported by a National Science Foundation Award: Improving Undergraduate STEM Education Grant GP-IMPACT 1600429.