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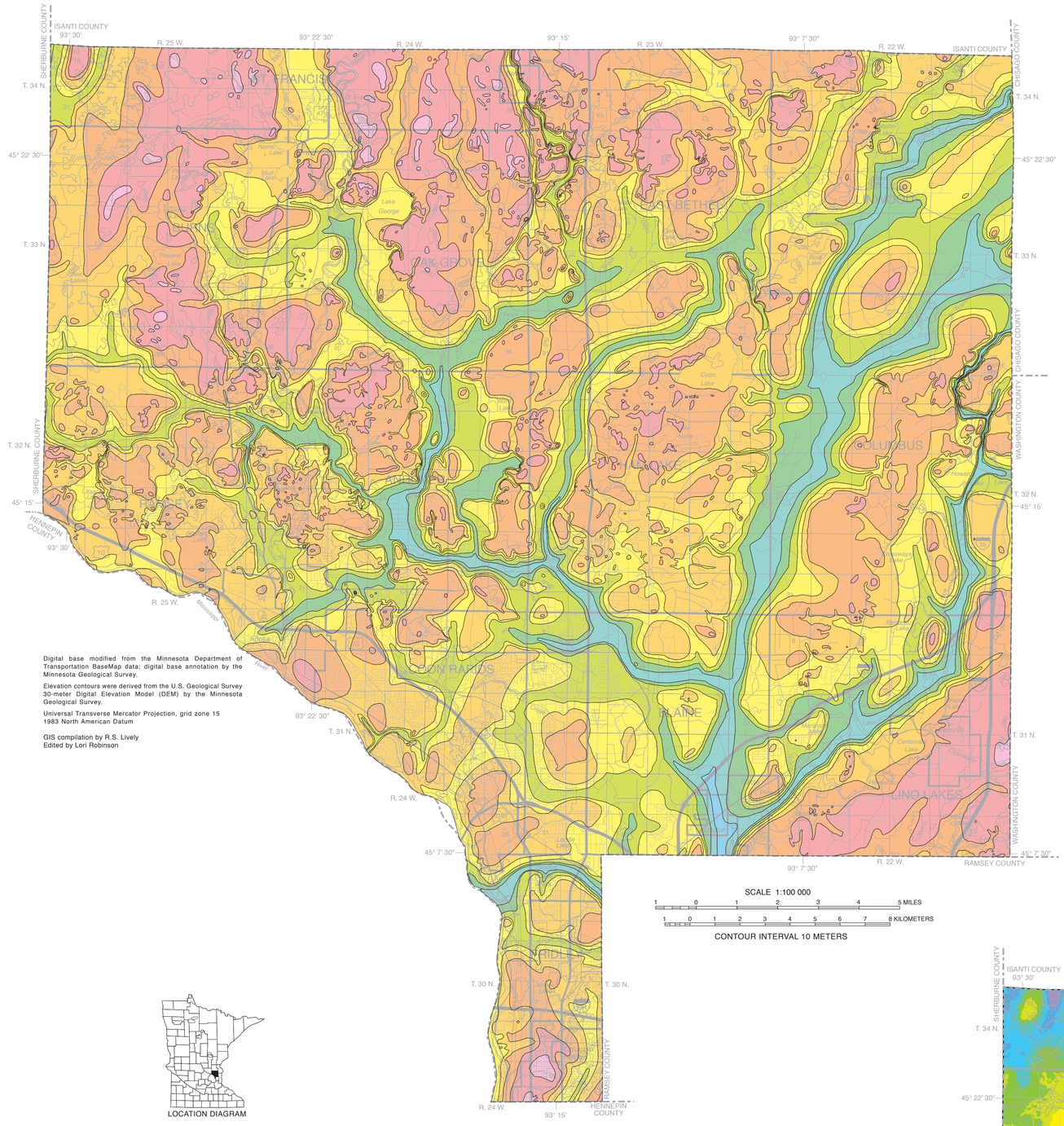
COUNTY ATLAS SERIES
ATLAS C-27, PART A
Anoka County
Plate 6—Bedrock Topography
***and* Depth to Bedrock**



Digital base modified from the Minnesota Department of Transportation BaseMap data; digital base annotation by the Minnesota Geological Survey.

Elevation contours were derived from the U.S. Geological Survey 30-meter Digital Elevation Model (DEM) by the Minnesota Geological Survey.

Universal Transverse Mercator Projection, grid zone 15
1983 North American Datum

GIS compilation by R.S. Lively
Edited by Lori Robinson

851-900
801-850
751-800
701-750
651-700
601-650
551-600
501-550
451-500

Elevation of the bedrock surface in feet above mean sea level

SCALE 1:100 000
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 8 KILOMETERS
CONTOUR INTERVAL 10 METERS

BEDROCK TOPOGRAPHY

By

John H. Mossler

2013

INTRODUCTION

The configuration of the bedrock surface is represented by colors assigned to 50-foot (15-meter) elevation intervals (example: 751 to 800 feet above sea level) on the Bedrock Topography map. The position of the contour intervals was determined mostly from records of water well construction and engineering test borings. Passive seismic soundings were also used to determine the elevation of the bedrock surface in some areas. The seismic data were collected by the Minnesota Geological Survey (Richard Lively and V.W. Chandler). The irregular distribution of data can be seen on Plate 1, *Data-Base Map*, and should be considered when assessing the reliability of the map at any particular location.

The bedrock surface in Anoka County varies from less than 500 feet (152 meters) to more than 850 feet (259 meters) above mean sea level. The most prominent features of the bedrock topography are buried valleys that cut into Paleozoic bedrock (Plate 2, *Bedrock Geology*) that cross the county. The buried valleys deepen toward the south and intersect buried valley systems in Ramsey County (Mossler, 1992). Deeper valleys generally are underlain by the Wonewoc Sandstone, Eau Claire Formation, and Mt. Simon Sandstone.

Several broad, irregular troughs that occur on the land surface of Anoka County were identified by the alignment of depressions and lakes (Meyer, 2011). They are interpreted to have been created when channels eroded by meltwater flowing beneath Superior-lobe ice were subsequently buried by sediments during later events. The drainage channels eroded deeply into substrate beneath Superior-lobe ice (Meyer, 2011) and locally followed pre-existing valleys eroded into bedrock. The prominent chain of lakes that extends from Higgins and Howard Lakes to Rice and Baldwin Lakes lies along a drainage channel that follows a deep bedrock valley that crosses the southeastern corner of the county. Peltier and Centerville Lakes to the east lie along a shorter drainage channel that partially overlies the same buried bedrock valley. The other prominent chain of lakes in the county (Ham, Coon, Linwood, and Martin Lakes) lies along the trough of a drainage channel that does not exhibit any obvious relationship to buried bedrock valleys. Other large lakes in the county, such as Fish Lake and Lake George, apparently overlie buried bedrock valleys, but are not in inferred drainage channels.

Other features of the bedrock topography are bedrock cuestas and mesas along the interfluves of the buried valleys that are generally underlain by more resistant bedrock units composed of carbonate-rich rock, such as the Platteville Formation, Prairie du Chien Group, and St. Lawrence Formation.

REFERENCES

Meyer, G.N., 2012, Surficial geology, pl. 3 *of* Meyer, G.N., project manager, Geologic atlas of Anoka County: Minnesota Geological Survey County Atlas C-27, scale 1:100,000.

Mossler, J.H., 1992, Bedrock topography and confining units of the St. Peter, pl. 4, *of* Meyer, G.N, and Swanson, L., eds., Geologic atlas of Ramsey County, Minnesota: Minnesota Geological Survey County Atlas C-7, scale 1:48,000.

DEPTH TO BEDROCK

By

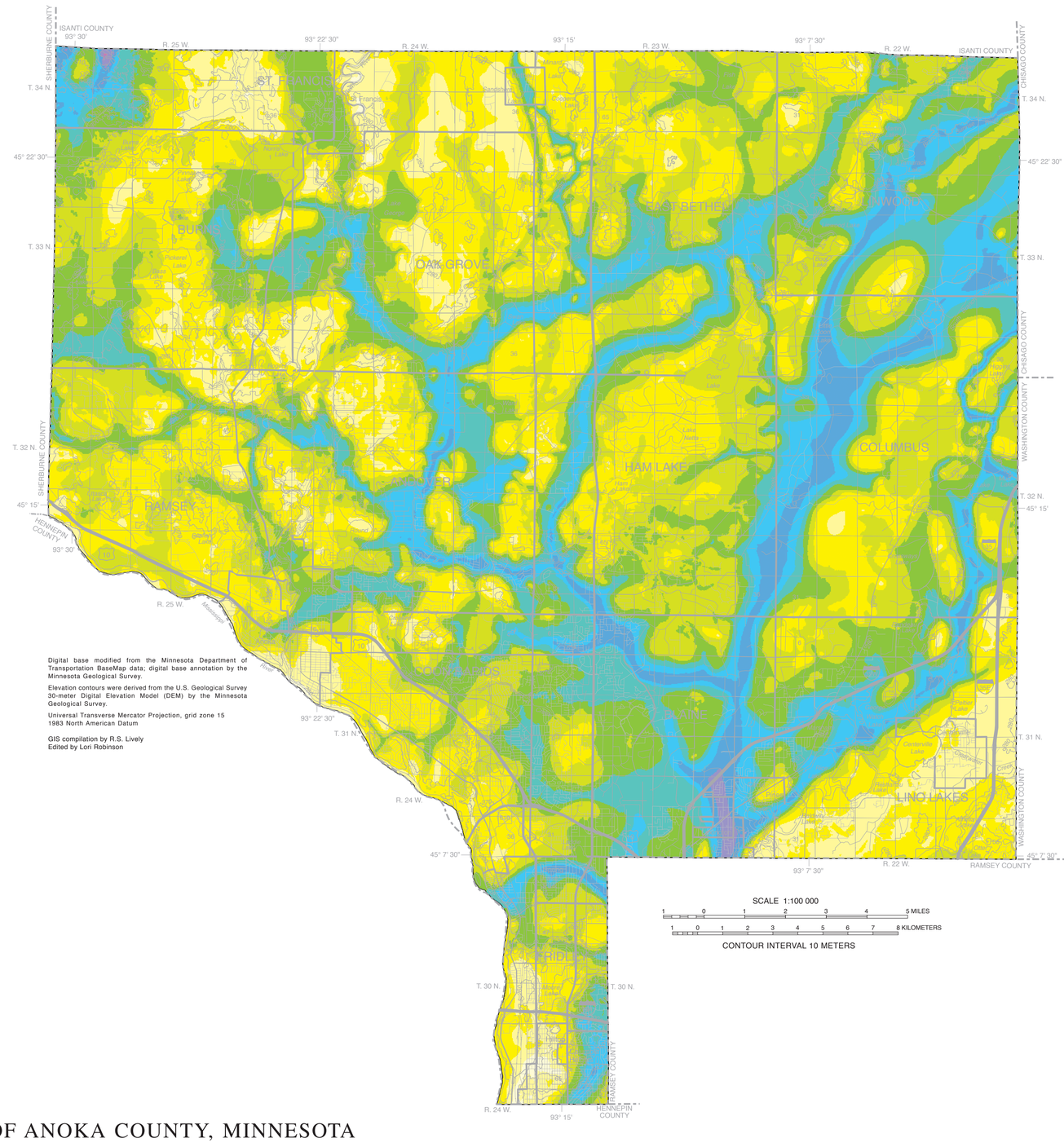
John H. Mossler

2013

INTRODUCTION

The thickness of the glacial sediment in Anoka County is equal to the depth from the land surface to the bedrock surface. To calculate this thickness, a grid of bedrock-surface elevations was subtracted from a corresponding grid of land-surface elevations (30-meter cell size). The surface elevation grid was resampled from the National Elevation 10-meter data set of the U.S. Geological Survey, and the bedrock elevation grid was interpolated from interpretations of water wells, engineering test borings, and passive seismic data (see the Introduction to the Bedrock Topography map). The residual grid was then classified at a 50-foot (15-meter) interval to produce the color-coded Depth to Bedrock map. Because the surface of a lake is regarded as the land surface elevation, the thickness of glacial sediment within lake boundaries includes the depth of the lake water. To calculate the true thickness of sediment beneath a lake it is necessary to subtract the water depth at that location. In places the thickness of the glacial sediment varies greatly over short distances, and mapping at this scale (1:100,000) may not properly resolve such variations. For that reason it is best to consult site-specific data, such as water well records and seismic soundings, wherever they are available.

The thickest sediments in Anoka County occur over deep, pre-glacial valleys in the bedrock surface. These occur throughout the county but are most prominent in the eastern half. Sediment is more than 400 feet (122 meters) thick along short intervals of some valleys, but more commonly ranges from 250 feet (76 meters) to 400 feet in thickness. In contrast, bedrock is at the surface or within 50 feet (15 meters) of the land surface in the panhandle of the county at Columbia Heights and along a stretch of the Mississippi River near Anoka. Most of the details in the Depth to Bedrock map are related to landforms because the land surface model is more detailed than the bedrock surface model.



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1–50
51–100
101–150
151–200
201–250
251–300
301–350
351–400
401–450
451–500

Depth in feet from the land surface to the bedrock surface

SCALE 1:100 000
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 8 KILOMETERS
CONTOUR INTERVAL 10 METERS

Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, effort has been made to ensure that the interpretation conforms to sound geologic and cartographic principles. No claim is made that the interpretation shown is rigorously correct, however, and it should not be used to guide engineering-scale decisions without site-specific verification.

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GEOLOGIC ATLAS OF ANOKA COUNTY, MINNESOTA