

Design Manual Chapter 6 - Geotechnical 6A - General Information

Typical Iowa Soils

A. General Information

There are three major types of soils in Iowa:

- 1. Loess: A fine-grained, unstratified accumulation of clay and silt deposited by wind (37.5%).
- **2. Glacial Till:** Unstratified soil deposited by a glacier; consists of clay, silt, sand, gravel, and boulders (28.5%).
- **3. Alluvium:** Clay, silt, sand, or gravel carried by running streams and deposited where streams slow down (20.1%).

Other types of soils, occurring in smaller amounts in Iowa, are:

- Sand and gravel (4.5%)
- Paleosols (4.0%)
- Bedrock (2.7%)
- Fine sand (1.4%)

B. Iowa Geology

The Iowa landscape consists mainly of seven topographic regions (see Figure 6A-3.01).

- Des Moines Lobe
- Loess Hills
- Southern Iowa Drift Plain
- Iowan Surface
- Northwest Iowa Plains
- Paleozoic Plateau
- Alluvial Plains

The soils in the Des Moines Lobe, Southern Iowa Drift Plain, Iowan Surface, Northwest Iowa Plains, and Paleozoic Plateau originated from glacial action at different periods in geologic time. The northwestern and southern parts of the state consist of glacial till covered by loess. The engineering properties of glacial till change as the age of glacial action changes. Loess soil engineering properties depend mainly on clay content. Figures 6A-3.01, 6A-3.02, and 6A-3.03 show the landform regions, the landform materials and terrain characteristics, and soil permeability.

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Paleozoic Northwest Iowa Plains Iowan Surface Plateau Des Moines Lobe Loess Limit of last glacial advas 00 Missouri Alluvial Plain Southern Iowa Drift Plain Mississippi Alluvial Plain 60 mi. 40 80 km.

Figure 6A-3.01: Landform Regions of Iowa

Source: Prior 1991

53/ Moderate to thick loess over glacial drift Gently rolling terrain Integrated drainage network Stepped erosion surfaces Thin loess cover Isolated patches of glacial drift Thin, discontinuous loess or loam over glacial drift Bedrock near surface Korst conditions locally Gently rolling terrain Bedrock-dominated terrain
Plateau-like uplands
Integrated drainage network
Deeply entrenched valleys
Karst topography
(sinkholes, caves, springs) Thin loess and glacial drift over bedrock Fresh glacial drift.

No loess cover

Bands of knob-and-kettle terrain

Areas of level terrain

Poor surface drainage

Natural lakes district; bogs, marshes Scattered glacial boulders Stepped erosion surfaces Isolated oblong hills (paha) Integrated drainage network Moderate loess cover
Thin glacial drift
Bedrock near surface
Dissected terrain Thick loess cover Sharply ridged terrain High drainage density Rapid surface runoff Gully development Moderate loess cover Weathered glacial drift with paleosol Moderately sloping terrain Moderate loess cover Weathgred glacial drifts with paleosols
Dissected terrain
Integrated drainage network
Stepped erosion surfaces
Bedrock exposed in deeper valleys Thick alluvium
Level terrain along valleys,
includes stream channels,
floodplains, oxbow lakes,
terraces, alluvial fans,
sand dunes Narrow-crested drainage divides Broad, flat (tableland) drainage divides 20 40 60 mi. 40 80 km.

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Figure 6A-3.02: Landform Materials and Terrain Characteristics of Iowa

Source: Prior 1991

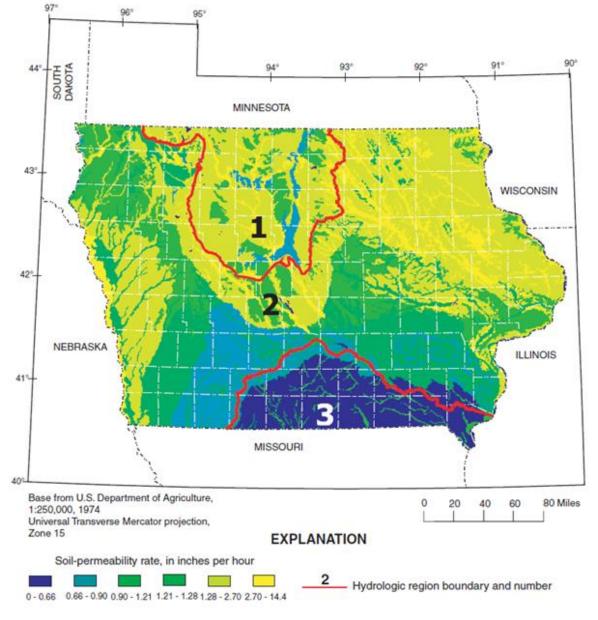


Figure 6A-3.03: Soil Permeability Rates and Hydrologic Regions in Iowa

Source: Eash 2001

C. References

Eash, D.A. *Techniques for Estimating Flood-Frequencies Discharges for Streams in Iowa*. Iowa City, Iowa: Iowa Department of Transportation and the Iowa Highway Research Board. 2001.

Prior, J.C. *Landforms of Iowa*. Iowa City, Iowa: Department of Natural Resources, University of Iowa Press. 1991.