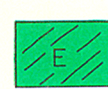


GLACIAL LANDFORMS

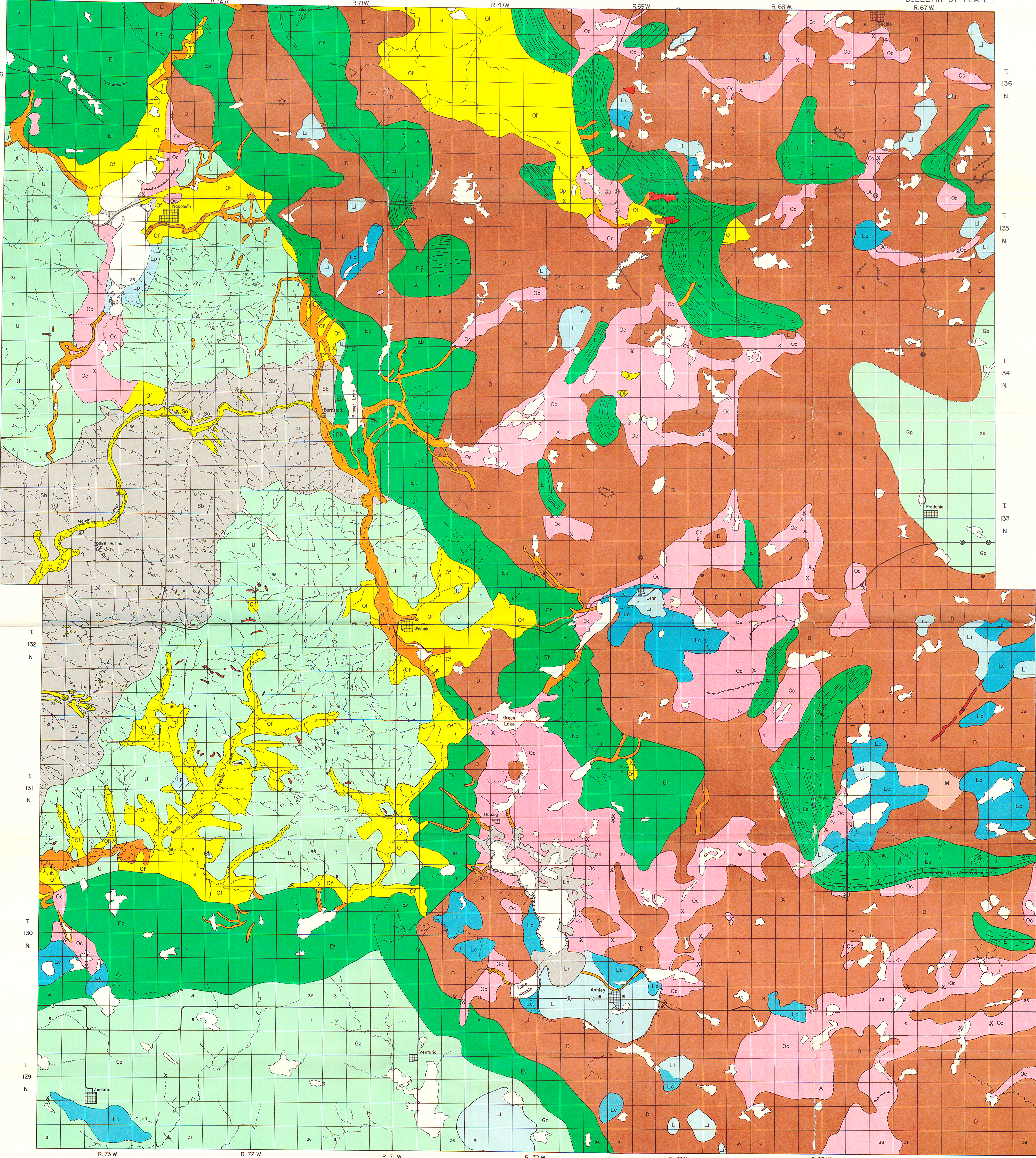
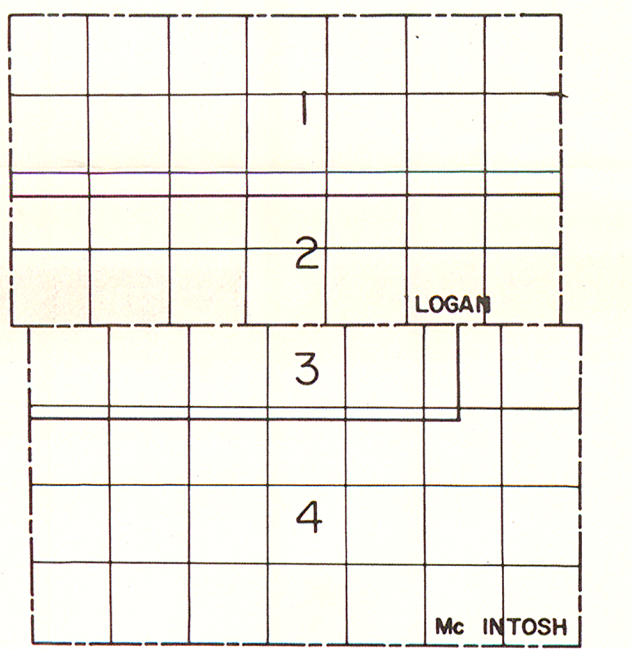
-  **END MORAINE.** Composed largely of stoney, sandy, silty, clayey till. Lines represent crests of individual end moraine ridges.
- Ei: LONG LAKE end moraine.** Southern part: a band of hills with gentle slopes and medium relief. Northern part: finer grained topography with higher local relief and steeper slopes.
- Ez: ZEELAND end moraine.** A band of hills with moderate to high local relief and numerous sloughs.
- Ev:** A ridge with detailed topography similar to that on either side of it.
- Eb: BURNSTAD end moraine.** A band of knobby hills with medium local relief and steep slopes; very fine-grained topography; boulders abundant.
- Ef: FRESH LAKE end moraine.** Similar to Burnstad end moraine; a ridged loop near south end.
- Es: STREETER end moraine.** A ridge, averaging 200 feet high, with smaller superimposed ridges, 10 to 50 feet high; in some places composed largely of gravel.
- Ec: COLLAPSED END MORAINE.** Similar to dead-ice moraine, but retains some of the original end moraine ridging.
- G:** **GROUND MORAINE.** Composed of stoney, sandy, silty, clayey till.
- Gz:** **South of Zealand end moraine.** Undulating ground moraine topography is superimposed on a pre-Wisconsin stream-eroded topography; regional relief more than 200 feet. May include some low-relief dead-ice moraine.
- Gp:** In southeastern Logan County. Flat, pitted with numerous kettles.
- U:** **GLACIALLY MODIFIED, STREAM-ERODED TOPOGRAPHY and GROUND MORAINE undifferentiated.** Composed of bedrock, nonglacial alluvium, and some thin till in lower areas and by thicker till in higher areas; medium to low local relief; nearly completely integrated drainage.
- D:** **DEAD-ICE MORAINE.** Composed of stoney, sandy, silty, clayey till and smaller amounts of lake silt and clay and outwash sand and gravel; high local relief (as much as 100 feet); numerous lakes and sloughs; drainage nonintegrated.
- Oc:** **COLLAPSED-OUTWASH TOPOGRAPHY.** Composed of sand and gravel and minor amounts of silt and lake sediment; medium to high local relief; numerous lakes and sloughs.
- Lc:** **COLLAPSED-LAKE-SEDIMENT TOPOGRAPHY.** Composed of lake silt and clay and minor amounts of outwash and till; medium local relief; numerous lakes and sloughs; may include some noncollapsed ice-walled lake plain of medium relief.
- M:** **COLLAPSED-SUBAQUEOUS-MUDFLOW TOPOGRAPHY (?)**. Composed of clay to stoney, sandy, silty clay; high to medium local relief; numerous lakes and sloughs.
- O:** **ICE-WALLED OUTWASH PLAIN.** Composed of sand and gravel; flat; surrounded by outward-facing ice-contact face.
- Li:** **ICE-WALLED LAKE PLAIN.** Composed of silt and clay, and some outwash sand and gravel near margins; flat; surrounded by outward-facing ice-contact face.
- K:** **KAMES.** Prominent hills composed of outwash sand and gravel.
- Kt:** **KAME TERRACES.** Terraces composed of outwash sand and gravel.
- Esk:** **ESKERS and CREVASSE FILLINGS.** Ridges composed of outwash sand and gravel; most omitted from Missouri Corridor.
- P:** **PARTLY BURIED CHANNELS.** Kettle chain or sag underlain by till and outwash.
- Ice:** **ICE-CONTACT FACES.** A steep slope; only the most prominent shown; arrow-headed; pointed downwards; includes some partly buried ice-contact faces; some are modified by postglacial lake wave action.

PROGLACIAL LANDFORMS

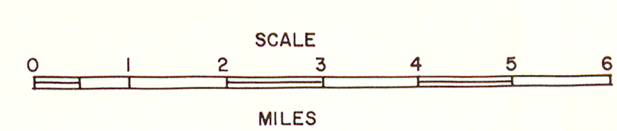
- Of:** **OUTWASH PLAIN and VALLEY TRAIN.** Composed of sand and gravel and minor amounts of silt; includes some lake plain and is covered with thin nonglacial alluvium in some places; flat, except next to end moraines where relief is higher.
- Op:** **PITTED OUTWASH PLAIN.** Same as outwash plain but pitted with kettles.
- Lp:** **LAKE PLAIN.** Composed of clay; flat.
- M:** **MELT-WATER CHANNEL.** Underlain by outwash sand and gravel, till, lake clay or silt, nonglacial alluvium, or bedrock.
- T:** **MELT-WATER CHANNEL TERRACES.** Composed of outwash sand and gravel.

NONGLACIAL LANDFORMS

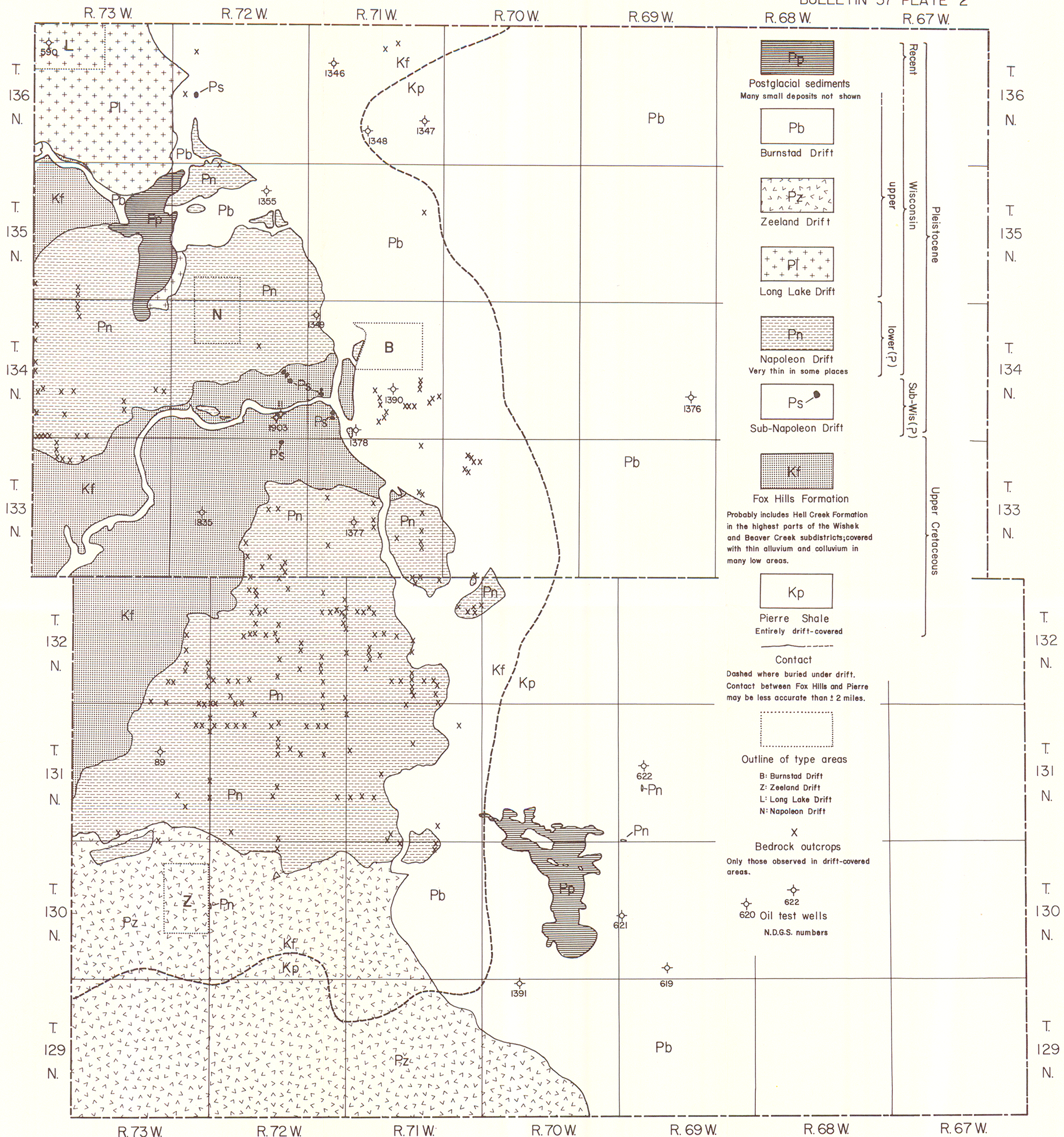
- Sb:** **STREAM-ERODED BEDROCK TOPOGRAPHY.** Composed of bedrock and some nonglacial alluvium and colluvium in low areas; high to medium relief; completely integrated drainage.
- B:** **BUTTES.** Capped with sandstone.
- So:** **STREAM-ERODED OUTWASH TOPOGRAPHY.** Flat-topped hills composed of outwash sand and gravel.
- Sg:** **SAND AND GRAVEL HILLS.** Eroded kames and crevasse fillings or other eroded outwash remnants; hills round topped.
- Ln:** **LAKE PLAIN.** Composed of clay and silt; flat; surrounded by a strandline 35 feet above present lake level.
- P:** **PRESENT-DAY-LAKE SPITS AND BARS.** Composed of sand.
- PL:** **PERMANENT LAKES, INTERMITTENT LAKES, and LARGE SLOUGHS.**
- IS:** **INTERMITTENT STREAMS.**
- PS:** **PERMANENT STREAMS.**
- SH:** **STATE HIGHWAYS.**
- GS:** **GRAVEL AND SAND PITS.**
- C:** **CONTACTS.**
Accuracy generally greater than=0.1 mile.
Accuracy may be less than=0.1 mile.
Accuracy may be less than=0.3 mile.
Location of end moraine profiles shown in figure 7.



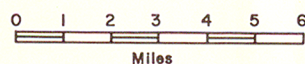
LANDFORMS
LOGAN AND MCINTOSH COUNTIES
NORTH DAKOTA



GEOLOGY BY:
1. Lee Clayton, 1960
2. John W. Bonneville, 1960
3. Gary G. Thompson, 1961
4. Lee Clayton, 1961



STRATIGRAPHIC UNITS OF LOGAN AND McINTOSH COUNTIES





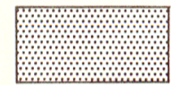
End Moraine
 Z: Zeeland
 L: Long Lake
 V: Ventura
 B: Burnstad
 F: Fresh Lake
 S: Streeter
 K: Kensal



Ground Moraine and Stream-eroded Topography



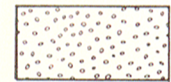
Dead-ice Moraine



Outwash Plains and Valley Trains



Lake Sediment Topography



Collapsed Outwash Topography



Missouri Escarpment

In part modified from Hard (1928), Flint (1955), Colton and Lemke (1957), Rau and others (in press), and unpublished N.D.G.S. maps by Kume, Hansen, Huxel, and Winters.

GENERALIZED LANDFORM MAP SOUTH-CENTRAL NORTH DAKOTA

