

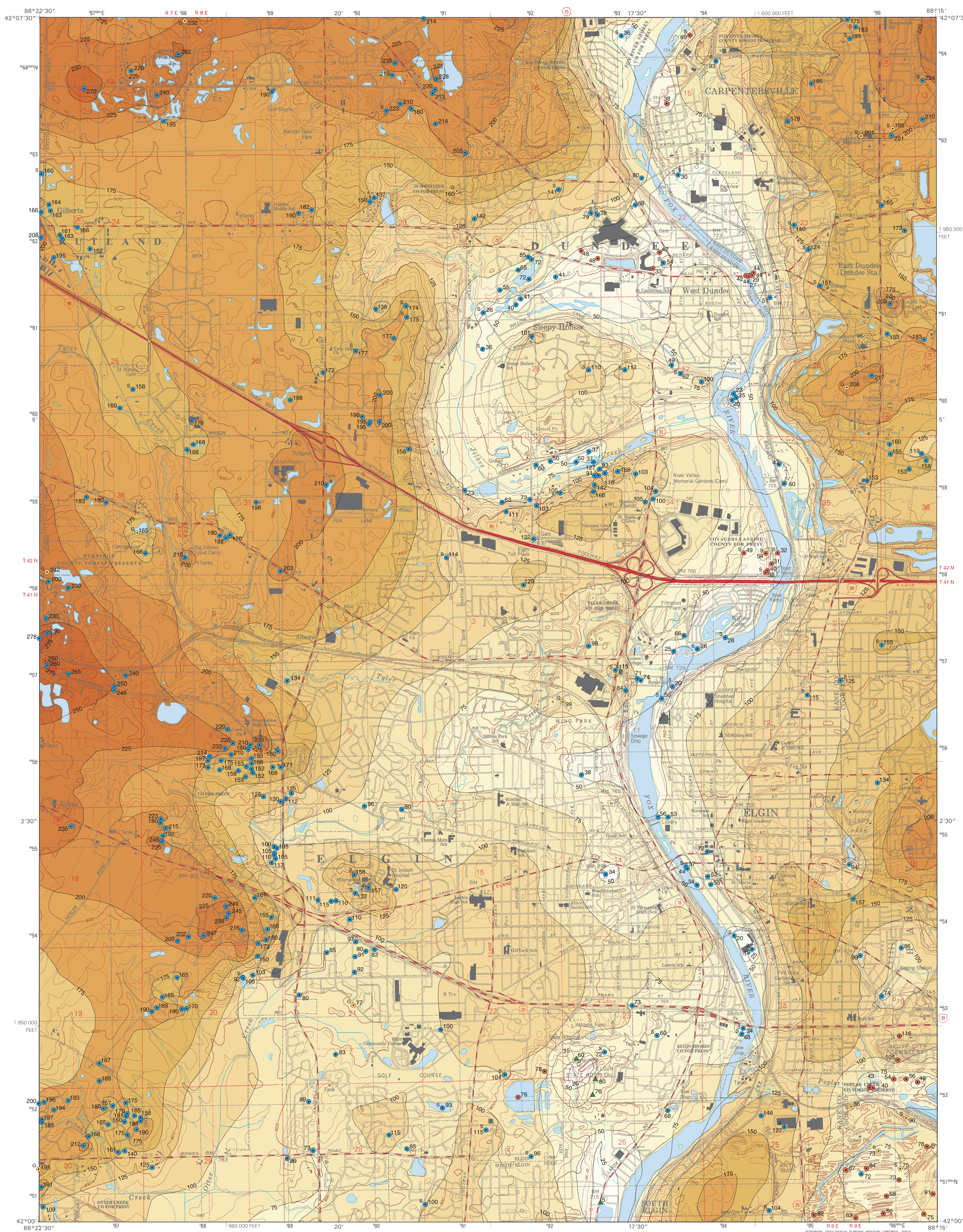
DRIFT THICKNESS OF ELGIN QUADRANGLE

KANE AND COOK COUNTIES, ILLINOIS

Illinois Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
William W. Shilts, Chief

Illinois Geologic Quadrangle Map
IGQ Elgin-DT

B. Brandon Curry
2007



Introduction

This map shows the approximate thickness of glacial drift in the Elgin 7.5-minute Quadrangle. Drift refers to un lithified geologic materials that were deposited in various sedimentary environments that resulted directly or indirectly from continental glaciation and includes till, sand and gravel outwash, lake sediment, loess (wind-blown silt), alluvium, peat, and debris flows (Curry 2007a). It also includes deposits from mass movement, such as landslides or downslope soil creep. This information is basic for land-use planning, decisions involving economic development, and the design of features such as bridges and quarries. Moreover, important aquifers occur in glacial drift, and the associated groundwater is susceptible to contamination where the drift is less than 50 feet thick (Schock et al. 1992). Glacial drift also offers some measure of protection from surface contaminants for groundwater in underlying bedrock aquifers. To fully assess bedrock aquifer vulnerability, however, additional information is necessary, such as the porosity and permeability of the sediment of the non-aquifer and aquifer. Glacial drift thickness also is an economic factor in the development of dolomite and limestone quarries (the expense of developing underground mines increases with thicker drift) because, as available sand and gravel aggregate resources become depleted in northeastern Illinois, aggregate companies are increasingly interested in developing underground bedrock aggregate mines. One such mine has recently opened on the Elgin Quadrangle in southwestern Cook County (Sec. 30, T41N, R9E).

Mapping Methods

This map was produced by subtracting a grid of surface elevation points from a same-size grid of bedrock surface elevation points using ESRI's ArcGIS 9.0 software. The node spacing of the grids was 600 feet. The surface elevation grid was prepared from a surface created from a digital elevation model (DEM) of Kane County (Kane County Regional Planning Commission 2001) using EarthVision® software (Dynamic Graphics Inc. 1997). The spot elevations of the DEM occur on a 32.8-foot (10-m) grid with a vertical accuracy of ±2 feet. For the portion of the Elgin Quadrangle located in Cook County, the standard 30-m DEM from the USGS was used (<http://data.geocomm.com/catalog/US/61071/3112/group1-3.html>); its vertical accuracy is ±5 feet.

The bedrock surface grid was created in several steps. First, the contours of the bedrock topography map (Curry 2007b) were digitized. Next, points were resampled along the contours every 1,200 feet using ArcGIS 9.0. Then, the bedrock topography values of the synthetic data points were added to the database of 349 actual bedrock topography values. The final bedrock surface grid was created from this combined data set. A grid of drift thickness values was then determined by subtracting the new bedrock surface grid from the DEM grid using ArcGIS 9.0.

The grid of drift thickness values was contoured using the inverse distance weighted algorithm in the 3-D Analyst Extension of ArcGIS 9.0 (settings: search radius = 12; cell size = 600 feet). Following the procedure just described, points were resampled along the contours every 1,200 feet; these synthetic data were added to actual values of drift thickness, and the data were recontoured using the same algorithm. Finally, the contour lines were adjusted to honor all actual values. By adding the steps for sampling points along the contour lines, adding actual data, and recontouring the grid, the contour lines required less adjustment to honor the data. The location of each data point on the map has been verified (Curry 2007c).

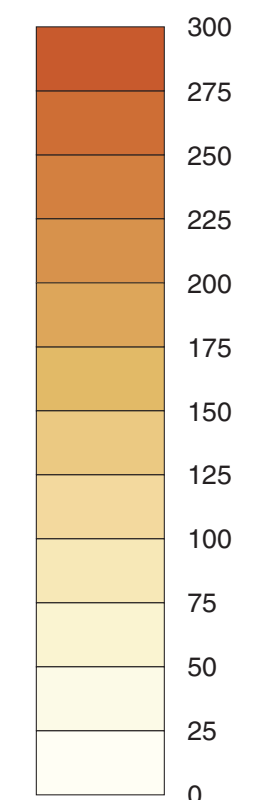
Discussion

Drift thickness varies from nil where bedrock crops out in quarries and along reaches of the Fox River in the southern part of the map to more than 290 feet in the west-central part of the quadrangle mapped as the ice stagnation topography of the Gilberts Drift by Willman and Frye (1970). Across the Elgin Quadrangle, the total relief of the land surface and bedrock surface is about equal (225 vs. 215 feet), and, therefore, the relative effects of these surfaces are about equal on the local drift thickness. Some of the variations in drift thickness occur along the valley of the Fox River, but not always for the same reasons. For example, a large change in drift thickness in the southern part of the quadrangle (Sec. 26, T41N, R8E) is due primarily to the local relief on the bedrock. The drift thickness changes from 5 feet at site 34927 (where bedrock crops out along a pond-filled abandoned quarry) to more than 170 feet in less than a mile to the east in the deepest part of the St. Charles Bedrock Valley. In other cases, the change in drift thickness is attributed to the high local relief of the ground surface where steep slopes lead from the floodplain of the Fox River and Jelkes Creek to high upland areas.

References

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Drift Thickness (feet)



Data Type

- ▲ Outcrop
- Stratigraphic boring
- Water boring
- Engineering boring

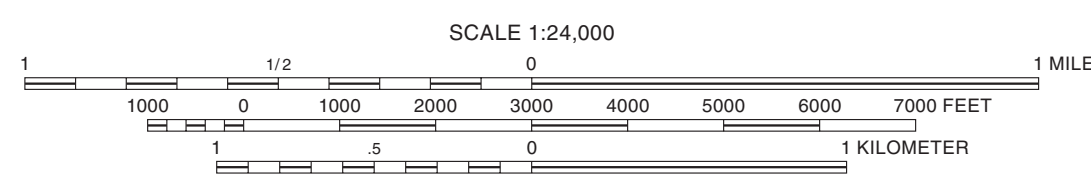
Labels indicate samples (s) or geophysical log (s).
Numeric labels indicate drift thickness in feet.
Dot indicates boring is to bedrock.

Note: Well and boring records are on file at the ISGS Geological Records Unit and are available at the ISGS Web site.

Base map compiled by Illinois State Geological Survey from digital data provided by the United States Geological Survey. Topography compiled 1988. Planimetry derived from imagery taken 1998. PLSS and survey control current as of 1991. Boundaries current as of 2002.

North American Datum of 1983 (NAD 83)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, east zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

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BASE MAP CONTOUR INTERVAL: 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Released by the authority of the State of Illinois: 2007

Geology based on field work by B. Curry, 2004.

Digital cartography by J. Carrell, J. Domier, M. Barrett, and A. Tovey, Illinois State Geological Survey.

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4	5	
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ADJOINING QUADRANGLES
1 Huntley
2 Crystal Lake
3 Barrington
4 Pingree Grove
5 Streamwood
6 Elburn
7 Geneva
8 West Chicago

APPROXIMATE MEAN DECLINATION, 2007

ROAD CLASSIFICATION

- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Unimproved road
- Interstate Route
- U.S. Route
- State Route