

# SURFICIAL GEOLOGIC MAP OF THE WEST POINT 7.5' QUADRANGLE, LEE COUNTY, IOWA



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## INTRODUCTION

The West Point Quadrangle is located in Lee County on the Southern Iowa Drift Plain landform region. The map area is dominated by loess mantled till plains in the uplands, and coarse to fine grained alluvial deposits within Sugar Creek and its tributaries. Glacial till is only exposed in drainages and steep slopes. Stratigraphically, the landscape is mantled with 2 to 5 m (7-15 ft) of Peoria Formation loess overlying paleosol formed in glacial till. In the eastern half of the quadrangle, the Peoria Formation overlies the Illinoian till plain. This glacier did not advance very far into Iowa and the terminal moraine extends roughly north-south through the City of West Point. The Illinoian till generally has a thickness ranging from 3 to 10 m (10-33 ft), but reaches a maximum thickness of 15 m (50 ft) near the terminal moraine. The Illinoian till overlies Pre-Illinoian deposits with an intervening Yarmouth Paleosol. To the west of the moraine, loess overlies a well-developed Yarmouth-Sangamon paleosol formed in Pre-Illinoian till. The thickness of Quaternary materials varies widely across the quadrangle ranging from 0 to 18 m (0-60 ft), reaching a maximum thickness of 97 m (320 ft) in the southeastern part of the mapping area. Bedrock exposures are found along Sugar Creek and its tributaries. Mississippian and Pennsylvanian units dominate the bedrock surface. An accompanying map of the bedrock geology of the West Point Quadrangle has been published concurrently with this map.

New data collected for this mapping project included four drill cores, 36 passive seismic data points, and investigation of 12 bedrock outcrops, seven Quaternary exposures, and one abandoned quarry. Additional subsurface information was derived from the analysis of more than 200 water well records, more than 25 of which have cutting samples that were described as part of this mapping project. Additional information about the surficial mapping units and stratigraphy may be found in the Summary Map Report of the West Point Quadrangle.

## LEGEND

### CENOZOIC

#### QUATERNARY SYSTEM

##### HUDSON EPISODE

- Qal** - Alluvium (DeForest Formation-Undifferentiated) Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous to calcareous, stratified silt clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hill slopes and in closed depressions. May overlie Pre-Illinoian or Illinoian formation glacial till, Peoria Formation loess or Noah Creek Formation sand and gravel. Associated with low-relief modern floodplain, closed depressions, modern drainageways or toeslope positions on the landscape. Seasonal high water table and potential for frequent flooding. The depth to bedrock may be less than 8 m (26 ft) along portions of Sugar Creek and its tributaries.
- Qalb** - Alluvium Shallow to Bedrock (DeForest Formation-Undifferentiated) - Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous to calcareous, stratified silt clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hillslopes and in closed depressions. May overlie the Noah Creek Formation, Mississippian or Pennsylvanian bedrock. Bedrock surface is within 5 m (16 ft) of the land surface. Associated with low-relief modern floodplain, closed depressions, modern drainageways or toeslope positions on the landscape. Seasonal high water table and potential for frequent flooding.
- Qallt** - Low Terrace (DeForest Formation-Camp Creek and Roberts Creek members) Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, stratified silt clay loam, loam, or clay loam, associated with the modern channel belts of Sugar and Devils creeks. Overlies Noah Creek Formation sand and gravel. Occupies the lowest position on the floodplain i.e. modern channel belts. Seasonal high water table and frequent flooding potential.
- Qali-ht** - Intermediate-High Terrace (DeForest Formation-Gunder Member) Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, silt clay loam to loam alluvium or colluvium. Overlies Noah Creek Formation sand and gravel along Sugar and Devils creeks. Occupies terrace and valley margin positions 1 to 2 m (3-7 ft) above the modern floodplain. Two terrace levels are present in some areas. Seasonal high water table and low to moderate flooding potential.

##### WISCONSIN EPISODE

- Qaf** - Alluvial fan (Corrington Mbr.) Variable thickness of 2 to 5 m (7-16 ft) of dark brown to yellowish brown, noncalcareous, silt loam to loam with interbedded lenses of fine sand and silt. A pebble lag is commonly found at or near the fan surface. Overlies thick sand and gravel of the Henry Formation along Mississippi River as steep angled fans at the base of low order drainages and colluvial slopes.
- Qnw(s)** - Slackwater deposits overlying sand and gravel (Noah Creek Formation-silt facies) Generally less than 2 m (7 ft) of dark grayish brown to yellowish brown, massive to laminated, calcareous silt loam. Unit overlies 5 meters of dark gray, dark grayish brown, dark brown to dark yellowish brown medium to coarse sand, gravelly sand to pebbly gravel. Low-relief landforms expressed as broad terraces, long, narrow longitudinal terraces or cusped-shaped point terraces. Unit is benched on a gray, calcareous, massive, dense clay loam diamict of the Glasford Formation. No flooding potential.
- Qnw** - Sand and Gravel (Noah Creek Formation) Generally 3 to 9 m (10-30 ft) of yellowish brown to gray, poorly to well sorted, massive to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium (Late Phase High Terrace) or may overlie a Farmdale Geosol developed in Pisgah Silt which in turn overlies a well-exposed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium (Early Phase High Terrace). This unit may be benched on bedrock.
- Qhs** - Outwash Sand and Pebbly Sand (Henry Formation, Sabula Mbr.) coarse to fine sand and pebbly sand mantled with up to 5 m (16 ft) of eolian sand. Comprises the Savanna Terrace complex in the Mississippi River Valley.
- Qpt** - Loess Mantled Terrace (Peoria Formation-silt and/or sand facies) 2 to 7 m (7-23 ft) of yellowish brown to gray, massive, jointed, calcareous or noncalcareous, silt loam and intercalated fine to medium, well sorted, sand. May grade downward to poorly to moderately well sorted, moderately to well stratified, coarse to fine feldspathic quartz sand, loam, or silt loam alluvium (Late Phase High Terrace) or may overlie a Farmdale Geosol developed in Pisgah Silt which in turn overlies a well-exposed Sangamon Geosol developed in poorly to moderately well sorted, moderately to well stratified, coarse to fine sand, loam, or silt loam alluvium (Early Phase High Terrace). This unit may be benched on bedrock.
- Qps** - Loess (Peoria Formation-silt facies) Generally 2 to 5 m (7-15 ft) of yellowish to grayish brown, massive, jointed, calcareous or noncalcareous silt loam to silt clay loam. May overlie a grayish brown to olive gray silt clay loam to silt clay (Pisgah Formation-eroded Farmdale Geosol) which is less than 1.5 m (5 ft) thick. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Farmdale Geosol may be welded to an older Sangamon Geosol developed in loamy glacial till of the Wolf Creek or Alburnett formations. This mapping unit encompasses upland divides, ridgetops and convex sideslopes. Well to somewhat poorly drained landscape.
- Qps-gla** - Loess (Peoria Formation-silt facies) Generally 2 to 5 m (7-15 ft) of yellowish to grayish brown, massive, jointed, calcareous or noncalcareous silt loam to silt clay loam. May overlie a grayish brown to olive gray silt clay loam to silt clay (Pisgah Formation-eroded Farmdale Geosol) which is less than 1.5 m (5 ft) thick. The Pisgah Formation is in the same stratigraphic position as the Roxanna Silt which is mapped in Illinois. The Farmdale Geosol may be welded to an older Sangamon Geosol developed in loamy glacial till of the Glasford Formation. This mapping unit encompasses upland divides, ridgetops and convex sideslopes. Well to somewhat poorly drained landscape.

##### ILLINOIS EPISODE

- Qgla** - Till (Glasford Formation) Generally 3 to 10 m (10-33 ft) of very dense, massive, fractured, loamy glacial till of the Illinoian Glasford Formation with or without a thin loess mantle (Peoria Formation- less than 2 m) and intervening clayey Farmdale/Sangamon Geosol. The maximum thickness reaches 15 m (50 ft) near the terminal moraine. Overlies the Yarmouth Paleosol in Pre-Illinoian till. This mapping unit encompasses narrowly dissected interfluvial and side slopes, and side valley slopes. Drainage is variable from well drained to poorly drained.

##### PRE-ILLINOIS EPISODE

- Qwa3** - Till (Wolf Creek or Alburnett formations) Generally 10 to 18 m (33-60 ft) of very dense, massive, fractured, loamy glacial till of the Wolf Creek or Alburnett formations with or without a thin loess mantle (Peoria Formation- less than 2 m) and intervening clayey Farmdale/Sangamon Geosol. This mapping unit encompasses narrowly dissected interfluvial and side slopes, and side valley slopes. Drainage is variable from well drained to poorly drained.

##### OTHER MAPPING UNITS

- Qbr** - Loamy Sediments Shallow to Dolomite, Limestone, Shale and Sandstone (DeForest, Noah Creek, Peoria, Glasford, Wolf Creek, and Alburnett formations) - 1 to 2 m (3-7 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty sediments that overlie the Pennsylvanian or Mississippian bedrock surface. All areas of bedrock outcrop or shallow to bedrock soils are shown in red on the map, regardless of the bedrock mapping unit. Bedrock units are shown on the cross-section and may be identified on the bedrock map of the West Point Quadrangle, see OFM-20-4.
- Qpq** - Pits and Quarries - Sand and gravel pits and rock quarries. Extent mapped as shown on the county soil survey and as identified on aerial imagery.

## CORRELATION CHART

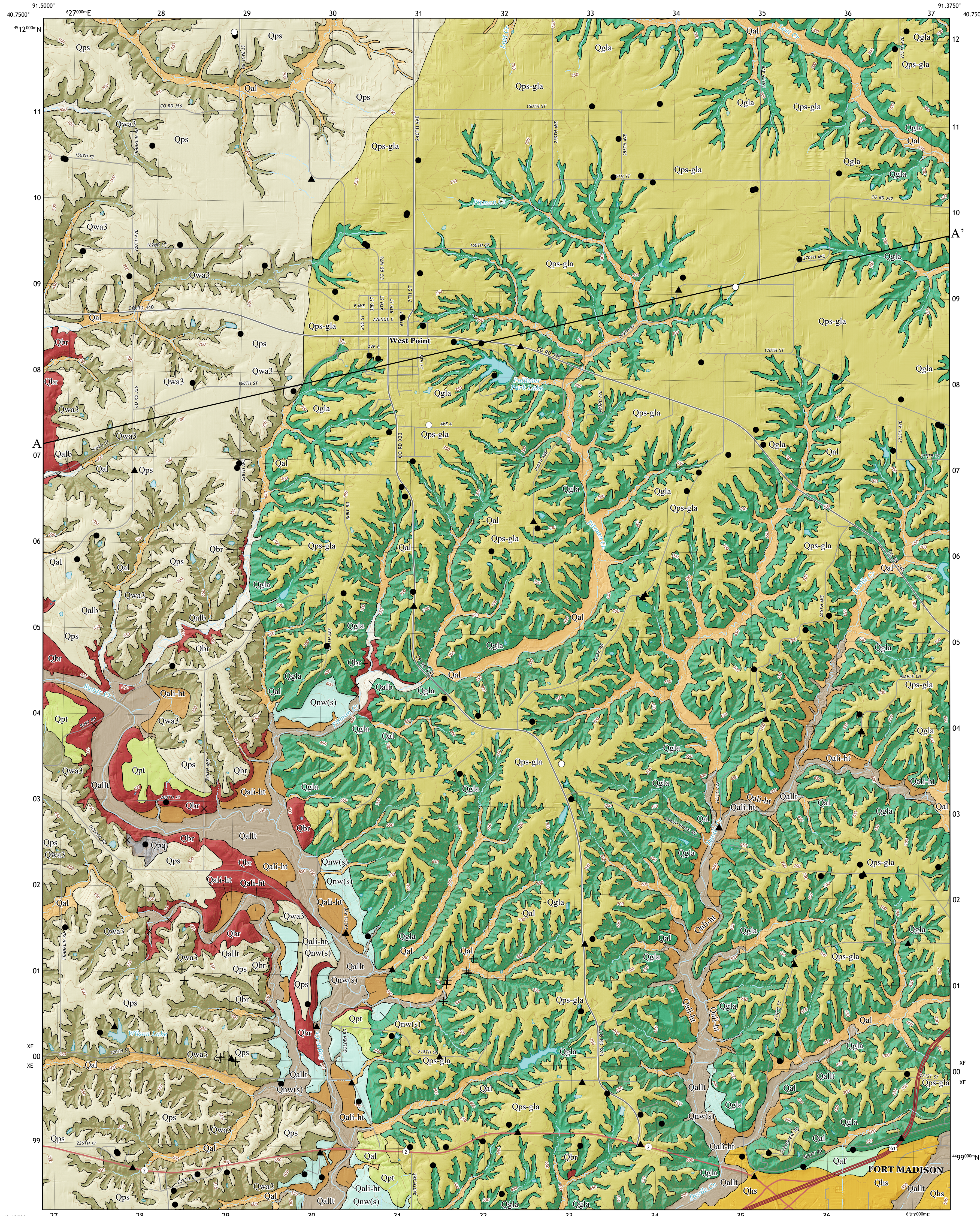
| General Lithology | Shallow Bedrock | Valley                            | Illinoian Till Plain | Pre-Illinoian Till Plain | Episode       | Series      | Stage                                      |
|-------------------|-----------------|-----------------------------------|----------------------|--------------------------|---------------|-------------|--|
| Alluvium          | Qalb            | Qallt<br>Qali-ht<br>Qnw(s)<br>Qaf | Qal                  | Qal                      | Hudson        | Holocene    | Quaternary                                 |
| Loess             | Qps             | Qpt<br>Qnw*                       | Qps-gla              | Qps                      | Wisconsin     | Pleistocene |  |
| Outwash           | Qhs             | Qhs                               |                      |                          | Illinoian     |             |  |
| Glacial Till      | Qgla            | Qgla                              | Qwa3                 |                          | Pre-Illinoian |             |  |
| Bedrock           |                 |                                   |                      |                          |               |             | Pennsylvanian<br>Mississippian<br>Devonian |
|                   |                 |                                   |                      |                          | Pel*          |             |  |
|                   |                 |                                   |                      |                          | Mpsl*         |             |  |
|                   |                 |                                   |                      |                          | Mws*          |             |  |
|                   |                 |                                   |                      |                          | Mkeo*         |             |  |
|                   |                 |                                   |                      |                          | Mb*           |             |  |
|                   |                 |                                   |                      | Mk*                      |               |             |  |
|                   |                 |                                   |                      | Der*                     |               |             |  |
|                   |                 |                                   |                      | Dss*                     |               |             |  |
|                   |                 |                                   |                      | Dgc*                     |               |             |  |

### MAP SYMBOLS

- × bedrock outcrop
- + Quaternary exposure
- GeoSam point
- new drill core
- ▲ geophysics collection point
- unit contact
- cross-section
- river/stream
- water body
- road classification
- U.S. Route
- State Route
- Local road

## ACKNOWLEDGMENTS

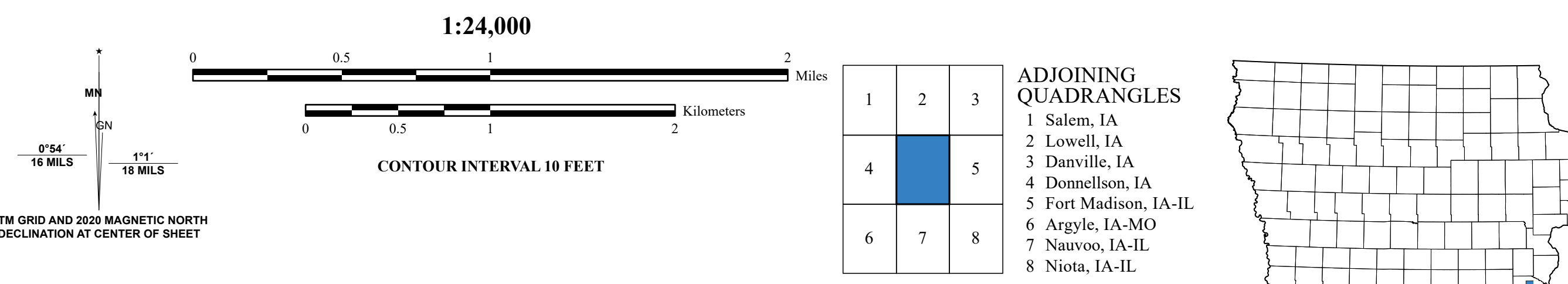
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Base map from USGS West Point 7.5' Quadrangle map, published by the US Geological Survey in 2018. Land elevation contours (10' interval). Map projection and coordinate system based on Universal Transverse Mercator (UTM) Zone 15N, datum NAD83.

The map and cross section are based on interpretations of the best available information at the time of mapping. Map interpretations are not a substitute for detailed site-specific studies. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies, either expressed or implied, of the U.S. Government.

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## GEOLOGIC CROSS-SECTION A-A'

