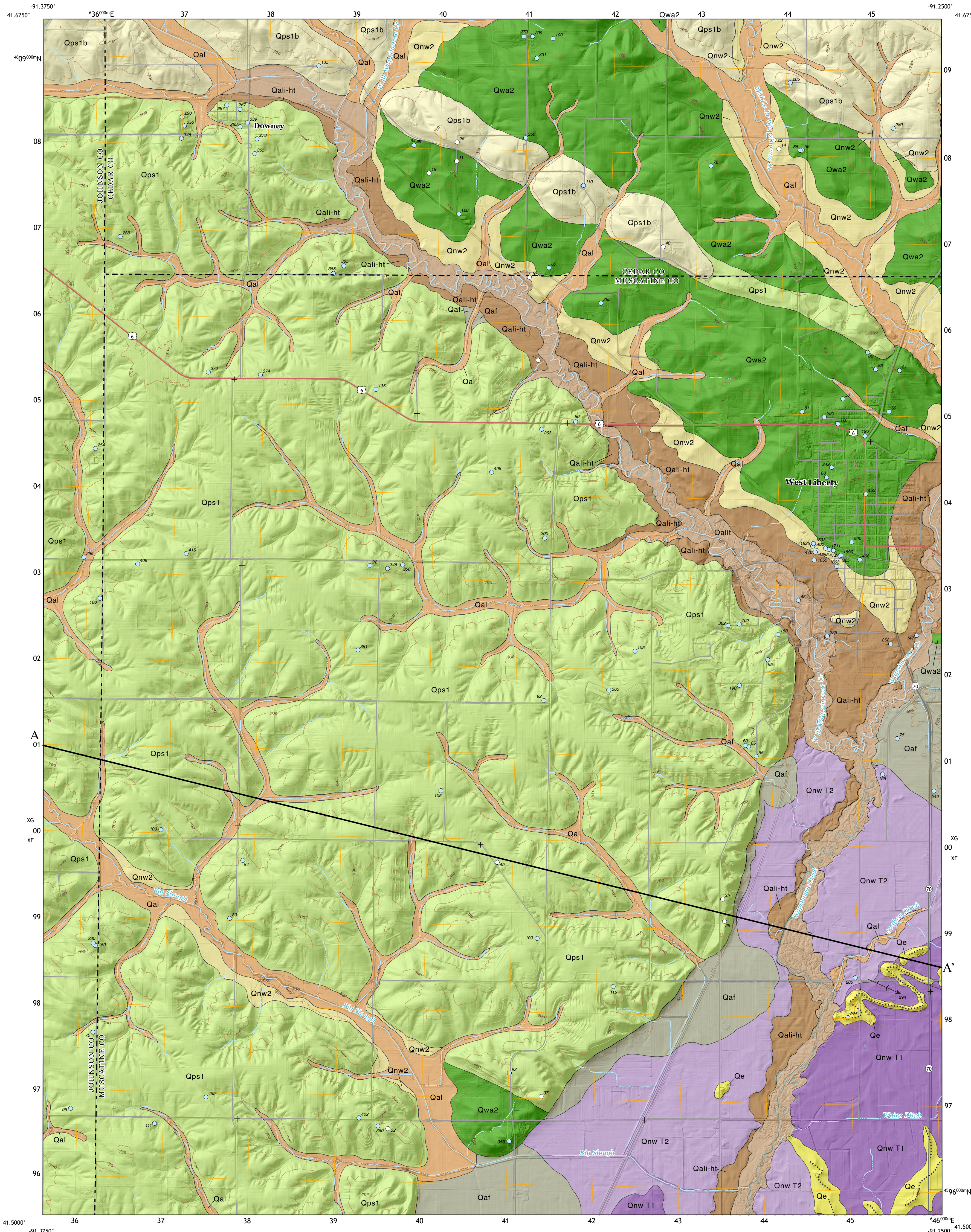


# SURFICIAL GEOLOGIC MAP OF THE WEST LIBERTY 7.5' QUADRANGLE, MUSCATINE, CEDAR, AND JOHNSON COUNTIES, IOWA

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## INTRODUCTION

The West Liberty 7.5' Quadrangle is located mainly in Muscatine County, Iowa with small portions in Cedar and Johnson counties. Unlike other areas in eastern Iowa, the mapping area does not have bedrock outcrops. The bedrock surface is generally 50 m (165 ft) below the modern surface across large portions of the landscape due to the presence of the Cleona Bedrock Channel. This buried valley contains glacial deposits from multiple Quaternary ice advances. The landscape of the mapping area is mainly a Pre-Illinoian Till Plain while the southeast corner lies in the Cedar River Valley.

The uplands in the mapping area are formed from Pre-Illinoian till of Wolf Creek and Alburnett formations. This diamictic commonly has the Sangamon Geosol developed in the uppermost 1 to 2 m (3-7 ft). This old soil is buried by loess of the Peoria Formation which is typically 2 to 5 m (7-16 ft) but can be over 10 m (33 ft) in the northern portion of the mapping area. There are, however, zones of thin loess. These areas, found northwest of the city of West Liberty, can also lack the Sangamon Geosol. Holocene alluvium of the DeForest Formation in this area was deposited by Wapsinonoc Creek and its tributaries.

The Cedar River Valley in the mapping area is considerably wider than the bedrock confined valley upstream north of Moscow, Iowa. Sediments in the valley are largely comprised of coarse glaciofluvial deposits of the Noah Creek Formation that can be 15 to 25 m (50-80 ft) thick which are mantled with 3 to 8 m (10-25 ft) of fine-grained materials. These are a combination of Holocene alluvium or in place of reworked Peoria Formation silt. These sediments are above tills and outwash of the Pre-Illinoian Wolf Creek and Alburnett formations.

Data collected for this mapping project included 3 drill cores and 7 hand probe locations.

## DESCRIPTION OF MAP UNITS

- Alluvium**
- 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 silty clay loam, clay loam, loam to sandy loam alluvium and colluvium in stream valleys, on hill slopes, and in closed depressions. May overlie Wolf Creek/Alburnett formation till or Noah Creek Formation sand and gravel. Associated with low-relief modern floodplains, closed depressions, modern drainageways, or toeslope positions on the landscape. Unit also includes colluvial deposits derived from adjacent map units. Seasonal high water table and potential for frequent flooding.
  - Qaf** - Alluvial Fan (DeForest Formation-Corrington Member) 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. Within the Cedar River Valley, alluvial fans overlie older silty clay to sandy loam alluvium of Holocene terraces or thick sand and gravel of the Noah Creek Formation.
- Terraces**
- Qallt** - River Channel Belt - 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 silty clay loam, loam, or clay loam, associated with the modern channel belt of Wapsinonoc Creek and its tributaries. May overlie Wolf Creek/Alburnett formation or Noah Creek Formation sand and gravel. Occupies lowest position on the floodplain (i.e., modern and historic channel belts). Oxbow lakes and meander scars are common features associated with this terrace level. Mapped primarily using aerial imagery and LIDAR. Seasonal high water table and frequent flooding potential.
  - Qali-ht** - Intermediate Terrace (DeForest Formation-Camp Creek, Roberts Creek, and Gunder members) Variable thickness of less than 1 to 5 m (3-16 ft) of very dark gray to brown, noncalcareous, stratified silty clay loam to loam that overlies the Noah Creek Formation or Henry Formation. Occupies low terrace position above the modern floodplain in Wapsinonoc Creek and its tributaries. Seasonal high water table and frequent flooding potential.
- Eolian Sediment**
- Qe** - Sand Dunes and Sand Sheets (Peoria Formation-sand facies) Generally less than 3 m (10 ft) of yellowish brown, massive, loamy sand to fine sand. It may overlie yellowish brown coarse-grained sand and gravel of the Noah Creek Formation or it diamict of the Wolf Creek/Alburnett formation. Usually restricted to narrow belts within the Wapsinonoc Creek and Cedar River Valley.
  - Qps1** - Loess and Interrelated Eolian Sand (Peoria Formation-silt and/or sand facies) Generally 2 to 5 m (7-16 ft) of yellowish brown to gray, massive, fractured, noncalcareous grading downward to calcareous, silt loam and intercalated fine to medium, well-sorted sand. Sand is most abundant in the lower part of the eolian package. Overlies massive, fractured, loamy glacial till of the Wolf Creek/Alburnett formation with or without the intervening clayey Farmdale/Sangamon Geosol.
  - Qps1b** - Thick Loess and Interrelated Eolian Sand (Peoria Formation-silt and/or sand facies) Generally 5 to 15 m (16-49 ft) of yellowish brown to gray, massive, noncalcareous grading downward to calcareous silt loam and intercalated fine to medium, well-sorted, sand. Overlies massive, fractured, loamy glacial till of the Wolf Creek/Alburnett formation with or without intervening clayey Farmdale-Sangamon Geosol.
- Meltwater Sediment**
- Qnw** - Sand and Gravel (Noah Creek Formation) Generally 3 m (10 ft) to more than 20 m (66 ft) of yellowish brown to gray, poorly to well-sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel with few intervening layers of silty clay. This unit is found in the Cedar River Valley and underlies Holocene alluvium and other terrace deposits. Shown only on the cross-section.
  - Qnw T1** - Eolian Mantled Outwash Terrace (Peoria Formation-silt and/or sand facies) Generally 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. The Peoria deposits overlie sand and gravel of the Noah Creek Formation. This terrace contains sand dunes and lies 1 to 3 m (3-10 ft) above the T2 terrace and 3 to 5 m (10-20 ft) above the modern channel.
  - Qnw T2** - Eolian Mantled Outwash Terrace (Peoria Formation-silt and/or sand facies) Generally 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. The Peoria deposits sand and gravel of the Noah Creek Formation. This terrace is typically 1 to 3 m (3-10 ft) above the modern channel.
- Colluvial Sediment**
- Qnw2** - Sand and Gravel (Noah Creek Formation) Generally 2 to 8 m (7-26 ft) of yellowish brown to gray, poorly to well-sorted, massive to well stratified, coarse to fine feldspathic quartz sand, pebbly sand and gravel with few intervening layers of silty clay. A thin mantle of loess, reworked loess or fine-grained alluvium may be present. This unit includes silty colluvial deposits derived from the adjacent map units. This unit encompasses deposits that accumulated in low-relief stream valleys during the Late Wisconsin. Seasonal high water table and some potential for flooding.
  - Qwa2** - Periglacial and Eolian Sediments Shallow to Glacial Till (unnamed erosion surface sediment) Generally 1 to 3 m (3-10 ft) of yellowish brown to gray, massive to weakly stratified, well to poorly sorted loamy, sandy and silty erosion surface sediment. Map unit includes some areas mantled with less than 2 m (7 ft) of Peoria silt or sand. Overlies massive, fractured, firm glacial till of the Pre-Illinoian Wolf Creek/Alburnett formation.
- Glacial Sediment**
- Qwa3** - Till (Wolf Creek & Alburnett formations) Generally 15 to 60 m (50-200 ft) of very dense, massive, fractured, loamy glacial till of the Wolf Creek and/or Alburnett formations. This unit overlies Paleozoic bedrock and is only shown on the cross-section.

## CORRELATION OF MAP UNITS

	Pre-Illinoian Till Plain	Cedar River Valley	Episode	Series	System
Alluvium	Qal	Qaf	Hudson	Holocene	
	Qallt	Qallt			
	Qali-ht	Qali-ht			
Eolian	Qps1	Qe	Wisconsin	Quaternary	
	Qps1b	Qnw T1			
Outwash		Qnw T2	Pleistocene		
		Qnw*			
Colluvium	Qnw2				
Glacial Till	Qwa2				
		Qwa3*	Pre-Illinoian		

\*units shown only on the cross-section

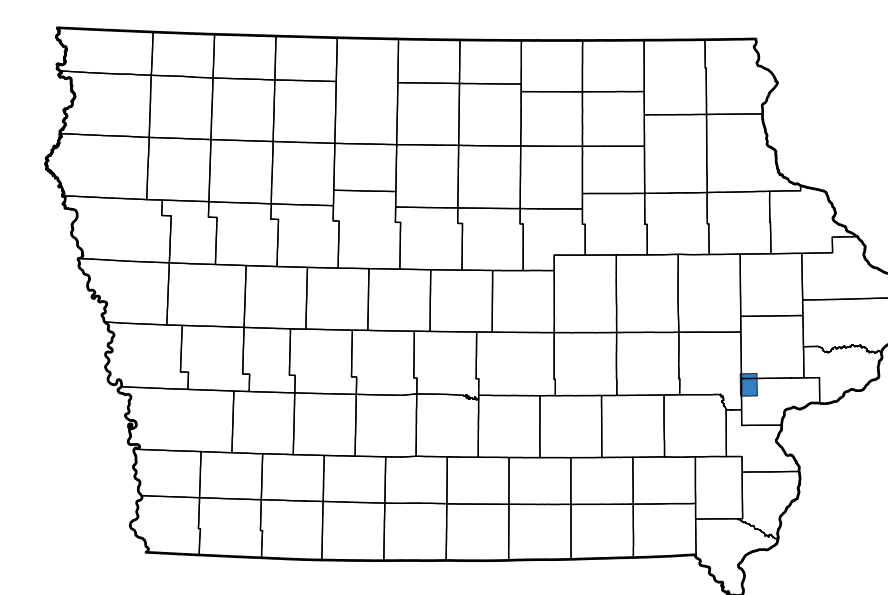


Figure 1. The location of the West Liberty Quadrangle in Iowa.

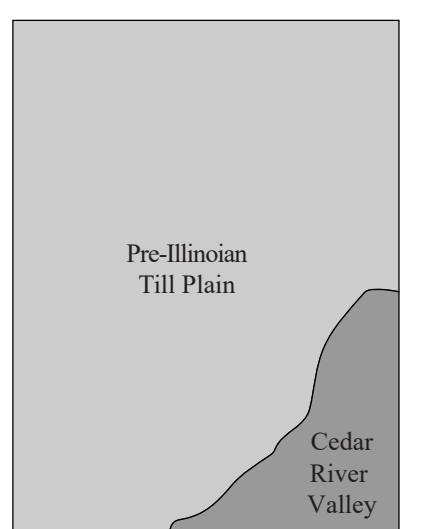
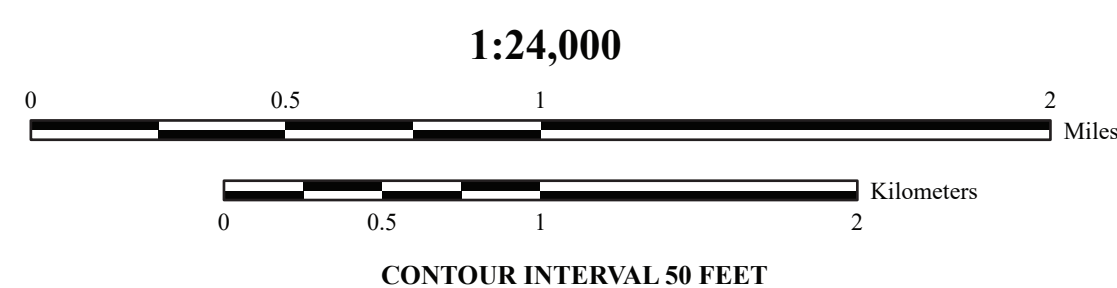
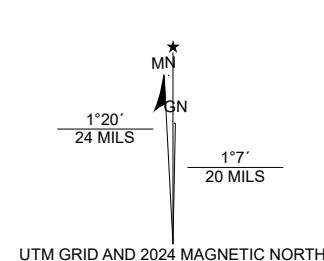


Figure 2. The West Liberty 7.5' Quadrangle is divided into two landscapes. The Pre-Illinoian Till Plain occupies most of the mapping while the Cedar River Valley is found in southeast corner. Shown at a 1:200,000 scale.

ADJOINING QUADRANGLES

1	2	3
4	5	
6	7	8

1 Iowa City East, IA  
2 West Branch, IA  
3 Rochester, IA  
4 West Liberty SW, IA  
5 Atalissa, IA-IL  
6 Lone Tree, IA  
7 Nichols, IA  
8 Muscatine NW, IA



Geology based on fieldwork done by P. Kerr, 2023-2024. Digital cartography by P. Kerr. Base map from U.S. Geological Survey (USGS) West Liberty 7.5' Quadrangle map, published by USGS in 2012. Map projection and coordinate system from United States National Geospatial Intelligence Agency (USNIMA) 11740 Zone 18N datum 102483. 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 necessarily representing the official policies, either expressed or implied, of the U.S. Government.

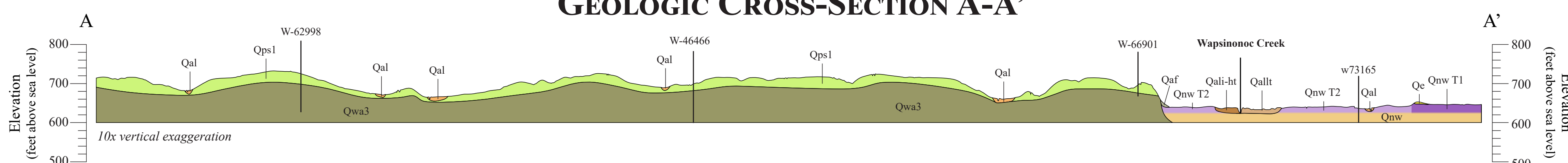
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- Road Classification**
- U.S. Route
  - State Route
  - Local Road

- Map Symbols**
- water well with total depth
  - stratigraphic core
  - unit contact
  - dune crest
  - paleowind direction from dune form
  - elevation contour
  - cross-section
  - water body
  - stream
  - hillshade

- Cross-Section Legend**
- W-73165 GeoSam sampling point
  - contact
  - gradual vertical contact

## GEOLOGIC CROSS-SECTION A-A'



## ACKNOWLEDGEMENTS

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