Institute of Natural Resource Sustainability
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SURFICIAL GEOLOGY OF RED BUD QUADRANGLE
RANDOLPH, MONROE, AND ST. CLAIR COUNTIES, ILLINOIS

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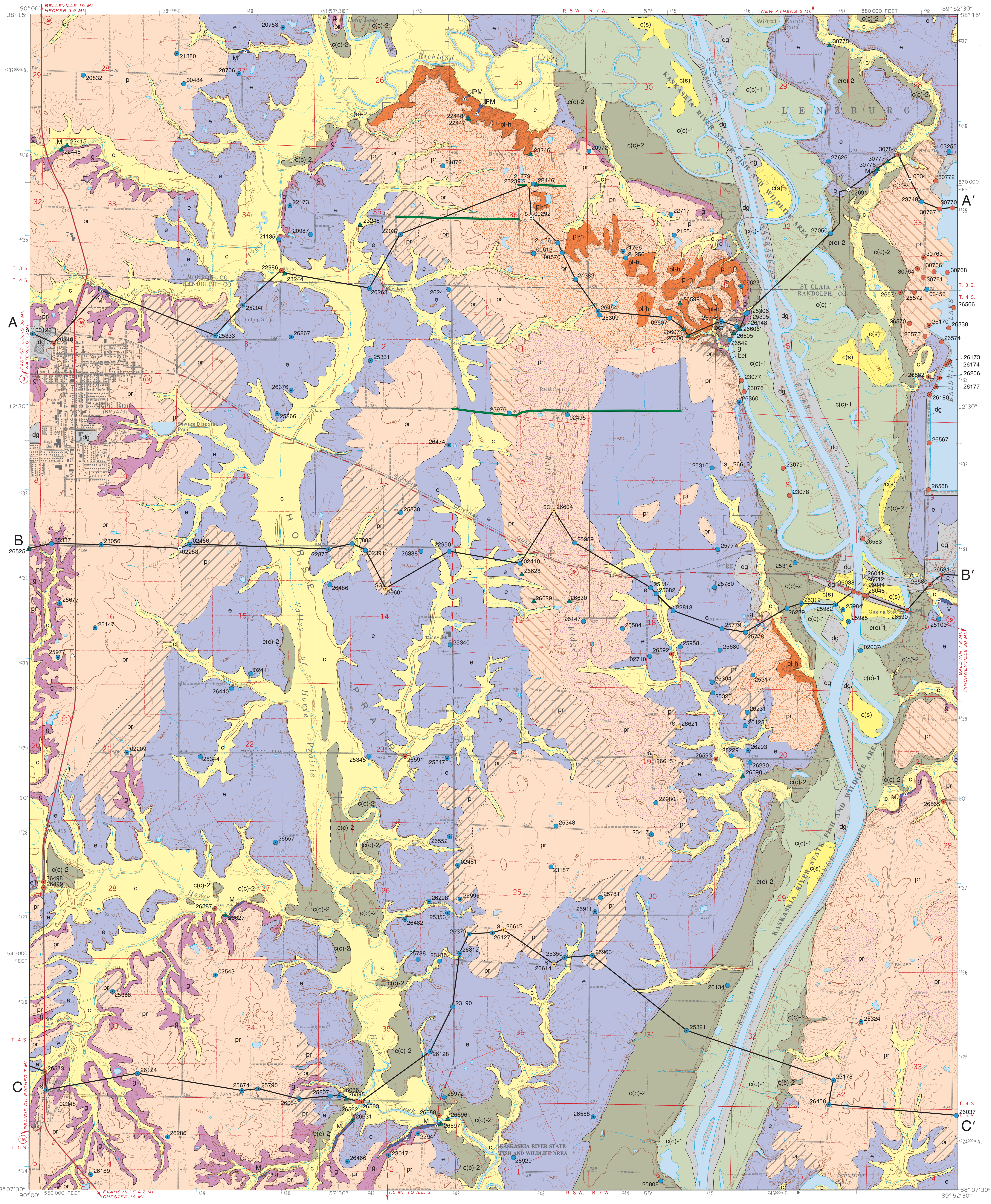
2010

Illinois Geologic Quadrangle Map
IGQ Red Bud-SG



QUATERNARY DEPOSITS

Description	Unit	Interpretation
HUDSON EPISODE (~12,000 years before present [B.P.] to today)		
Fill or removed earth; includes material in dredge spoil and roadway fill	Disturbed ground: dg	**Anthropogenic fill or excavations;** includes spoil areas adjacent to the dredged Kaskaskia River channel and Baldwin Lake (man-made); some areas of fill also occur where major roadways have been raised above floodplain areas
Silt loam to silty clay loam; may contain thin sandy, gravelly, or loamy zones; brown to dark grayish brown; sometimes mottled; massive to weakly stratified; noncalcareous; soft to medium consistency; up to 20 feet thick	Cahokia Formation: c	**Alluvium (river deposits)** in floodplains of tributaries to the Kaskaskia River; derived mainly from erosion of sediments in adjacent uplands and slopes; includes some historical deposition
Silt loam, silty clay loam, and silty clay; olive-gray to grayish brown to gray; massive to stratified; noncalcareous; contains weak soil development (lacks B horizon); up to 20 feet thick	Cahokia Formation (clayey facies): c(c)-1	**Abandoned channel fills, backswamp and overbank alluvium;** frequently floods; differentiated only in modern floodplain of Kaskaskia River
Fine to medium sand; may include beds of sandy loam and silty clay loam; dark yellowish brown to brownish gray; moderately to well sorted; stratified; noncalcareous; soft; at surface the upper few feet contains modern soil profile and finer deposits; up to 25 feet thick	Cahokia Formation (sandy facies): c(s)	**Point bar and channel deposits;** in modern Kaskaskia floodplain (near surface) as well as in early to middle Holocene terraces (in subsurface); differentiated only in Kaskaskia Valley; interstratified with c(c)-1 and c(c)-2
Silty clay loam to silt loam; brown to yellowish brown to grayish brown; noncalcareous; includes relatively weak modern soil profile in upper 5 feet; soft; up to ~30 feet thick	Cahokia Formation (clayey facies–high level): c(c)-2	**Overbank alluvial deposits;** occurs within early to middle Holocene terrace at ~395 to 400 feet asl; differentiated in Kaskaskia Valley and lower reaches of tributaries; underlain by Equality, Henry, or Cahokia Formations (c(s))
WISCONSIN EPISODE (~75,000–12,000 years B.P.)		
Silt loam to silty clay loam to silty clay; some interbeds of fine sand or coarse silt; light olive-brown to grayish brown to dark gray; stratified; secondary carbonate concretions may occur along bedding planes; may contain small (<1 cm) aquatic gastropod shells, bivalves, or conifer wood in unoxidized portions; soft to medium consistency when moist; up to 50 feet thick	Equality Formation: e	**Lake deposits and/or fine-grained alluvium;** mainly deposited as slackwater sediment during peak glacial aggradation of the Mississippi River; terraces generally occur at ~415 to 425 feet asl; includes ~3 feet loess cover; underlain by Henry Formation, Pearl Formation, Glasford Formation, or Petersburg Silt
Fine to medium sand; tan to grayish brown; stratified; may contain interbeds of fine-grained deposits (silty); moderately to well sorted; noncalcareous to calcareous; up to ~20 feet thick	Henry Formation (cross sections only): h	**Outwash (glacial meltwater river deposits) or nonglacial alluvium;** generally underlain by the coarser Pearl Formation; overlain by the finer-grained Equality or Cahokia Formations; may be intertongued with the Equality Formation
Silt loam to silty clay loam; brown to yellowish brown to grayish brown to slightly pinkish brown; leached of carbonates; massive but with strong soil structure from modern soil solum in upper 5 feet; soft to moderately stiff; up to 12 feet thick	Peoria and Roxana Silts (>5 feet thick): pr	**Loess (windblown silt);** includes redeposited loess in sloping areas; contains modern soil; typically underlain by Glasford Formation at surface elevations >440 feet asl; areas underlain by Pearl Formation, Berry Clay-Teneriffe Silt, or morainal areas with Glasford Formation are indicated on the map by unique patterns (see below)
SANGAMON AND ILLINOIS EPISODES (~150,000–75,000 years B.P.)		
Silty clay to silt to clay loam; brown to yellowish brown to grayish brown; may contain fine sandy or loamy beds; leached to calcareous; faintly stratified to rhythmically laminated in places; soft to medium in silty zones and medium to stiff in clayey zones; up to 20 feet thick	Berry Clay Member and/or Teneriffe Silt: bct; (beneath >5 feet loess)	**Accretionary deposits, loess, lake deposits, and alluvium;** upper portions contain pedogenic alteration of the Sangamon Geosol (interglacial); diagonal line pattern shown where buried by loess and not underlain by Pearl Formation
ILLINOIS EPISODE (~200,000–130,000 years B.P.)		
Intermixed sandy loam, sand, silt, and diamicton beds; reddish brown to light olive-brown to olive-gray; may contain up to 10% gravel; diamicton beds may be finely interstratified with sand; upper 15 feet or so is more weathered; soft to moderately stiff; noncalcareous to calcareous; up to 80 feet thick	Hagarstown Member, Pearl Formation: pl-h; (beneath >5 feet loess)	**Ice-contact sediment** in hummocky ridges; upper portion contains Sangamon Geosol weathering; includes fluvial and lacustrine deposits as well as debris flows and melt-out deposits; intertongues with the Mascoutah facies and the Glasford Formation
Fine to coarse sand to sandy loam; in places with gravel generally less than 1 cm; yellowish brown; stratified below zone of alteration; typically weathered or more clayey in upper portions; moderately well sorted; leached to calcareous; up to 55 feet thick	Pearl Formation (Mascoutah facies) (cross sections only): pl(m); (beneath >5 feet loess)	**Outwash (glacial meltwater deposits) deposited during ice-margin retreat;** diagonal line pattern shown on loess-covered Illinois Episode terraces and outwash plains; occurs in subsurface primarily in the Kaskaskia Valley and nearby areas; may contain Sangamon Geosol development in upper part; may be overlain by Berry Clay Member
Pebbly loam to silty clay loam to sandy loam diamicton; contains pebbles mainly less than 2 inches in diameter; includes silt, sand and gravel lenses (up to several feet thick); yellowish brown to grayish brown to dark gray; iron and manganese oxide staining along fracture faces; leached to calcareous; stiff to very stiff; up to 120 feet thick	Glasford Formation: g; (morainic areas beneath >5 feet loess)	**Till and ice-marginal sediment;** upper few feet of diamicton may contain Sangamon Geosol solum; consists mainly of subglacial till with some supraglacial and glaciofluvial deposits; shear planes and inclusions of paleosol are common in morainic areas; has <5 feet loess cover in mapped areas
Fine sand to gravelly sand; up to 20% gravel; yellowish brown to grayish brown; stratified; loose; well sorted; calcareous; up to 50 feet thick	Grigg tongue, Pearl Formation (cross sections only): pl-g	**Outwash (glacial meltwater deposits);** proglacial deposits from advancing Illinois Episode glaciers; subsequently buried by the Glasford Formation; may be hydraulically connected to the Mascoutah facies in the Kaskaskia Valley
Silty clay loam to silty clay; may contain some sandy beds; dark gray to dark grayish brown; massive to weakly stratified; calcareous to noncalcareous; stiff; up to 20 feet thick	Petersburg Silt (cross sections only): pb	**Lake deposits,** with minor areas of deltaic and alluvial sediment; consists mainly of slackwater lake sediment; immediately underlies Glasford Formation especially in the buried valley underlying Horse Prairie; maximum elevation of ~380 feet asl
YARMOUTH EPISODE (~420,000–200,000 years B.P.)		
Silty clay loam to silty clay to clay loam; yellowish brown to pale green; can contain strong soil structure with clay skins, iron and manganese oxide staining; few pebbles; faintly stratified in places; noncalcareous; stiff to very stiff; up to 10 feet thick	Lierle Clay Member, Banner Formation (cross sections only): b-l	**Accretionary deposits, alluvium, and lake sediment;** deposited and strongly weathered during the Yarmouth interglacial episode
PRE-ILLINOIS EPISODE (~700,000–420,000 years B.P.)		
Diamicton, sand, silt, or silty clay; up to 30 feet thick	Banner Formation, undifferentiated (cross sections only): b	**Includes till, ice-marginal sediment, lake deposits, and alluvium;** undifferentiated deposits of the Lierle Clay, Omphghent, Harkness Silt, and/or Canteen members
Pebbly silty clay to silt loam diamicton; yellowish brown to grayish brown; may include some sand and gravel lenses; pebbles of shale, limestone, sandstone, and chert; iron oxide staining along fractures; noncalcareous to calcareous; very stiff; up to 20 feet thick	Omphghent member, Banner Formation (cross sections only): b-o	**Till and ice-marginal sediment;** may contain evidence of Yarmouth Geosol weathering (oxidation, leaching, and pedogenic features) in upper portions; the alteration zone may be truncated by younger units or may be mostly within the Lierle Clay Member
Silty clay loam to silty clay; contains some silty beds; dark grayish brown (mostly) to brownish yellow (oxidized upper portion); stratified; contains small wood fragments, organic-rich zones, and small aquatic gastropod shells (<1 cm); calcareous; medium to stiff; up to 60 feet thick	Harkness Silt Member, Banner Formation (cross sections only): b-h	**Lake deposits;** likely deposited in slackwater lakes resulting from pre-Illinois Episode glacial aggradation in the Mississippi River valley; typically found below 370 feet asl in bedrock valleys; may contain some alluvium
Loamy sand, loam, silt, and silty clay loam; dark grayish brown to olive-brown; massive to laminated; minor diamicton beds may be included; noncalcareous to calcareous; contains angular pebbles of locally derived chert, shale, and sandstone (no erratics); medium consistency in sandy zones to stiff in clayey zones; up to 15 feet thick	Canteen member, Banner Formation (cross sections only): b-c	**Alluvium, with some colluvium and residuum;** preglacial; preserved mainly in basal portions of deep bedrock valleys; underlain by bedrock; may contain paleosol development; typically occurs below 330 feet asl

PRE-QUATERNARY DEPOSITS

Description	Unit	Interpretation
Limestone, shale, and sandstone; ranges from gray to yellowish brown to greenish gray (shale) or reddish (shale), laminated to bedded to massive; fractures are common where exposed; limestones typically contain abundant marine fossils such as crinoids and brachiopods; noncalcareous to calcareous	Mississippian or Pennsylvanian bedrock: IPM; Mississippian bedrock: M	**Bedrock or near-surface bedrock (within 5 feet of land surface);** shallow marine, deltaic, or terrestrial; bedrock outcrops (typically <10 feet in thickness) occur where stream erosion has revealed bedrock topographic highs (see fig. 2 in report); most outcrops are of Mississippian bedrock

Base map compiled by Illinois State Geological Survey from digital data (Raster Feature Separates) provided by the United States Geological Survey. Topography compiled from imagery dated 1968. Field checked 1970. Photorevision in 1982 from imagery dated 1980.

North American Datum of 1927 (NAD 27)
Projection: Transverse Mercator
10,000-foot ticks: Illinois State Plane Coordinate system, west zone (Transverse Mercator)
1,000-meter ticks: Universal Transverse Mercator grid system, zone 16

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SCALE 1:24,000
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
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Geology based on field work by David A. Grimley and Nathan D. Webb, 2008–2009.

Digital cartography by Jennifer E. Carrell and Jane E.J. Domier, Illinois State Geological Survey.

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Data Type

- Outcrop
- Outcrop in field notes (ISGS archives)
- Stratigraphic boring
- Water-well boring
- Engineering boring
- Other boring, including oil and gas

- Contact
- Inferred contact
- Buried contact
- Electrical resistivity profile line
- A—A′ Line of cross section

SG 26211 Labels indicate samples (S) or geophysical log (G). Boring and outcrop labels indicate the county number. Dot indicates boring is to bedrock

Note: The county number is a portion of the 12-digit API number on file at the ISGS Geological Records Unit. Most well and boring records are available online from the ISGS Web site.

ROAD CLASSIFICATION
- Primary highway, hard surface
- Secondary highway, hard surface
- Light-duty road, hard or improved surface
- Unimproved road
- State Route

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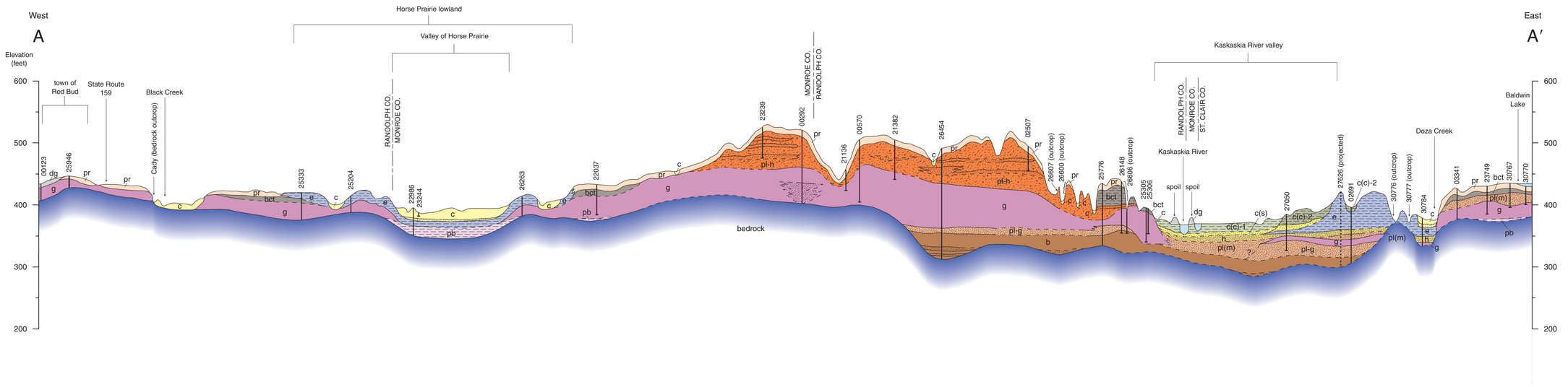
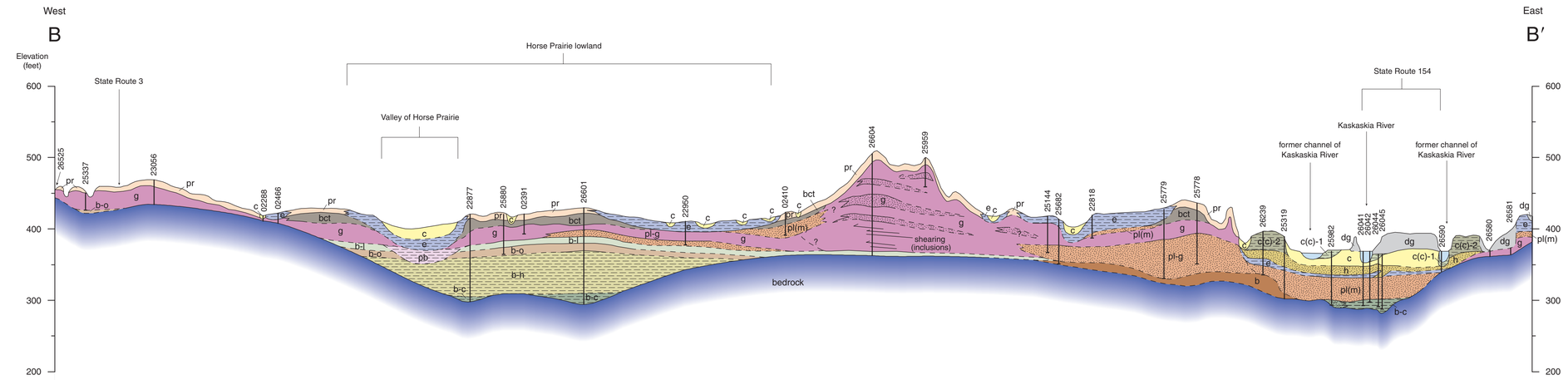
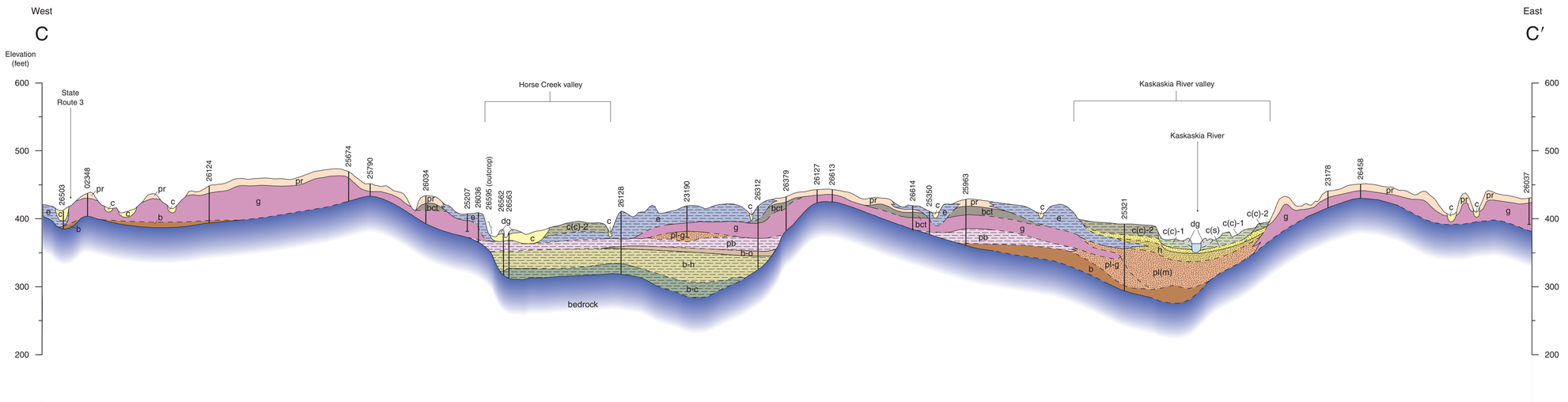
1	2	3
4		5
6	7	8

ADJOINING QUADRANGLES
1 Paderborn
2 New Athens West
3 New Athens East
4 Ames
5 Baldwin
6 Prairie Du Rocher
7 Evansville
8 Walsh

1°
TRUE NORTH
MAGNETIC NORTH
APPROXIMATE MEAN DECLINATION, 2010







Cross Sections

- Mainly sand; may contain some gravel or silt
- 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
- Boring on line of cross section
- Boring projected to line of cross section

Horizontal scale: 1 inch = 2,000 feet
Vertical scale: 1 inch = 100 feet
Vertical exaggeration: 20×

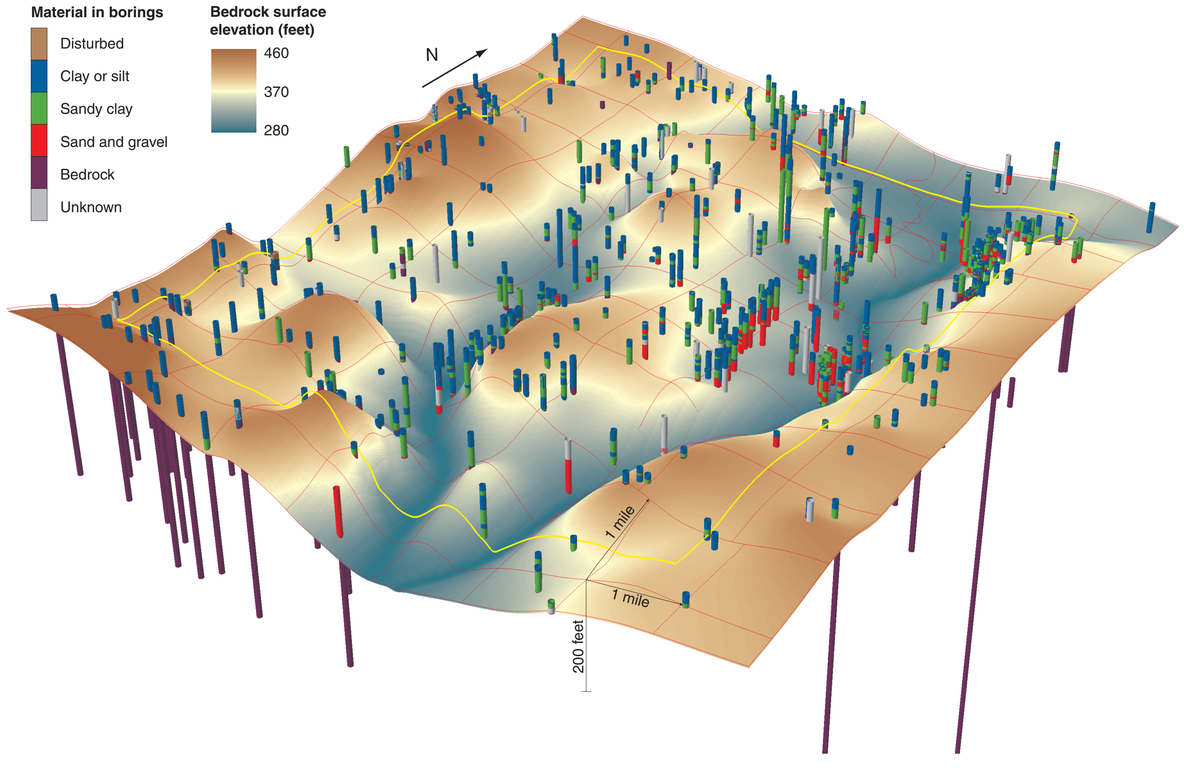
dg	Disturbed ground	c(c)-1	Cahokia Formation (clayey facies)	c(c)-2	Cahokia Formation (clayey facies - high level)	h	Henry Formation	bct	Berry Clay and/or Teneriffe Silt	pl(m)	Pearl Formation (Mascoutah facies)
pl-g	Pearl Formation (Grigg tongue)	b-l	Lierle Clay Member, Banner Formation	b-o	Omphghent member, Banner Formation	b-c	Canteen member, Banner Formation				
c	Cahokia Formation (tributaries)	c(s)	Cahokia Formation (sandy facies)	e	Equality Formation	pr	Peoria and Roxana Silts	pl-h	Hagarstown Member, Pearl Formation	g	Glasford Formation
pb	Petersburg Silt Formation	b	Banner Formation, undifferentiated	b-h	Harkness Silt Member, Banner Formation		bedrock				

Material in borings

- Disturbed
- Clay or silt
- Sandy clay
- Sand and gravel
- Bedrock
- Unknown

Bedrock surface elevation (feet)

460
370
280



A three-dimensional view of borings and some outcrop exposures intersecting the bedrock surface map. Borings used for this model include water wells, engineering tests, oil and gas wells, and stratigraphic tests. The quadrangle boundary is outlined in yellow. Section lines are shown in red. The vertical exaggeration is about 30×.