Surficial Geology of Madison County, Illinois

Illinois Department of Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
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2006

Illinois Preliminary Geologic Map
IPGM Madison County-SG

This surficial geology map is a compilation of 1:24,000-scale quadrangle maps funded by the STATEMAP component of the National Cooperative Geologic Mapping Program and undertaken from 1997–2006. Eleven published 7.5-minute quadrangle maps (listed below), 4 unpublished maps (contract reports cited below) as well as surficial geology mapping of remaining portions of Madison County were merged digitally. Slight modifications were made to previously mapped quadrangles where more recent work has improved our understanding of the geology or for consistency of unit mapping. Detailed descriptions of map units as well as extensive text and cross sections for each quadrangle are available with the published quadrangles. Digital products are available on the ISGS website (http://www.isgs.uiuc.edu/isgshome/online_maps_data.htm). Data used to compose the surficial map include the county soil report (Goddard and Sabata 1982), outcrops, and subsurface boring information from stratigraphic tests, engineering tests, coal tests, and water wells.

The surficial geology of the county varies widely from thick alluvium in the broad Mississippi River valley (known as the American Bottoms) in the southwest to thin drift (usually < 50 feet) and abundantly exposed Paleozoic bedrock in the northwest (west of Alton) to thick loess cover in south-central areas (Edwardsville to Collinsville) to ice-contact deposits in the "ridged-drift" in eastern areas. Madison County was covered by continental glaciers twice by ice advancing from the northeast during the Quaternary Period; first, during the pre-Illinois episode and second, during the Illinois Episode (Willman and Frye 1970; Hansel and Johnson 1996; Grimley et al. 2001). During the Wisconsin Episode (last regional glaciation), the area was not covered by ice but did receive glacial meltwater from the north that deposited silt, sand, and gravel (outwash) in the Mississippi Valley. Deflation of silty waterlain deposits in the American Bottoms by prevailing westerly winds during the last glaciation resulted in a significant cover of loess deposits (dashed-line contours on map). The loess is thickest (up to 95 feet) at the bluffs immediately east of the broad Mississippi Valley and thins to the east and northeast. Mississippian bedrock is exposed in areas west of Alton along the bluffs of the Mississippi River and along nearby tributaries. To the east of Alton, Pennsylvanian bedrock is exposed sporadically near bedrock topographic highs where drift has been eroded along ravines and creeks.

Drift thickness (Quaternary deposits) is typically 25 to 150 feet in the county, but can be up to 200 feet over infilled preglacial bedrock valleys (north-central areas). Pre-Illinois episode deposits, up to 125 feet thick, include preglacial Quaternary alluvium (Canteen member, Banner Formation), till and ice-marginal deposits (Banner Formation), that have served to partially infill many north-south oriented preglacial bedrock valleys. Illinois Episode deposits, up to 120 feet thick, include till and ice-marginal deposits (Glasford Formation), outwash (Pearl Formation, outwash facies), and ice-contact deposits in ridges (Pearl Formation, Hagarstown Member). Wisconsin Episode deposits include loess (Peoria and Roxana Silts) up to 95 feet thick, outwash (Henry Formation) up to 145 feet thick in terraces near Wood River, and lake sediment (Equality Formation), up to 100 feet thick. The lake sediment was deposited in backwater areas, now terraces, along Cahokia Creek, Indian Creek, and Wood River valleys during last-glacial aggradation of the Mississippi River. Postglacial deposits (up to 60 feet thick) include various alluvial deposits (facies of the Cahokia Formation; clayey and sandy deposits are distinguished only in the Mississippi Valley) as well as colluvial deposits (Peyton Formation) along steep slopes in northwestern areas. Alluvial fans (Cahokia Formation, fan facies) are mapped at the base of the eastern bluffs of the American Bottoms, where thick loess deposits have been mobilized and redeposited on the eastern edge of the valley. Areas of anthropogenic fill (disturbed ground) are mapped in industrial areas, landfills, and the many interstate interchanges, particularly in the American Bottoms.

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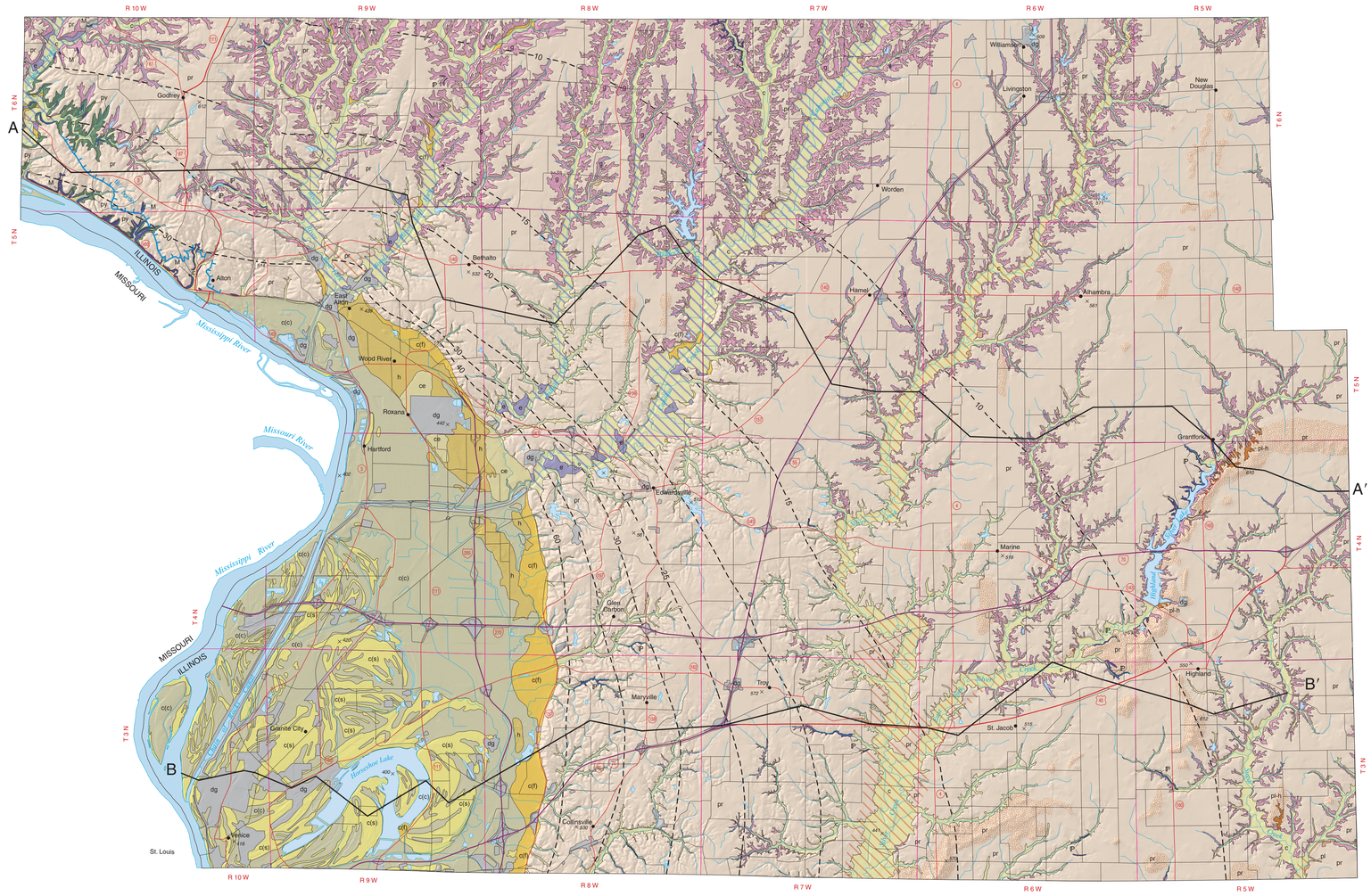

Base map compiled by Illinois State Geological Survey from 1:100,000-scale Digital Line Graph data provided by the United States Geological Survey.

North American Datum of 1983 (NAD 83)
Lambert Conformal Conic Projection

SCALE 1:100 000

1 0 1 2 3 4 5 6 7
1 0 1 2 3 4 5 6 7 8 9 10 KILOMETER

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Geology based on field work and data compilation by D. Grimley and A. Phillips, 1997–2006.

Digital cartography by J. Carrell and J. Dornier, Illinois State Geological Survey.

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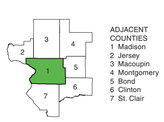
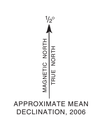




APPROXIMATE MEAN DECLINATION, 2006

ROAD CLASSIFICATION

Interstate Route
U.S. Route
State Route
Other paved roads

QUATERNARY DEPOSITS

Description	Unit	Interpretation
HUDSON EPISODE (~12,000 years before present (B.P.) to today)		
Fill or removed earth; various sediment types	Disturbed ground: dg	**Man-made fill or excavations**
Mainly silt, silty clay and fine sand; weakly to well stratified; includes some coarser beds	Cahokia Formation (undivided): c	**River deposits (alluvium);** mapped in valleys tributary to the Mississippi Valley
Silt loam with thin fine sand beds; weakly stratified	Cahokia Formation (fan facies): c(f)	**Alluvial fan deposits;** mainly reworked loess from bluffs east of American Bottoms
Silty clay loam, silty clay, and silty loam; massive to stratified; some fine sand lenses	Cahokia Formation (clayey facies): c(c)	**Overbank alluvium, abandoned channel and swale fills;** mapped only in Mississippi Valley
Very fine, fine and medium sand; stratified; moderately to well sorted	Cahokia Formation (sandy facies): c(s)	**Alluvium;** point bar and channel deposits; mapped only in Mississippi Valley
Silt loam, pebbly silt loam or pebbly silty clay diamicton	Peyton Formation: py	**Sediments moved downslope by gravity (colluvium);** creep layers, slumps, or landslides
Silty clay to silt with some fine sand; massive to stratified	Cahokia or Equality Formation (undifferentiated): ce	**Overbank alluvium or lake deposits;** occurs on or near the Wood River Terrace
WISCONSIN EPISODE (~75,000–12,000 years B.P.)		
Silt loam to silty clay loam with some fine sand; massive to stratified	Equality Formation: e (hachures on map where buried)	**Lake deposits;** of slackwater origin during peak Mississippi River aggradation
Fine, medium and coarse sand; stratified; generally coarsens at depth; some gravelly zones	Henry Formation: h	**Outwash (glacial meltwater deposits);** on Wood River Terrace in northern American Bottoms
Silt loam; massive; upper 3/5 of unit is more tan or gray (Peoria); lower portion has pinkish hue (Roxana)	Peoria and Roxana Silts: pr	**Loess (windblown silt);** blankets all uplands; thickness contours shown on map; thins eastward from Mississippi Valley bluffs
ILLINOIS EPISODE (~200,000–130,000 years B.P.)		
Mixture of loam, sand and gravel, and diamicton; weakly stratified; poorly to well sorted sands; may be fractured or faulted (from glacial processes)	Hagarstown Member, Pearl Formation: pl-h (stipples on map where buried)	**Ice-contact sediments;** deposited mainly in ice-marginal, subglacial, or supraglacial channels; locally contains glaciotectonic faulting and deformation
Sand with some gravel; stratified; may include silty or clayey zones, especially near surface	Pearl Formation (outwash facies): pl (hachures on map where buried)	**Outwash;** common in loess-covered terraces along Silver Creek
Pebbly loam diamicton (mixture of clay, silt, sand, and gravel); generally massive; includes some sand and gravel lenses (especially in upper portion)	Glasford Formation (< 5 feet of loess cover): g	**Till and ice marginal deposits;** includes subglacial and supraglacial deposits
Silt loam to silty clay loam; massive to weakly stratified; locally fossiliferous.	Petersburg Silt (cross sections only): pb	**Lake sediment;** deposited under slackwater conditions or ice marginal setings.
PRE-ILLINOIS EPISODE (~700,000–400,000 years B.P.)		
Pebbly silty clay loam diamicton; generally massive; include sand and gravel lenses, zones of stratified silt near base	Banner Formation, (undivided) (cross sections only): b	**Till and ice marginal deposits;** includes subglacial fill and supraglacial debris flows; may include lake sediment
Silty clay loam, silty clay, and silt loam; weakly stratified; contains some fine sand beds	Banner Formation, Canteen member (cross sections only): b-c	**Preglacial alluvium and lake deposits;** may include some residuum or colluvium at base; occurs mainly in preglacial bedrock valleys

PRE-QUATERNARY DEPOSITS

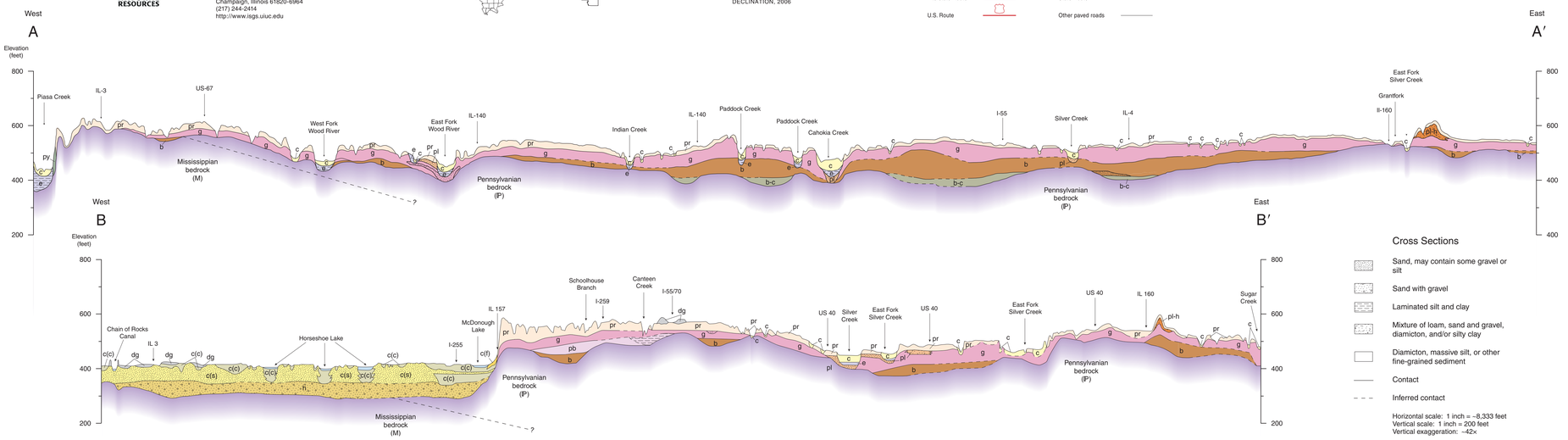
Description	Unit	Interpretation
Shale, siltstone, limestone, and sandstone; less commonly beds of coal and underclay	Pennsylvanian or Mississippian bedrock: P M	**Bedrock outcrops or bedrock within 5 feet of land surface;** most common in bluff area west of Alton; includes Pennsylvanian and Mississippian rocks

Illinois Episode till border (areas to southwest of line are driftless)

−−15−− Loess thickness contour (in feet)

A — A′ Line of cross section

Note: Loess contours show the combined thickness of Peoria and Roxana Silts on uneroded upland areas. The actual thickness at a given spot may be much less, especially along valley slopes where post-depositional erosion of loess has been significant (see cross sections).



Cross Sections

- Sand, may contain some gravel or silt
- Sand with gravel
- Laminated silt and clay
- Mixture of loam, sand and gravel, diamicton, and/or silty clay
- Diamicton, massive silt, or other fine-grained sediment
- Contact
- Inferred contact

Horizontal scale: 1 inch = ~8,333 feet
Vertical scale: 1 inch = 200 feet
Vertical exaggeration: ~42×