

EXPLANATION

**SAND AND GRAVEL LANDFORMS**  
 Low relief = 5 to 20 feet per square mile  
 Moderate relief = 20 to 50 feet per square mile  
 High relief = 50 to 150 feet per square mile

Omc

MILNOR CHANNEL OUTWASH; sand and gravel about 40 feet thick near center of channel. Low relief

K

KAMES; sand and gravel, poorly sorted. Moderate relief

Co

COLLAPSED and PITTED OUTWASH; sand and gravel, 70 to 130 feet thick. Overridden by ice, thinly covered with till in places. Moderate relief

Lb

LAKE AGASSIZ BEACHES; mainly sand and gravel beds near southern edge of county. Low relief

Dsa

SHEYENNE DELTA; sand, well sorted, about 100 feet thick along western edge of county. Low relief

Du

DUNES; wind blown sand. Moderate relief

**SILT AND CLAY LANDFORMS**

Dsi

SHEYENNE DELTA; mainly silt, generally overlain by 2 to 5 feet of eolian sand. Moderate relief

Lc

LAKE AGASSIZ PLAIN; mainly thin deposits of clay but locally includes silt beds in upper part. Low relief

Al

STREAM VALLEYS OF RECENT ORIGIN, mainly silt and clay. Moderate relief

**TILL LANDFORMS**

Em

END MORAINES; till, linear trends. Moderate relief

Sm

STAGNATION MORAINES; hill, lacking linear trends, numerous kettles. High relief

Gm

GROUND MORAINES; till, lacking linear trends. Low to moderate relief

Lt

LAKE AGASSIZ PLAIN; mainly lake-washed till. Low relief

EXISTING LAKE

Lakeward edge of prominent ridge or steep slope associated with the Lake Agassiz shorelines, dashed where low but traceable

Contact between map units; dashed where approximate

TEST HOLE; 4-digit number indicates hole drilled during this study. Letter prefix K, W, H, or F indicates hole drilled during the Kindred, Wyndmere, Hankinson, or Fairmount study

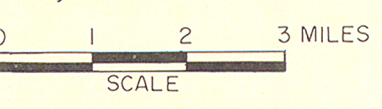


PLATE 1. Landforms map of Richland County, N. Dak.



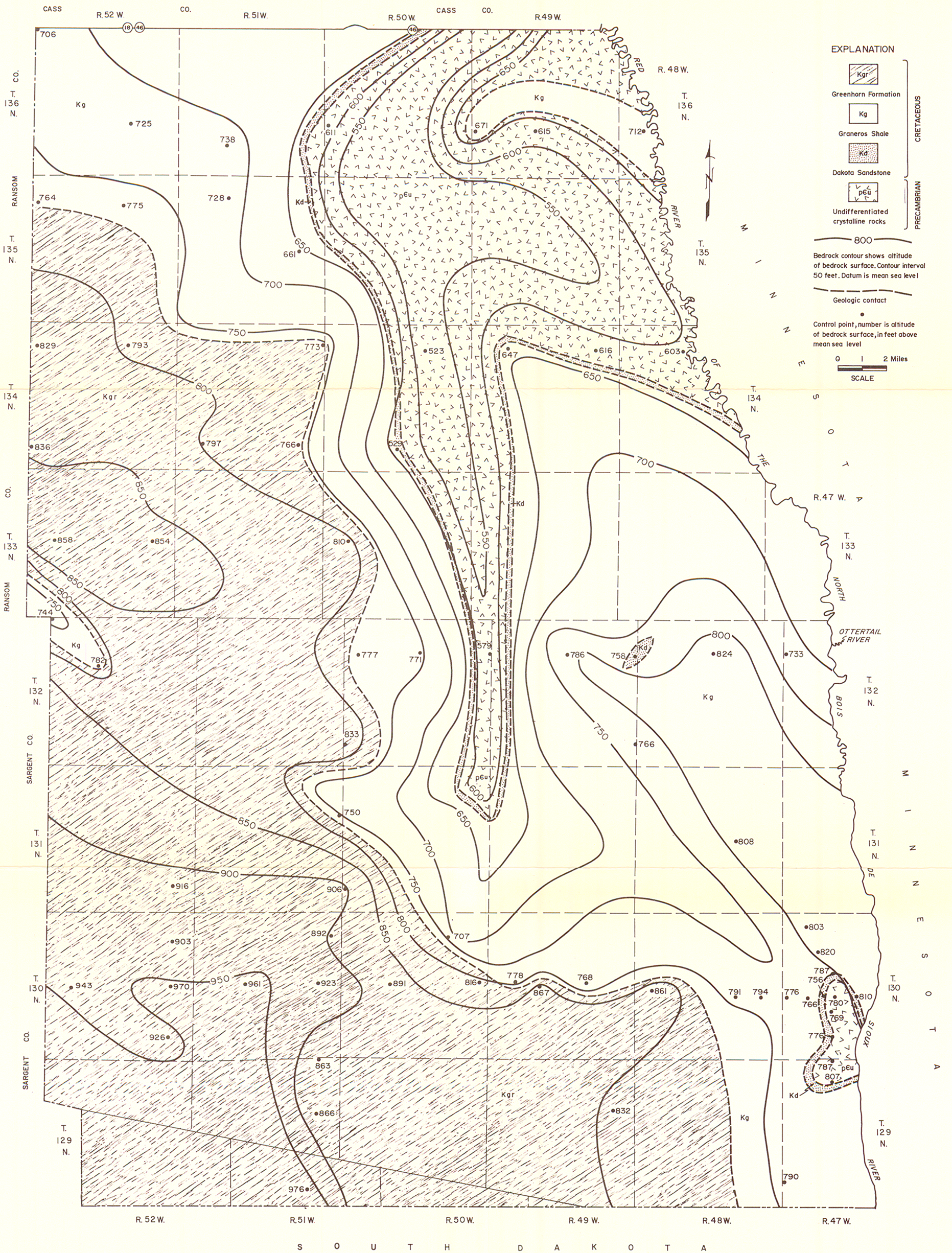
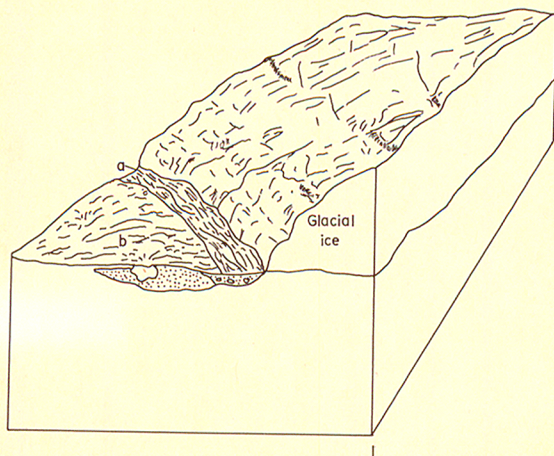
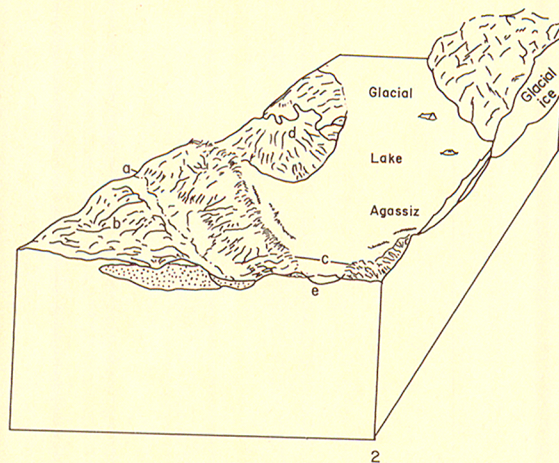


PLATE 2. Bedrock contour and generalized subcrop map of Richland County, N. Dak.

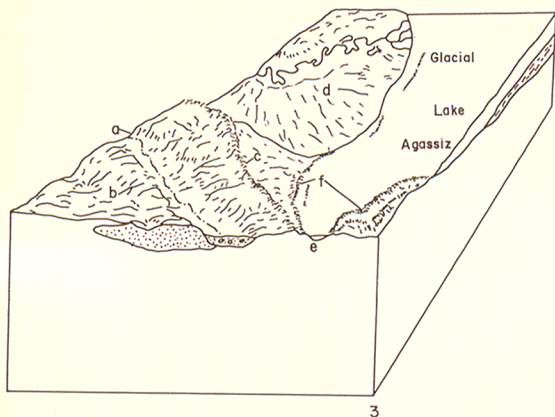




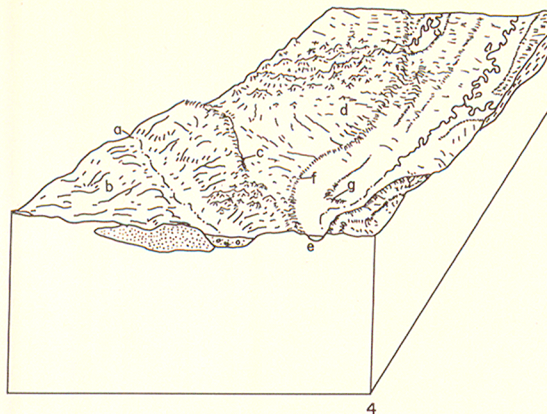
1. Prior to Lake Agassiz time, the Sheyenne River was an ice-marginal stream flowing through the Milnor channel. a-Milnor channel, b-stagnation moraine with ice-blocks still in place in the kettles.



2. Lake Agassiz early in the Herman stage. The Sheyenne River has been diverted into the growing lake, and is forming a large delta. The Milnor channel contains only an intermittent stream. a-Milnor channel, b-stagnation moraine, c-Herman beach, d-Sheyenne delta, e-outlet of Lake Agassiz.



3. Lake Agassiz during Campbell time. The outlet of the lake is deeper, and the ice dam is north of the area. The Sheyenne River is becoming entrenched in its delta, and a wave-cut cliff is being formed on the lakeward side of the delta. d-Sheyenne delta, e-outlet of Lake Agassiz, f-Campbell beach.



4. Lake Agassiz has receded completely from Richland County. The Sheyenne River is deeply entrenched in the delta, and high dunes are forming near the river valley. The axis of the lake bed is occupied by the Red River of the North and the Bois de Sioux River. The land forms are essentially as seen today. c-Herman beach, f-Campbell beach, g-McCauleyville beach.

PLATE 3. Block diagrams showing successive stages in the history of glacial Lake Agassiz in Richland County, N. Dak.



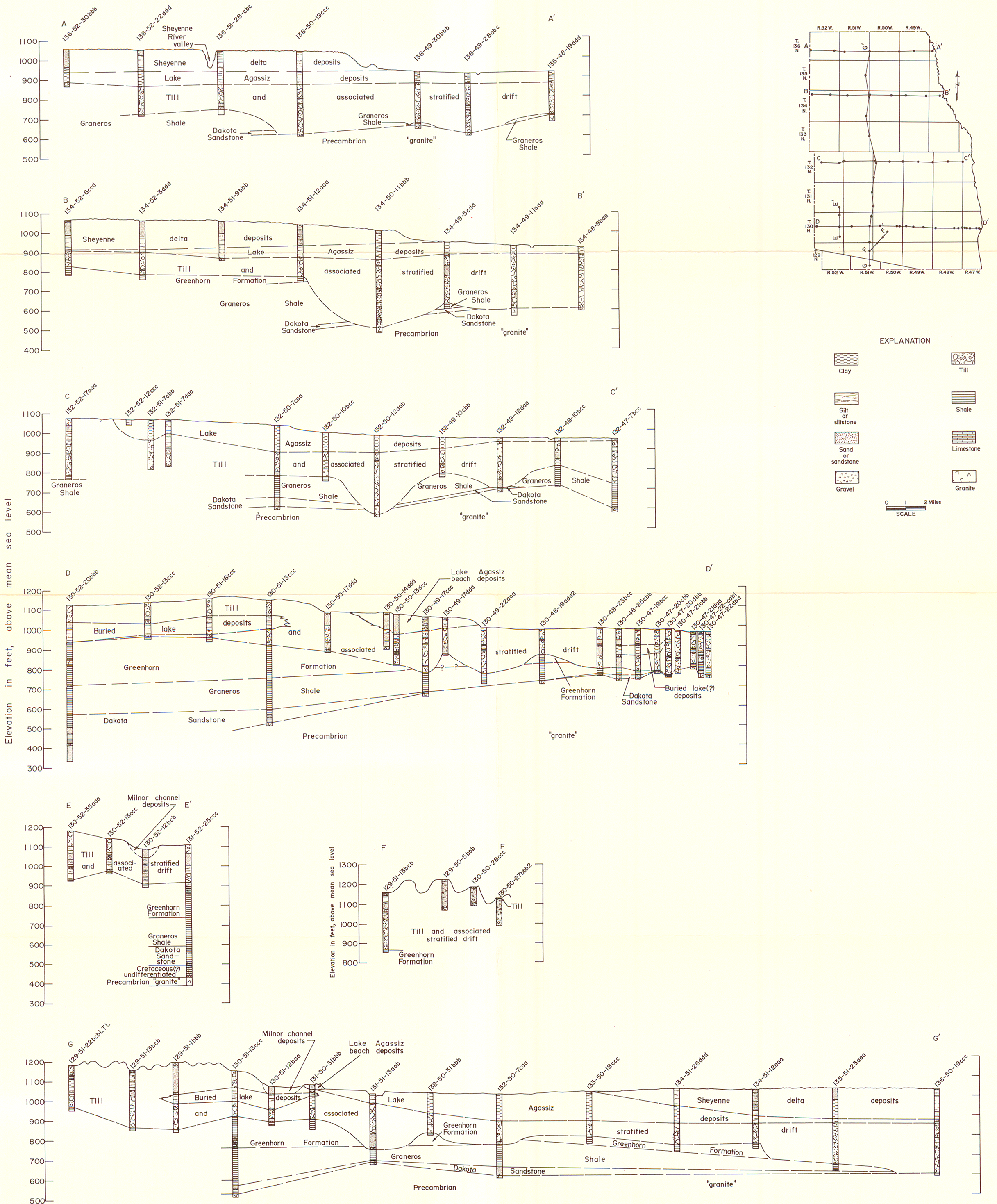


PLATE 4. Geologic sections in Richland County, N. Dak.