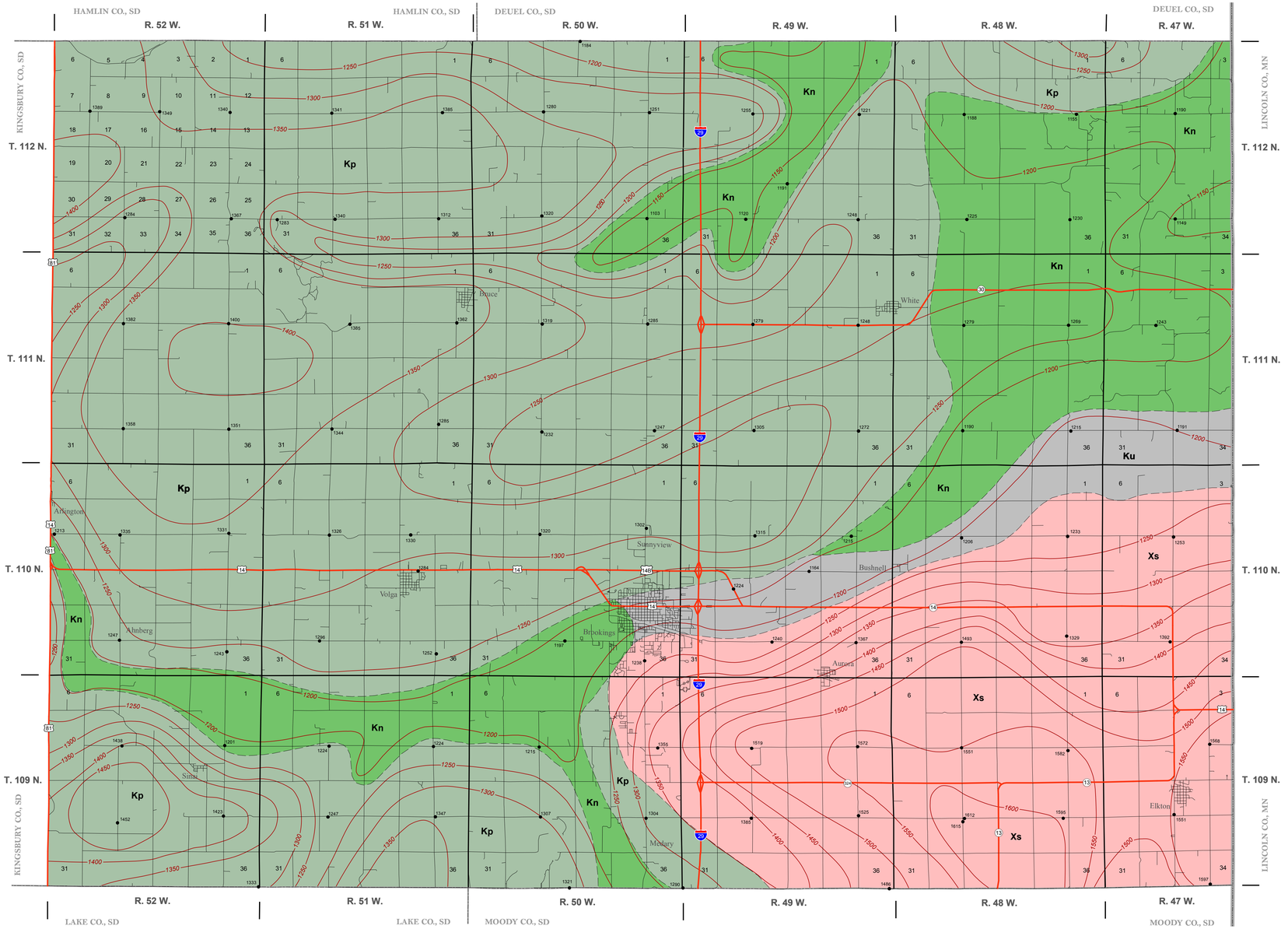


Plate 1. Bedrock map of Brookings County, South Dakota.

Department of Environment and Natural Resources
Division of Financial and Technical Assistance
Geological Survey

Bulletin 40 – 2009

Layne D. Schulz
Martin J. Jarrett

CRETACEOUS

- Kp — PIERRE SHALE
- Kn — NIOBRARA FORMATION
- Ku — UNDIFFERENTIATED ROCKS

PRECAMBRIAN

- Xs — SIOUX QUARTZITE

1253 — Data point. Number is elevation of bedrock surface in feet above mean sea level

Major highway

Road

Township boundary

Approximate geologic contact

1350 — Contour on bedrock surface. Number is elevation in feet above mean sea level. Contour interval = 50 feet

For township section numbering system, see T. 112 N., R. 52 W.

Scale: 1:100,000

0 1 2 3 4 5 6 Miles

0 1 2 3 4 5 6 Kilometers

Index map showing the location of Brookings County

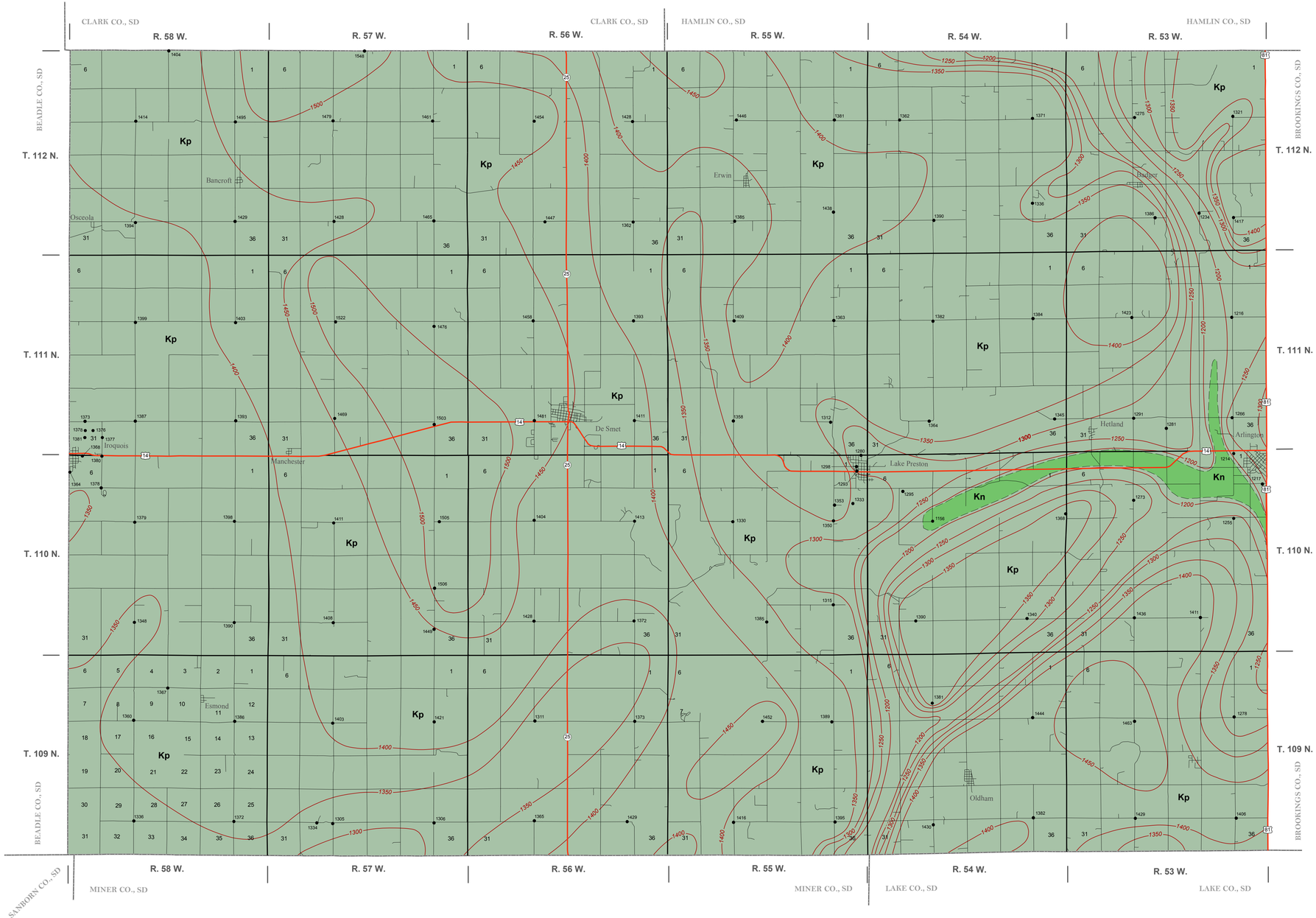


Plate 2. Bedrock map of Kingsbury County, South Dakota.

Department of Environment and Natural Resources
Division of Financial and Technical Assistance
Geological Survey

Bulletin 40 – 2009
Layne D. Schulz
Martin J. Jarrett

CRETACEOUS

- Kp — PIERRE SHALE
- Kn — NIOBRARA FORMATION

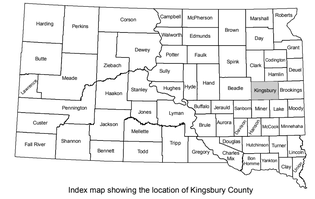
- Data point. Number is elevation of bedrock surface in feet above mean sea level
- Major highway
- Road
- Township boundary
- Approximate geologic contact
- 1350 — Contour on bedrock surface. Number is elevation in feet above mean sea level. Contour interval = 50 feet

For township section numbering system, see T. 109 N., R. 58 W.

Scale: 1:100,000

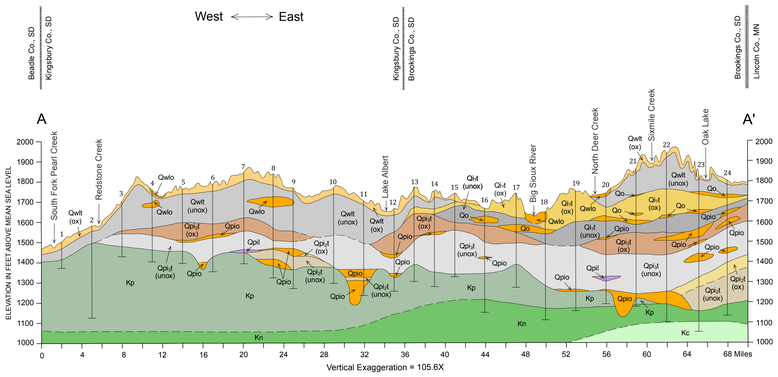
0 1 2 3 4 5 6 Miles

0 1 2 3 4 5 6 Kilometers

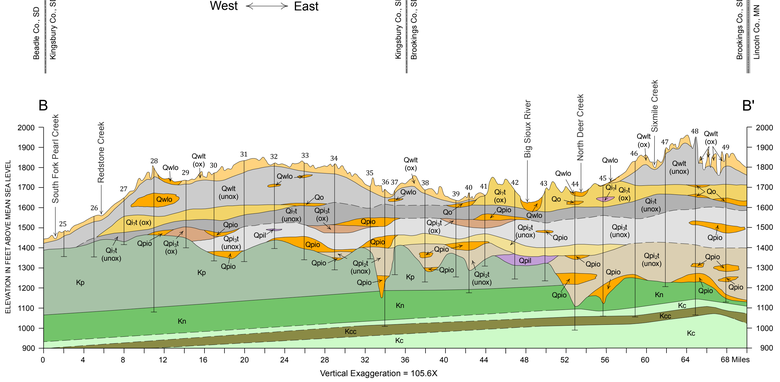


Index map showing the location of Kingsbury County

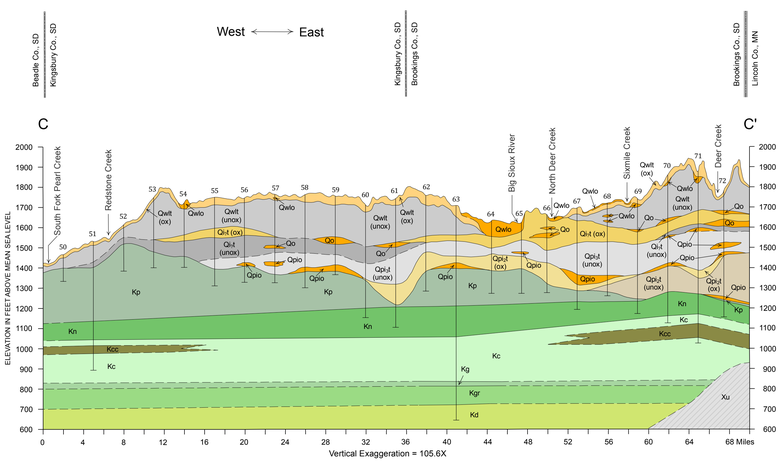
Geologic cross section A - A'



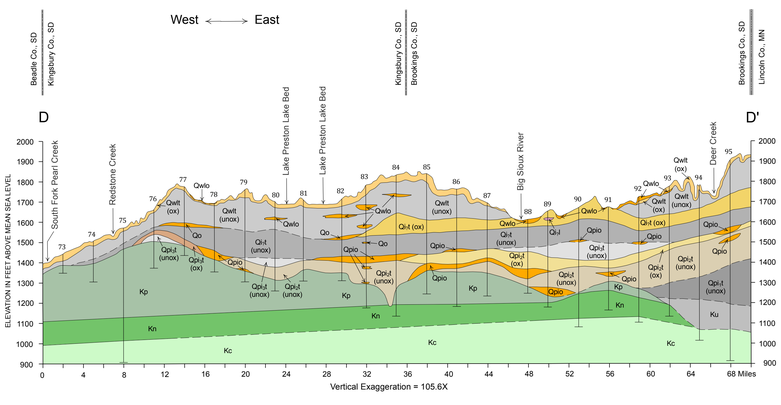
Geologic cross section B - B'



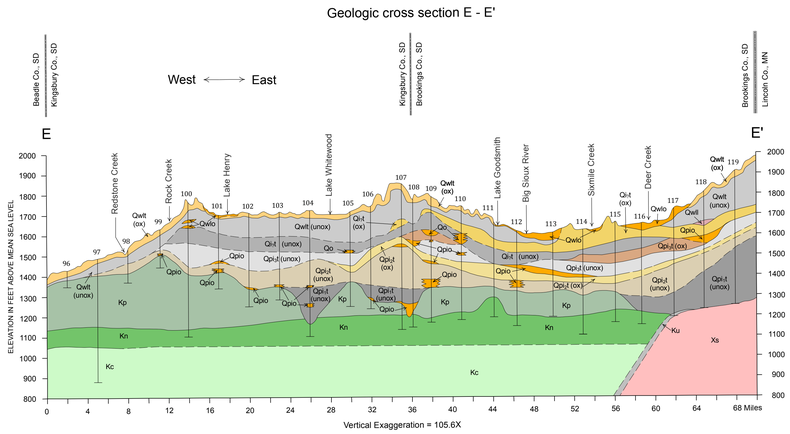
Geologic cross section C - C'



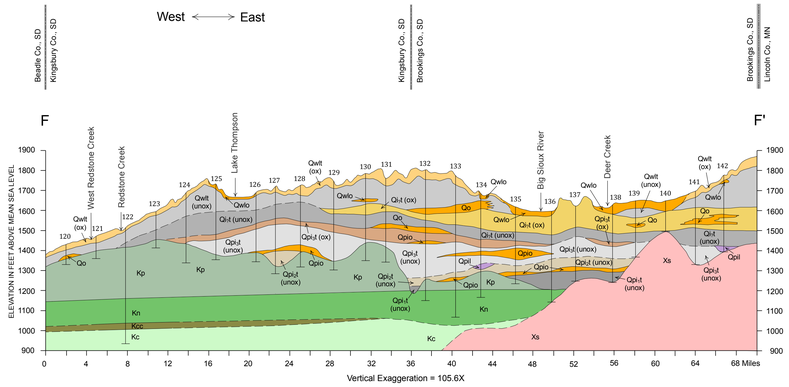
Geologic cross section D - D'



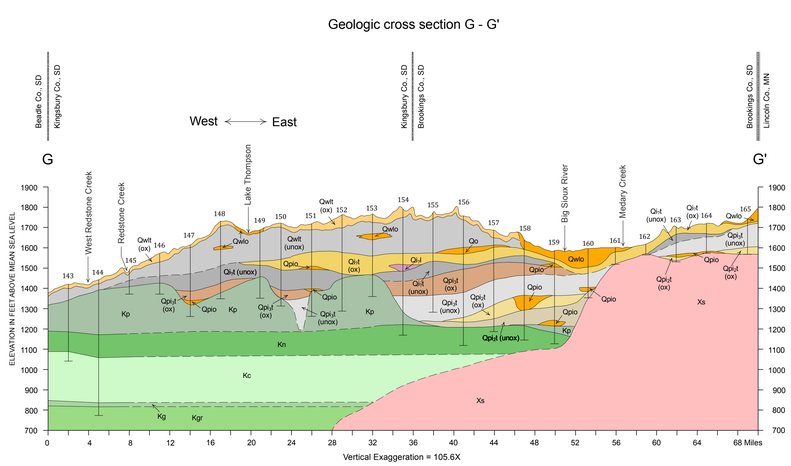
Geologic cross section E - E'



Geologic cross section F - F'



Geologic cross section G - G'



Geologic cross section H - H'

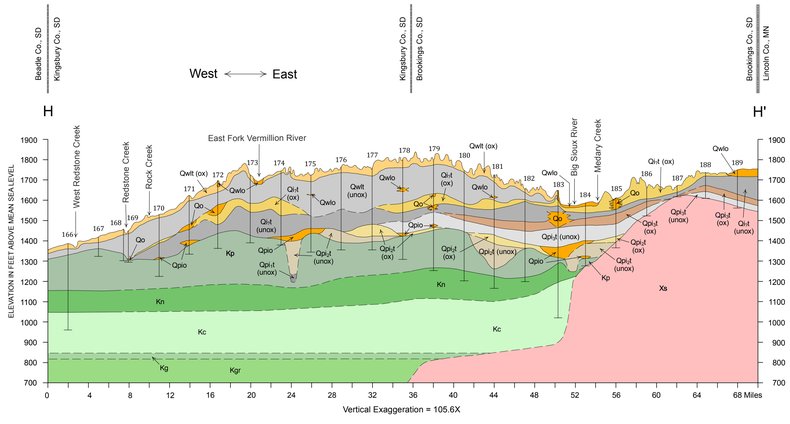


Plate 3. Index map and geologic cross sections in Brookings and Kingsbury Counties, South Dakota.

Department of Environment and Natural Resources
Division of Financial and Technical Assistance
Geological Survey

Bulletin 40 – 2009
Layne D. Schulz
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Quaternary

- Qwlo — late Wisconsin outwash
- Qwll — late Wisconsin lacustrine
- Qwlt (ox) — late Wisconsin till (oxidized)
- Qwlt (unox) — late Wisconsin till (unoxidized)
- Qo — outwash undifferentiated
- Qi_1l — Illinoian$_1$ lacustrine
- Qi_1t (ox) — Illinoian$_1$ till (oxidized)
- Qi_1t (unox) — Illinoian$_1$ till (unoxidized)
- Qpil — pre-Illinoian lacustrine
- Qpio — pre-Illinoian outwash
- Qpi_3t (ox) — pre-Illinoian$_3$ till (oxidized)
- Qpi_3t (unox) — pre-Illinoian$_3$ till (unoxidized)
- Qpi_2t (ox) — pre-Illinoian$_2$ till (oxidized)
- Qpi_2t (unox) — pre-Illinoian$_2$ till (unoxidized)
- Qpi_1t (unox) — pre-Illinoian$_1$ till (unoxidized)

Cretaceous

- Ku — Cretaceous undifferentiated
- Kp — Pierre Shale
- Kn — Niobrara Formation
- Kc — Carlile Shale
- Kcc — Codell Sandstone member, Carlile Shale
- Kg — Greenhorn Limestone
- Kgr — Graneros Shale
- Kd — Dakota Sandstone

Precambrian

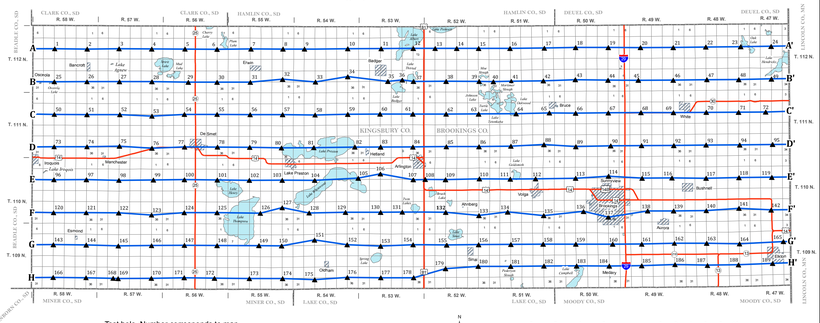
- Xs — Sioux Quartzite
- Xu — Precambrian undifferentiated

Geologic contact

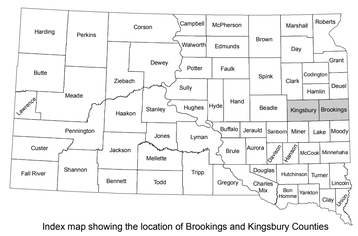
Geologic contact, uncertain

142 — Test hole. Number is map location number. See the index map for cross section location. See appendix A for legal location.

Index map of Brookings and Kingsbury Counties showing locations of stratigraphic crosss sections and test holes



Original drafting completed by Lori L. Roinstad



Index map showing the location of Brookings and Kingsbury Counties

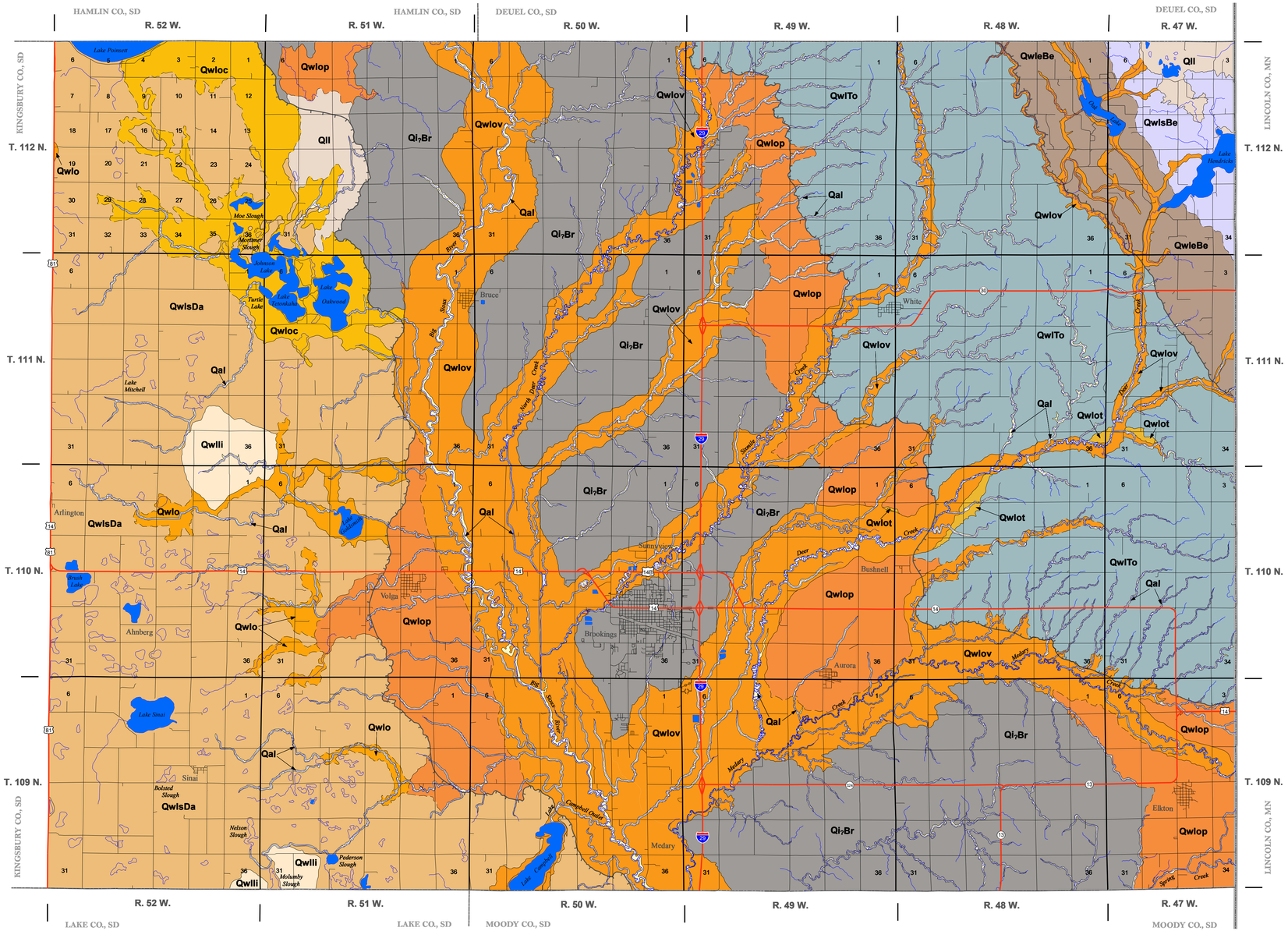


Plate 4. Geology and landforms of Brookings County, South Dakota.

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Martin J. Jarrett

QUATERNARY

PLEISTOCENE

LATE WISCONSIN

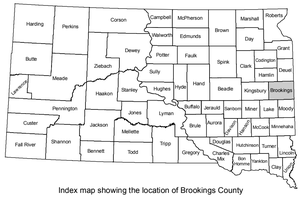
HOLOCENE

ILLINOIAN(?)

Qal	**Alluvium** - Stream deposits of silt and clay with minor amounts of sand and gravel
Qll	**Lake Sediments** - Clay, silt, and minor amounts of fine sand; relatively flat surfaces
Qwlli	**Ice-Walled Lake Plain** - Clay and silt, minor amounts of sand; elevated features, with relatively flat surfaces
Qwlo	**Outwash Undifferentiated** - Sand and gravel of glaciofluvial origin; occurs intermittently as minor, ice marginal stream deposits
Qwlov	**Valley Train Outwash** - Sand and gravel of glaciofluvial origin with minor alluvial overburden confined within a valley, little to no relief
Qwlot	**Terrace Outwash** - Sand and gravel of glaciofluvial origin; flat to slightly sloping surface above the floodplain
Qwlop	**Outwash Plain** - Sand, gravel, and silt of glaciofluvial origin; broad, low relief areas, slight gradient away from ice front or end moraine position
Qwloc	**Collapsed Outwash** - Stagnation material composed of sand and gravel of glaciofluvial origin with minor amounts of till; generally undulating to hummocky topography
QwlsDa	**Dakota Stagnation Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; low to medium relief, hummocky, no lineation. Contains many lakes, sloughs, and closed depressions
QwleBe	**Bemis End Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; linear ridge-like landform is highly dissected, has very high relief, and a rugged, hummocky surface
QwlsBe	**Bemis Stagnation Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; low to medium relief, many closed depressions and sloughs
QwlTo	**Toronto Till Plain** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; medium relief, dissected by many streams. Pronounced downward gradient to the west
Qi7Br	**Brookings Till Plain** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; appears as a series of low, gently undulating, linear ridges

- Major highway
- Road
- Township boundary
- Geologic contact, uncertain
- Geologic contact
- Approximate ice margin
- River or stream
- Lake
- Slough or intermittent lake

For township section numbering system, see T. 112 N., R. 52 W.



Index map showing the location of Brookings County

Scale: 1:100,000

0 1 2 3 4 5 6 Miles

0 1 2 3 4 5 6 Kilometers

N W E S

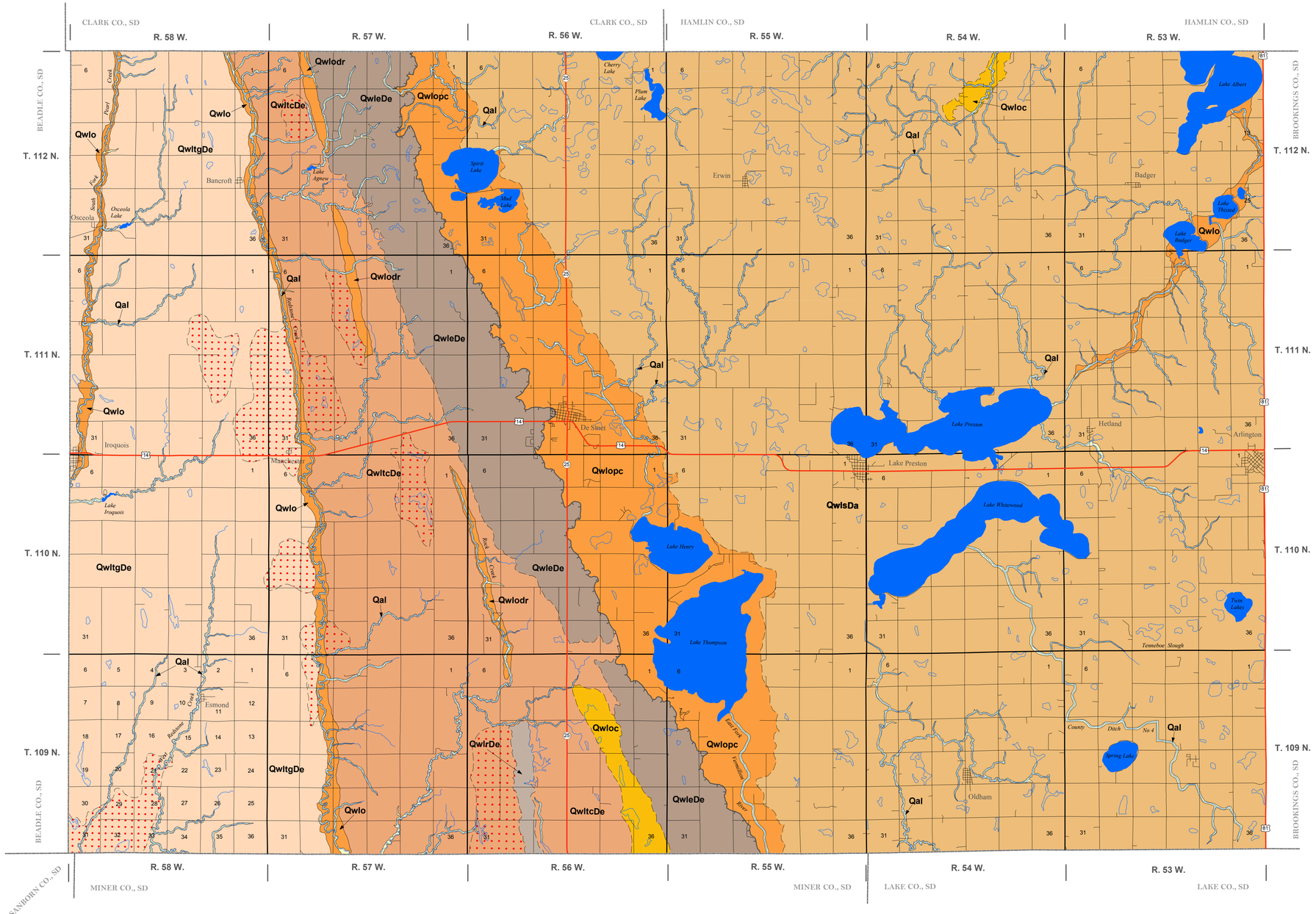


Plate 5. Geology and landforms of Kingsbury County, South Dakota.

Department of Environment and Natural Resources
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Geological Survey

Bulletin 40 – 2009
Layne D. Schulz
Martin J. Jarrett

QUATERNARY

HOLOCENE

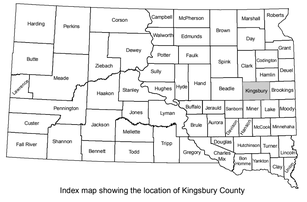
PLEISTOCENE

LATE WISCONSIN

- **Qal** — **Alluvium** - Stream deposits of silt and clay with minor amounts of sand and gravel
- **Qwlo** — **Outwash Undifferentiated** - Sand and gravel of glaciofluvial origin; occurs intermittently as minor, ice marginal stream deposits
- **Qwlopc** — **Outwash Plain Collapsed** - Sand, gravel, and silt of glaciofluvial origin; broad undulating surface, may contain some deposits of till
- **Qwlodr** — **Disintegration Ridge** - Stagnation material composed of sand and gravel with a mixture of boulders, pebbles, silt, and clay; forms linear ridges
- **Qwloc** — **Collapsed Outwash** - Stagnation material composed of sand and gravel of glaciofluvial origin with minor amounts of till; generally undulating to hummocky topography
- **QwleDe** — **De Smet End Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; high relief, linear ridge-like landform; surface often strewn with boulders
- **QwltcDe** — **De Smet Coteau Slope Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; sloped surface topography; some lineation. Stippled pattern denotes areas of stagnation material composed mainly of till
- **QwlrDe** — **De Smet Recessional Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; medium relief, elevated topography
- **QwltgDe** — **De Smet Ground Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; medium relief, some lineation, some closed depressions. Stippled pattern denotes areas of stagnation material composed mainly of till
- **QwlsDa** — **Dakota Stagnation Moraine** - Heterogeneous mixture of boulders, gravel, sand, silt, and clay; low to medium relief, hummocky, no lineation; contains many lakes, sloughs, and closed depressions

- Major highway
- Road
- Township boundary
- Geologic contact, uncertain
- Geologic contact
- Approximate ice margin
- River or stream
- Lake
- Slough or intermittent lake

For township section numbering system, see T. 109 N., R. 58 W.



Index map showing the location of Kingsbury County

Scale: 1:100,000

0 1 2 3 4 5 6 Miles

0 1 2 3 4 5 6 Kilometers

N
W E
S