George H. Ryan, Governor

Department of Natural Resources
Brent Manning, Director
ILLINOIS STATE GEOLOGICAL SURVEY
William W. Shilts, Chief

Illinois Geologic Quadrangle Map: IGQ Sugar Grove-BT
2002

# TOPOGRAPHIC MAP OF THE BEDROCK SURFACE

## Sugar Grove 7.5-minute Quadrangle
## Kane County, Illinois

B. Brandon Curry

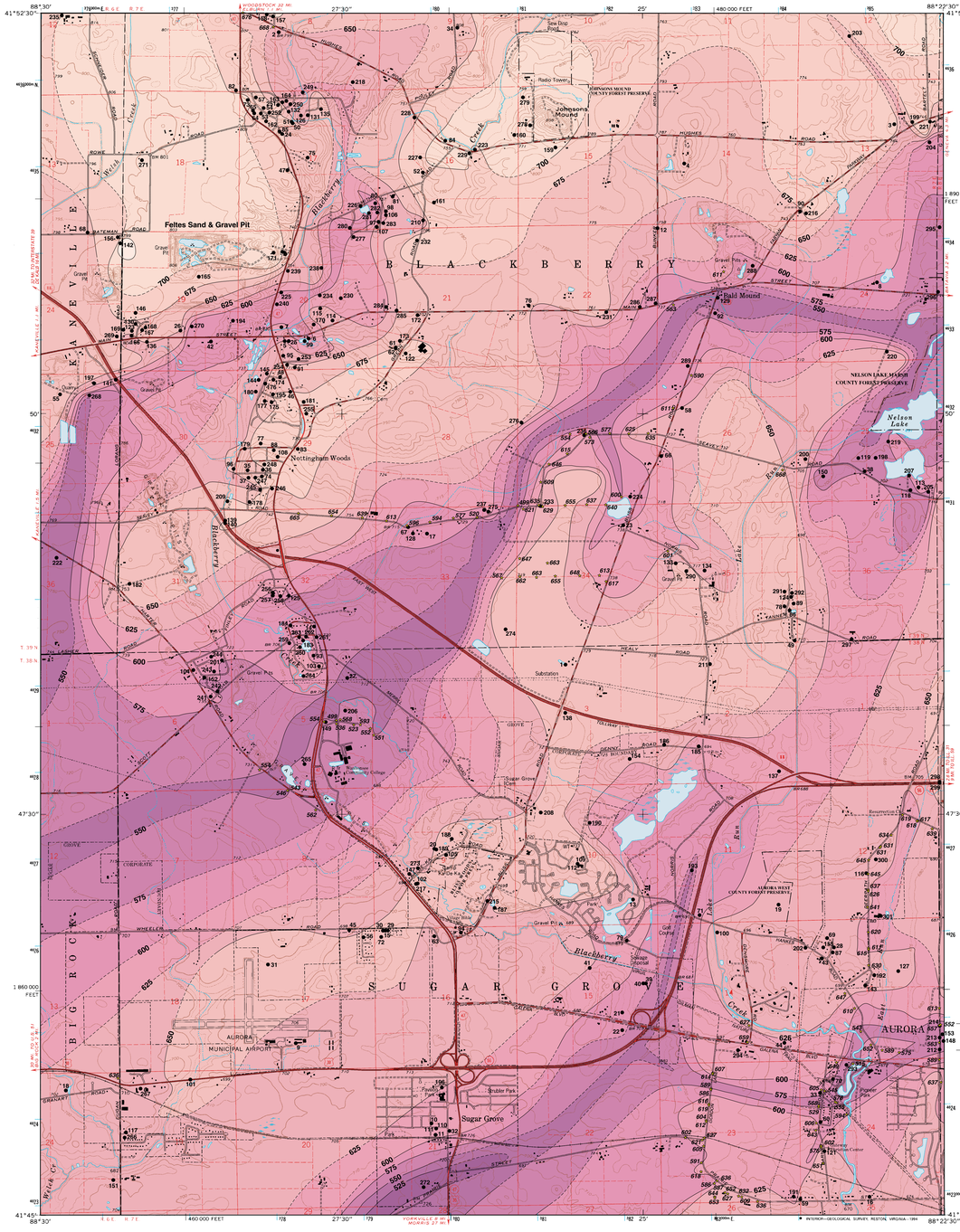


Table 1 Bedrock surface elevations and API numbers for map data points.

| Number on map | Bedrock surface elevation | API number | Number on map | Bedrock surface elevation | API number | Number on map | Bedrock surface elevation | API number |
|---|---|---|---|---|---|---|---|---|
| 1 | 668 | 1208900043000 | 51 | 687 | 1208890121600 | 101 | 655 | 1208922508600 |
| 2 | 645 | 1208900072000 | 52 | 684 | 1208890122900 | 102 | 653 | 1208922541000 |
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| 4 | 659 | 1208900007600 | 54 | 671 | 1208890123100 | 104 | 579 | 1208922596000 |
| 5 | 617 | 1208900007900 | 55 | 658 | 1208890124500 | 105 | 662 | 1208922598000 |
| 6 | 590 | 1208900008000 | 56 | 656 | 1208890124800 | 106 | 623 | 1208922640000 |
| 7 | 607 | 1208900008100 | 57 | 689 | 1208890125200 | 107 | 630 | 1208922641000 |
| 8 | 592 | 1208900008400 | 58 | 631 | 1208890125400 | 108 | 691 | 1208922643000 |
| 9 | 642 | 1208900021700 | 59 | 613 | 1208890126300 | 109 | 719 | 1208922775400 |
| 10 | 617 | 1208900022500 | 60 | 559 | 1208890126400 | 110 | 676 | 1208922822000 |
| 11 | 608 | 1208900022900 | 61 | 685 | 1208890126800 | 111 | 691 | 1208922822300 |
| 12 | 641 | 1208900026400 | 62 | 670 | 1208890126900 | 112 | 715 | 1208923020100 |
| 13 | 634 | 1208900027500 | 63 | 645 | 1208890128600 | 113 | 610 | 1208923220000 |
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| 15 | 654 | 1208900035000 | 65 | 687 | 1208890136700 | 115 | 636 | 1208923419000 |
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| 20 | 652 | 1208900039200 | 70 | 553 | 1208890143400 | 120 | 595 | 1208926563000 |
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| 24 | 688 | 1208900042900 | 74 | 672 | 1208890156900 | 124 | 645 | 1208926794000 |
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| 26 | 648 | 1208900048800 | 76 | 652 | 1208890163700 | 126 | 635 | 1208926853000 |
| 27 | 538 | 1208900062300 | 77 | 688 | 1208890163900 | 127 | 635 | 1208926874400 |
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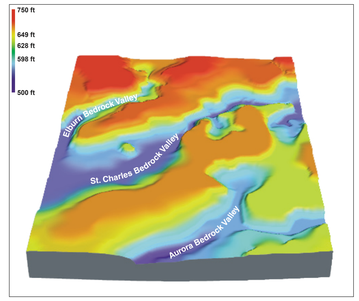


Figure 1 Three-dimensional model of the bedrock surface of the Sugar Grove 7.5-minute Quadrangle. This map was made using Vertical Mapper 2.0 (1998) and nearest neighbor gridding.

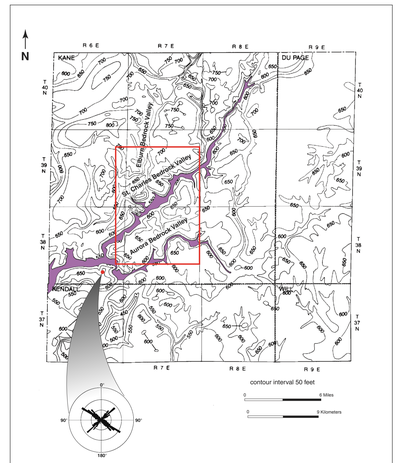


Figure 2 Regional bedrock topography (modified from Graese et al. 1988); the deepest parts of the St. Charles and Aurora Bedrock Valleys are shaded purple. The Sugar Grove Quadrangle is outlined in red. The new bedrock topography map at left incorporates new data and is significantly different in some areas from this regional map. Joint orientations measured by Foote (1982) at the Meyers-Podschwit Quarry (now part of the Big Rock Forest Preserve) are shown. Note that the set of fractures oriented N 50° E parallels the trend of many segments of the St. Charles and Aurora Bedrock Valleys.

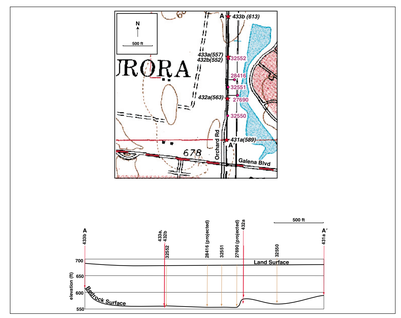


Figure 3 Interpretation of the bedrock surface based on test drilling by Layne-Western, Inc. and seismic refraction data (Heigold 1990, p. 47). The depth to bedrock based on test drilling is shown by the brown arrows; the depth to bedrock based on seismic refraction is shown by the red arrows. The test boring data are projected orthogonally onto the line of section (see inset). Note that overlapping seismic refraction data do not yield the same bedrock surface elevation values. This figure demonstrates that the seismic refraction method, in general, yields reasonable depth-to-bedrock values.

## Introduction

The bedrock surface in the Sugar Grove Quadrangle was eroded into the top of the lithified Silurian and Ordovician dolostone and shaly dolostone that underlie the glacial drift or modern stream sediment. Traversing the quadrangle from northeast to southwest is the St. Charles Bedrock Valley, the major trunk valley in the region. The Aurora and Elburn Bedrock Valleys are tributary to the St. Charles (figs. 1 and 2). Bedrock valleys are significant features in this region because they often contain sand and gravel aquifers (Curry and Seaber 1990). There are no known exposures of bedrock in the quadrangle, although the drift is less than 10 feet thick in some areas, such as where Interstate 88 exits the Sugar Grove Quadrangle on the east.

Figure 2 shows the regional topography of the bedrock surface of Kane County (Graese et al. 1988). The new Sugar Grove Quadrangle map is more detailed and has been revised based on records from additional water wells and test borings and on seismic refraction profiles (Heigold 1990, Larson et al. 1991).

## Geologic History Associated with Development of the Bedrock Surface

Most of the rock that occurs at and just below the bedrock surface was deposited in warm, tropical oceans 400 million years ago. The sediment that covers the bedrock surface is related to continental glaciation, modern stream processes, or soil formation and is less than 500,000 years old (Curry et al. 1999). Where covered by these younger sediments, the bedrock surface is an outstanding example of a geologic unconformity that is found everywhere in Illinois except where bare outcrops of bedrock occur at the ground surface.

The topography of the bedrock surface probably has been most influenced by erosion caused by glaciers and the torrents of meltwater that flowed from the glaciers, although erosion by postglacial streams and rivers also was important. The best evidence for glacial erosion is boulder-sized fragments of the underlying rock incorporated in the glacial diamicton, as was observed in the Sugar Grove Quadrangle at the Feltes Sand and Gravel Pit (Curry et al. 1999; Section 19, T39N, R7E). Additional evidence includes the polished and striated bedrock surfaces observed in many nearby quarries on the Big Rock and Aurora North Quadrangles (Curry 2001).

The orientation of major bedrock valley segments may have been controlled by joints (fractures) in the bedrock. The orientations of joints measured by Foote (1982) at the Meyers-Podschwit Quarry (now part of the Big Rock Forest Preserve) includes one joint set that strikes N 50° E (fig. 2), subparallel to the orientation of the St. Charles Bedrock Valley and many segments of the Aurora Bedrock Valley. The north-south orientation of many bedrock valleys tributary to the major bedrock valleys possibly was caused by ice-marginal erosion or post-glacial erosion adjacent to moraines. The Fox River valley in the Aurora North Quadrangle, due east of the Sugar Grove Quadrangle (Curry 2001), is a prominent example of this type of control.

## Map Data

The bedrock surface elevation and API (American Petroleum Institute) number associated with numbered data points on the map are given in table 1. A unique API number is assigned to every well and test boring record on file at the Geological Records Unit at the Illinois State Geological Survey. These records are available to the public.

The most reliable bedrock surface data were obtained from the logs of water wells and other test borings that penetrated the bedrock surface. The bedrock surface elevation data from these sources were calculated by subtracting the thickness of the unconsolidated materials from the ground surface elevation. Bedrock surface elevation data from a one-mile-wide buffer zone around the edge of the Sugar Grove Quadrangle were included in the calculations, but are not shown on the map. Land surface elevations, if not known, were estimated from the 7.5-minute topographic maps. These estimated elevations have an accuracy of ±5 feet (U.S. Geological Survey 1999).

Only wells or other data points with locations verified by ISGS geologists or by private consulting engineers were used to make this map. Many well locations within subdivisions were verified by checking lot numbers in plat books filed at the county courthouse. The locations of wells outside of subdivisions generally were verified by pacing and/or measuring from houses or roadways or by identification on aerial photographs or orthophotoquadrangle maps. Notable records include (1) water-well test borings drilled by Layne-Western Inc. for the Orchard Street water-well field for the City of Aurora (Gilkeson et al. 1987), Village of Sugar Grove, and other test borings; (2) engineering test borings for bridges; (3) ISGS stratigraphic test borings (Reed 1975), including two test borings to bedrock recently completed for a study of Nelson Lake (Curry et al. 2001); and (4) seismic refraction data (Heigold 1990, Larson et al. 1991). Bedrock surface elevation data estimated from the results of seismic refraction surveys were also plotted; these data were used to help contour the map unless other more reliable data were available. Subsequent test drilling has shown that the accuracy of estimates from seismic refraction profiles is greater than 84%, that is, within 20 feet of the actual bedrock surface elevation (fig. 3; Gilkeson et al. 1987).

The quality of much of the data is excellent. Of the more than 300 well logs used to determine bedrock surface elevation points, 8 are high-quality logs described and interpreted by ISGS geologists, 41 are from Layne-Western, Inc. (for the purpose of sitting municipal water wells), and the remainder are from private water wells. The reliability of data from the water-well logs was tested, in part, by comparing similar bedrock surface elevations in subdivisions where data density is high.

Record 129 (API 120892691600) indicates a bedrock surface elevation of 508 feet just south and west of Bald Mound, thus marking the lowest elevation associated with the St. Charles Bedrock Valley in the Sugar Grove Quadrangle. The well location has been field verified. Although record 129 is shown on the map, the value was not used in the contouring because no supporting information exists. The next lowest elevation, 538 feet (record 27), is located about 4 miles downstream in the St. Charles Bedrock Valley.

## Mapping Methods

Contouring was done using a nearest neighbor gridding algorithm (Vertical Mapper 2.0 1998). In general, only polygons larger than about 0.125 mi² were retained on the map. In some areas, the contours were modified to reflect a joint-influenced, dendritic drainage pattern. This conceptual model for regional drainage reflects what is observed in the surface drainage of the drift less area of northwestern Illinois. Although much of central and eastern Kane County is underlain by carbonate rock, the general absence of sinkholes or other evidence of carbonate solution in the highwalls of nearby quarries (Graese et al. 1988) argues against adopting a conceptual model of a karstified bedrock surface. On or near the edge of the map, contour lines were modified additionally to accommodate information from a 1:62,500 scale map of the bedrock surface topography of Kane County (Vaiden and Curry 1990) and a 1:24,000 scale map of the adjoining Aurora North Quadrangle (Curry 2001).

Contours are dashed where bedrock surface data points are more than about 2,000 feet distant (1 inch on the map) from the contour or where the contour may be moved about 2,000 feet away from its present location and still be valid based on available information.

The three-dimensional model of the bedrock surface also was created using the computer program Vertical Mapper Version 2.0 (1998; fig. 1).

## References

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### Bedrock Topography

725–750
700–725
675–700
650–675
625–650
600–625
575–600
550–575
525–550
500–525

Contour Interval 25 Feet
Elevation Datum Mean Sea Level

### Data Type

301 Well location; number is identified in table.

561 Seismic refraction data point with estimated bedrock surface elevation (from Heigold 1990, Larson et al. 1991)

Contour lines are dashed where there are no validating data points within 2,000 feet of the contour.

Contour lines are solid where there are validating data points within 2,000 feet of the contour.

### Road Classification

Heavy-duty
Medium-duty
Light-duty
Unimproved dirt
State Route
U.S. Route

Surface topographic map produced by the United States Geological Survey in cooperation with State of Illinois agencies.
Surface topographic control by USGS and NOS/NOAA
Surface topography by photogrammetric methods from aerial photographs taken 1963. Field checked 1964. Revised from aerial photographs taken 1988. Field checked 1991. Map edited 1993.
Projection and 10,000-foot grid ticks: Illinis coordinate system, east zone (transverse Mercator grid ticks, zone 16, shown in blue 1927 North American Datum (NAD).
North American Datum of 1983 (NAD 83) is shown by dashed corner ticks.
The values of the shift between NAD 27 and NAD 83 for 7.5-minute intersections are given IN USGS Bulletin 1875.

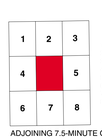
SCALE 1:24000

1 1/2 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

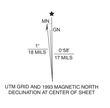
Base map contour interval 10 feet
Surface topographic map compiled at the Illinois State Geological Survey (ISGS) from digital data provided by the U.S. Geological Survey and the ISGS
1927 North American Datum

**Recommended Citation**

Curry, B.B., 2002, Topographic Map of the Bedrock Surface, Sugar Grove 7.5-minute Quadrangle, Kane County, Illinois: Illinois State Geological Survey, Illinois Geologic Quadrangle Map, IGQ Sugar Grove-BT, 1:24,000.




ADJOINING 7.5-MINUTE QUADRANGLES




UTM GRID AND 1993 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

**IMPORTANT INFORMATION ON THE USE OF THESE MAPS AND OTHER MATERIALS**

This document has been carefully reviewed and edited and meets the standards of the Illinois State Geological Survey with regard to scientific and technical quality and is suited to the purpose and the use intended by its authors. It presents reasonable interpretations of the geology of the area and is based on available data. However, the interpretations are based on data that may vary with respect to accuracy of geographic location, the type and quantity of data available at each location, and the reliability of the data sources. Any map or cross section included in this document is not meant to be enlarged. Enlarging the scale of an existing map or cross section, by whatever means, does not increase the inherent accuracy of the information and scientific interpretations it portrays.

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