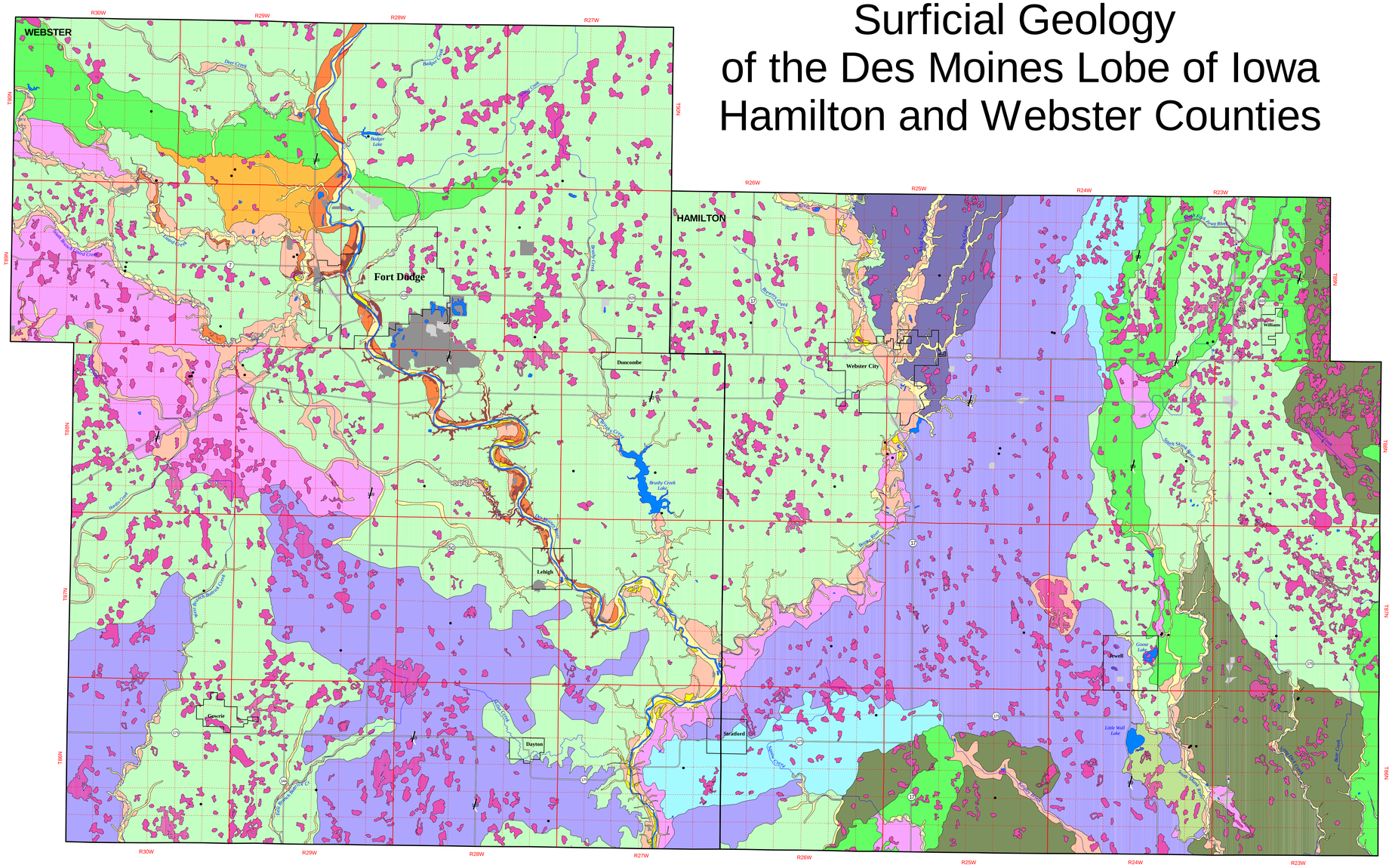
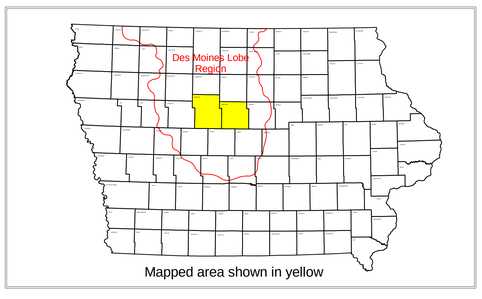
Surficial Geology of the Des Moines Lobe of Iowa Hamilton and Webster Counties





Mapped area shown in yellow

1:100,000

2 0 2 4 6 8 10 Miles

2 0 2 4 6 8 10 Kilometers

SURFICIAL GEOLOGIC MAP
OF THE DES MOINES LOBE OF IOWA
Hamilton and Webster Counties

Geological Survey Bureau
Open File Map 2000-1
May 2000

Prepared by

Deborah J. Quade[1]
James D. Giglierano[1]
E. Arthur Bettis[2]
Robin J. Wisner[3]

Supported by the U.S. Geological Survey
Cooperative Agreement Number 99HQAG0064
National Cooperative Geologic Mapping Program (STATEMAP)

Energy and Geological Resources Division
Geological Survey Bureau

Iowa Department of Natural Resources
Lyle W. Asell, Interim Director

ACKNOWLEDGEMENTS

Recognized for direct contributions to map's production: Timothy J. Kemmis, Adrian Gostenmoeller, Andy Asell, Kathryn Benz, Mary Ellis, Courtney Nash, Leah Young, Jessica Overmohle, Shane Smith, Julia E. Tabbut, Stephanie Tassier-Surine, Mark Alexander, Matthew A. Culp, Robert M. McKay, Rick Langel, Billy J. Bunker, Jackson L. Gilmore, Calvin F. Wolter, Bernard E. Hoyer, Pat I. Lohman, Michael J. Bounk, Donald L. Koch and Mary P. Skopec. Drilling was provided under contract by Aquadrill. Assistance in obtaining permission from landowners was provided by the Natural Resources Conservation Service, Fort Dodge Office. A special thanks to the following individuals who graciously allowed access to their land for drilling: Robert Condon, Terry Condon, Edna Schultz, Delmar Enlund, Delbert Denzklau, Ralph Sonnickson, Don Shelton, William Petersen, Vern Chalstrom, Margaret Banwell, Russ Slotten, Garret Geisler, Engstrom, Schwendemann, Greg Carlson, Don Will, Steve Sater, John Andersen, Anne Kapustka, Ray Allard, Webster County Conservation Board and the Fort Dodge Asphalt Co., Webster County, George Myers, Darrel Hay, Jim Walker, Lyle Anderson, Dennis Doulitzle, John VanLangen, Leslie Eggers, Barbara Sylvester, Lawrence VanHauen, Bob Sharer, Brian Wilcox, Don Hill, Bruce Berggren, Merylin Hegland, Kevin Larsen, Glen Hodnefield, Lon Crosby and the Hamilton County Conservation Board, Hamilton County.

[1] Iowa Department of Natural Resources, Geological Survey Bureau,109 Trowbridge Hall, Iowa City, IA 52242-1319
[2] Department of Geoscience, The University of Iowa, 121 Trowbridge Hall, Iowa City, IA 52242
[3] Natural Resources Conservation Service, 1617 N. Lake St., Storm Lake, IA 50588

LEGEND

Description of Mapping Units

Hudson Episode

Qs - Muck and Peat (DeForest Formation-Wisden Mbr) Generally 2.5 to 11 m of black to very dark gray, calcareous, muck, peat and silty clay loam colluvium and organic sediments in drained and undrained closed and semi-closed depressions. Overlies a gray, calcareous, massive, dense loam diamicton (Dows Fm.- Alden Mbr.) or may overlie Noah Creek Fm. sand and gravel. Low relief features that occupy depressions and low sags on the landscape. Seasonal high water table.

Qal - Alluvium (DeForest Formation-Undifferentiated) Variable thickness of less than 1 m to 5 m of a very dark gray to brown, noncalcareous, stratified silty clay loam, loam to sandy loam alluvium and colluvium in stream valleys, hillslopes and closed depressions. May overlie Dows Formation (Morgan or Alden Mbr.), Noah Creek Formation or Pennsylvanian/Mississippian bedrock. Occupies low relief modern floodplain, closed depressions, modern drainageways or nonslope position on the landscape. Seasonal high water table

Qs - Eolian Sand (Peoria Formation--sand facies) Generally less than 3 m of yellowish brown, massive, calcareous loamy sand to fine sand. It may overlie yellowish-brown coarse-grained sand and gravel (Noah Creek Fm.) or it may overlie yellowish to grayish brown usually calcareous, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable (Dows Fm.-Morgan Mbr.). Usually restricted to a narrow belt on major river valley bottoms or adjacent uplands on the Des Moines Lobe.

Late Wisconsin Episode

Qtp - Till Plain (Dows Formation-Morgan Mbr.) Less than 8 m of yellowish brown, often calcareous and fractured, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Low to moderate relief (3 m to 8 m), undulating plains with irregular surface patterns. Seasonal high water table.

Qtpl - Till Plain with lineated ridge forms (Dows Formation-Morgan Mbr.) Less than 3 m of yellowish to grayish brown, often calcareous and fractured, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr.). Low relief, (less than 3 m of local relief), slightly undulating plains with irregular surface patterns. **Lineated ridge forms** (Dows Formation-Morgan Mbr./ Pilot Knob Mbr.) Less than 6 m of yellowish brown, often calcareous, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable. Occasionally, these ridges consist primarily of sand and gravel and exhibit evidence of syndepositional collapse (Pilot Knob Mbr.) Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-Alden Mbr.). Faint to well-defined lineated ridges oriented transverse to glacier flow are inset on till plain. Ridges are moderate to high relief features (3 to 8+ m). Overall landform is a swell and swale topography. Seasonal high water table.

Qtr - Till Ridge (Dows Formation-Morgan Mbr.) Generally 4 to 15 m of yellowish to grayish brown, usually calcareous and fractured, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Moderate to high relief hummocky landform feature exceeds 3-8 m of local relief.

Qsch - Outwash Channels (Noah Creek Formation) Generally less than 7 m of yellowish brown coarse-grained sand and gravel. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). In valley positions, it is at the land surface of older terraces. On the modern floodplain it is buried by DeForest Fm. alluvium. Low-relief landforms that may be deposited in broad terraces; long, narrow longitudinal terraces or in cuspate-shaped point terraces.

Qschb - Outwash Channels shallow to bedrock (Noah Creek Formation) Generally less than 5 m of yellowish brown coarse-grained sand and gravel. In the northern part of Webster county the unit overlies Mississippian carbonate bedrock. From Fort Dodge south the unit overlies Pennsylvanian bedrock. In valley positions, the unit is at the land surface of older terraces. On the modern floodplain it is buried by DeForest Fm. alluvium. Low-relief landforms that may be deposited in long, narrow longitudinal terraces or in cuspate-shaped point terraces which overlie bedrock.

Qof - Outwash Fan (Noah Creek Formation) Thickness can be quite variable from 3 to 12 m of yellowish-brown coarse-grained sand and gravel. May overlie yellowish to grayish brown usually calcareous, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable (Dows Fm.-Morgan Mbr.) or it may overlie a gray, calcareous, massive, dense loam diamicton (Dows Fm.- Alden Mbr.). Narrow low-relief apron that gently slopes away from the moraine front. Seasonal high water table.

Qglp - Lake Sediment Plain - broad-scale landform features (Dows Formation-Lake Mills Mbr.) Generally less than 3 m of dark grayish brown, massive, calcareous silty clay loam, silt loam overlying a thin basal increment of sand and gravel (<1 m). It may overlie yellowish to grayish brown usually calcareous, stratified loam to silt loam to sandy loam diamicton (Dows Fm.--Morgan Mbr.) or it may overlie a gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Low relief broad plain with less than 3 m of local relief. Seasonal high water table.

Qglbc - Collapsed Lake Sediments - hummocky isolated ice-walled lake plains-flat-topped hummocks (Dows Formation-Lake Mills Mbr./ Morgan Mbr.) Generally less than 3 m of dark grayish brown, massive, calcareous silty clay loam, silt loam overlying a thin basal increment of sand and gravel (<1 m). It usually overlies yellowish to grayish brown usually calcareous, stratified loam to silt loam to sandy loam diamicton (Dows Fm.--Morgan Mbr.). Overlies a gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Collapsed lake sediments occupy a relatively flat to undulating plain that occupies a large portion of this landform area. Other hummocks consist of less than 4 m of yellowish to grayish brown usually calcareous, stratified loam to silt loam to sandy loam diamicton (Dows Fm.--Morgan Mbr.). Overlies a gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Moderate to high relief hummocky landform area with 3 to 8+ m of local relief.

Qglplr - Lake Sediment Plain - broad-scale landform features with lineated ridge forms (Dows Formation- Lake Mills Mbr.)/Morgan Mbr.) Generally less than 3 m of dark grayish brown, massive, calcareous silty clay loam, silt loam overlying a thin basal increment of sand and gravel (<1 m). It may overlie yellowish to grayish brown usually calcareous, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable (Dows Fm.--Morgan Mbr.) or it may overlie a gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Low relief broad plain with less than 3 m of local relief. Faint lineated ridges oriented transverse to glacier flow are inset on till plain adjacent to major stream and river valleys. Ridges are lower relief features (<3 m). Overall landform is an undulating plain. Low relief (<3 m) on lineated ridges. Seasonal high water table.

Complexes

Qsgc - Supraglacial Complex (Dows Formation-Pilot Knob Mbr./ Morgan Mbr.) Greater than 3 m and less than 15 m of yellowish brown, often calcareous and fractured, stratified sand and gravel with interbedded stratified loam diamicton. Collapse features are usually evident. In depressions and sags on upland surfaces, the sand and gravel may be buried by DeForest Fm.-Wisden Mbr. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Moderate to high relief (3 to 8+ m) hummocks, beaded ridges, kames and associated linked drainages on upland surfaces.

Qsgclp - Supraglacial Complex with lineated ridge forms (Dows Formation-Pilot Knob Mbr./ Morgan Mbr.) Greater than 4 m and less than 10 m of yellowish brown, often calcareous and fractured, stratified sand and gravel with interbedded stratified loam diamicton or yellowish to grayish brown, often calcareous and fractured, stratified loam to silt loam to sandy loam diamicton; textures can be quite variable. In depressions and sags on upland surfaces, the sand and gravel may be buried by DeForest Fm.-Wisden Mbr. Overlies gray, calcareous, massive, dense loam diamicton (Dows Fm.-- Alden Mbr.). Faint to well-defined lineated ridges oriented transverse to glacier flow are inset on till plain. Ridges are moderate to high relief features (3 to 8+ m). Occasionally, these ridges consist primarily of sand and gravel and exhibit evidence of syndepositional collapse (Pilot Knob Mbr.). Overall landform is a hummocky or swell and swale topography. Moderate to high relief (3 to 8+ m) on lineated ridges and hummocks. Seasonal high water table.

Pa/Mu - Pennsylvanian Bedrock(Cherokee Group)/Mississippian Bedrock (St. Louis and Pella Formations) *Pennsylvanian*--Primarily composed of deltaic sediments associated with the Cherokee Group. Lithologies are extremely variable. *Major lithologies* consist of shale and sandstone with minor coal seams. *Mississippian*-- Composed of marine limestones, sandstones and shales. Outcrops present along the Des Moines River valley north of Fort Dodge. In the Fort Dodge vicinity some outcrops of Jurassic age gypsum and red mudstones are present.

Qpg - Pits and Quarries -Gypsum and limestone quarries; and sand, gravel, and clay pits. Extent mapped as shown in county soil surveys.

Qf - Fill Areas of major land filling. Fill associated with railroad grades, highway grades and land leveling. Variable in texture ranging from loamy to sandy to concrete rubble. Extent mapped as shown in county soil surveys.

Water Features

Drill Hole Location