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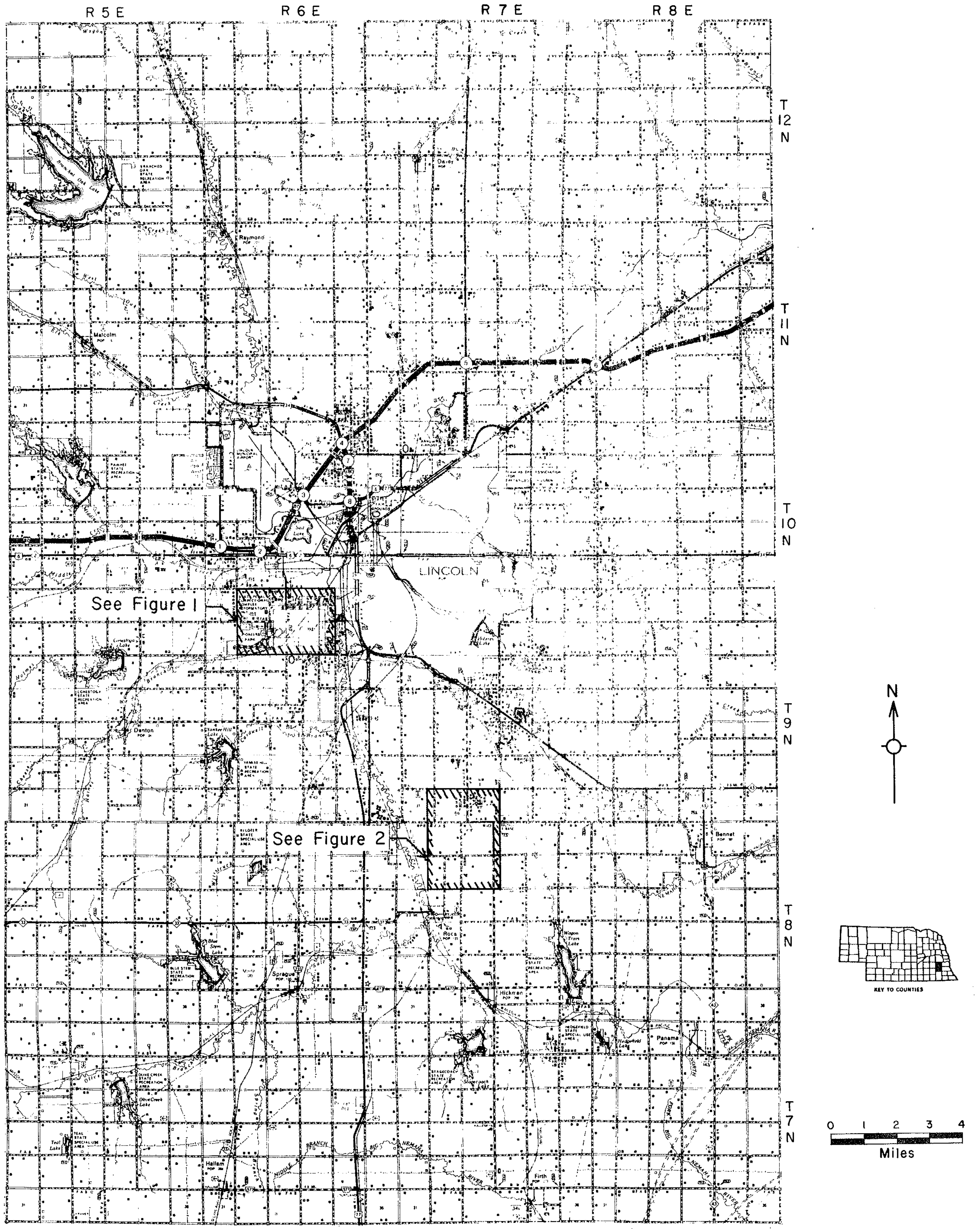
# Geology Tour of Lancaster County, Nebraska

# GEOLOGY TOUR OF LANCASTER COUNTY, NEBRASKA




Conservation and Survey Division
Institute of Agriculture and Natural Resources
University of Nebraska—Lincoln

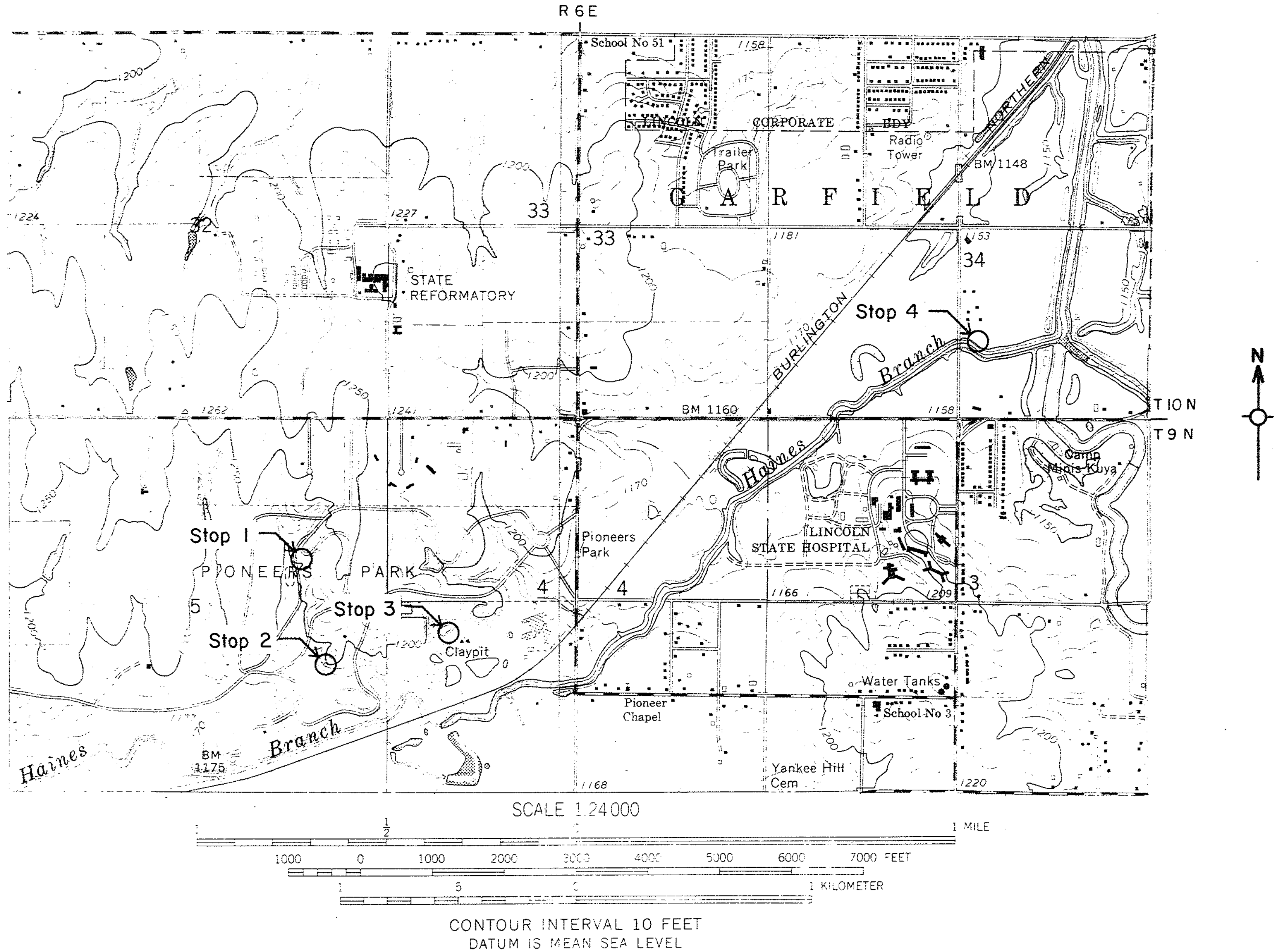
# GEOLOGIC TIME COLUMN

| AGE (MILLIONS OF YEARS AGO) | GEOLOGIC TIME UNITS | | ROCK TYPES | |
|---|---|---|---|---|
| | CENOZOIC (RECENT LIFE) | PLEISTOCENE | Glacial till, silt, clay, sand, gravel, volcanic ash. | STOPS 1,3,4,5,6 |
| 2 | | TERTIARY | Sandstone, siltstone, clay, gravel, marl, volcanic ash. | |
| 70 | MESOZOIC (MIDDLE LIFE) | CRETACEOUS | Chalk, chalky shale, dark shale, varicolored clay, sandstone, conglomerate | STOPS 2,3 |
| 135 | | JURASSIC | Subsurface only. Sandstones and shales | |
| 180 | | TRIASSIC | | |
| 225 | PALEOZOIC (ANCIENT LIFE) | PERMIAN | Shale, limestone, dolomite, gypsum, anhydrite, sandstone, siltstone, chert. | STOP 6 |
| 280 | | PENNSYLVANIAN | Limestone, shale, sandstone, coal. | |
| 310 | | MISSISSIPPIAN | Subsurface only. Limestone, dolomite. | |
| 350 | | DEVONIAN | Subsurface only. Dolomite, gray shale. | |
| 400 | | SILURIAN | Subsurface only. Dolomite. | |
| 440 | | ORDOVICIAN | Subsurface only. Dolomite, sandstone, shale. | |
| 500 | | CAMBRIAN | Subsurface only. Dolomite, sandstone. | |
| 600 | CRYPTOZOIC (HIDDEN LIFE) | PRECAMBRIAN | Subsurface only. Granite, other igneous rocks, and metamorphic rocks. | |
| ? 5,000 | | | | |

# GEOLOGY TOUR OF LANCASTER COUNTY, NEBRASKA

The purpose of this tour is to acquaint you with some of the interesting geological exposures near Lincoln, Nebraska. Stops have been planned so that you can see rock outcrops ranging from very old to recent. As you go along, you will want to note the relation between environmental geology and land use. This is a timely theme that recurs throughout the tour.

Stop No. 1: PIONEERS PARK, NW¼ SE¼ NE¼ sec. 5, T. 9 N., R. 6 E. (figure 1). The road at this stop has been cut and built on till, which is a mixture of clay, silt, sand, gravel, and boulders deposited by glaciers during the Pleistocene Epoch. Erosion has removed some of the finer sediments and left the larger sized materials on the road, giving the road an appearance of having been graveled. Note that there are particles of all sizes from silt to small boulders, a characteristic of this type of glacial deposit. Many of these particles were gouged by glacial ice from the surface of the Canadian Shield, transported within the ice to this location, and deposited by the ice when it melted. Examination of these particles will show that many are fragments of igneous and metamorphic rocks. An occasional agate or piece of petrified wood may also be found in such deposits.



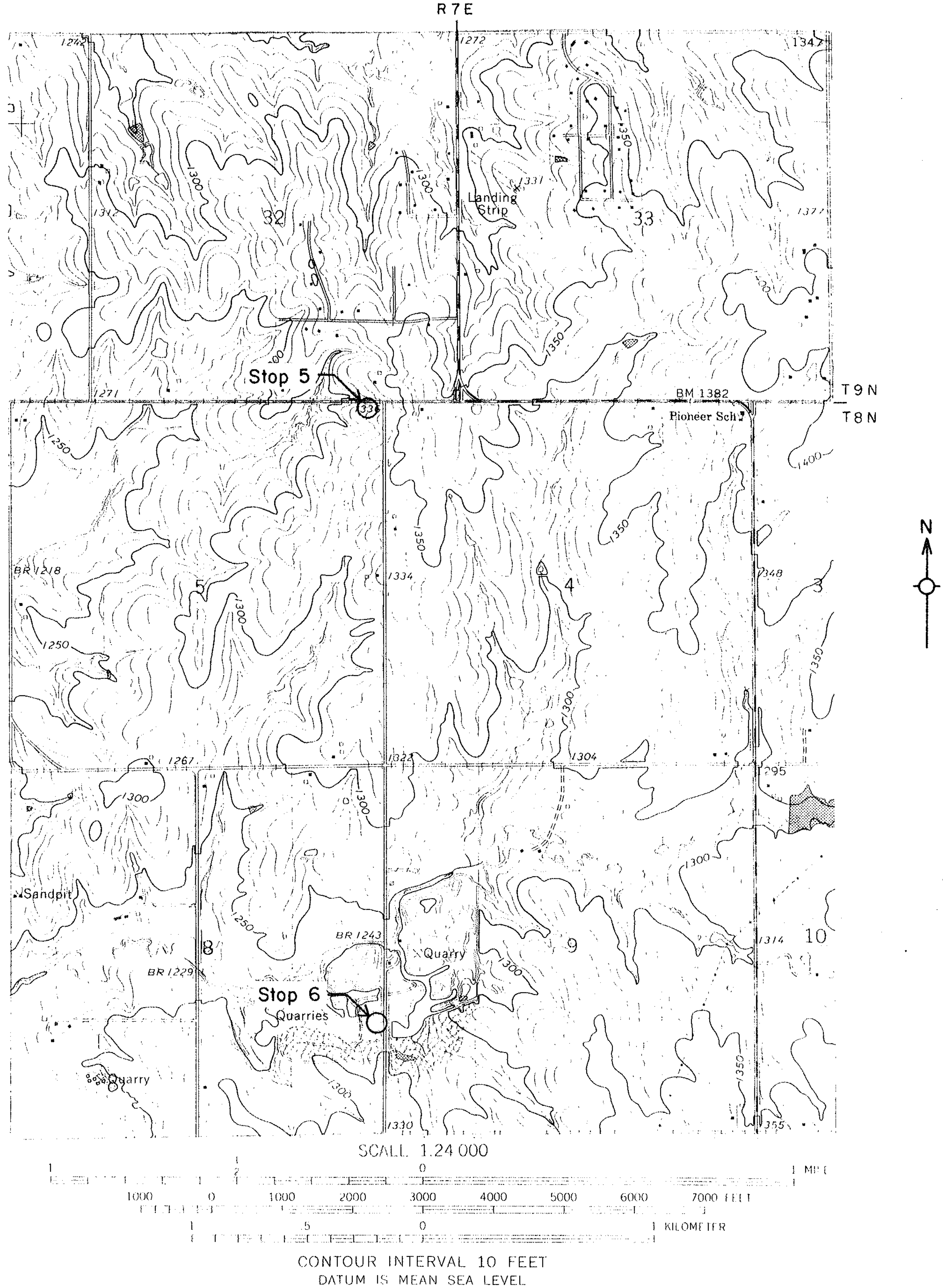

**A Portion of the Emerald and Lincoln Quadrangles Showing Locations of Stops 1 through 4**

**Figure 1**

Stop No. 2: INDIAN STATUE ("SMOKE SIGNAL") IN PIONEERS PARK, NW¼ SW¼ NE¼ SE¼ sec. 5, T. 9 N., R. 6 E. (figure 1). Sandstone and siltstone of the Dakota Group are exposed at this location. The Dakota Group was deposited as beach sand by an advancing sea during Cretaceous time. The yellowish-red stain is due to an iron oxide coating on the individual sand grains. Notice the difference in erosion that has taken place on the harder, more resistant yellowish sandstones and the softer, less resistant, gray siltstones. The ridges formed by the harder sandstones are called "hogbacks." The apparent dip or tilt of the beds may be structural or may be due to slumping. Till caps the sandstone in some places.

Stop No. 3: YANKEE HILL BRICK YARDS, NW¼ SW¼ sec. 4, T. 9 N., R. 6 E. (figure 1). Clayey shale of the Dakota Group is exposed at this location. The Yankee Hill Brick Company utilizes a mixture of this shale and loess (wind-deposited silt and very fine sand) to manufacture brick and tile products. Two deposits of loess, both of Pleistocene age, are present at this location. The younger is called Peorian Loess and occurs as a layer capping the hilltops. It generally is a yellowish-tan silt that has a tendency to break along columnal fractures and thus to form nearly vertical walls. The older loess, a reddish-brown silt, is called Loveland Formation.

Stop No. 4: FOLSOM STREET BRIDGE OVER HAINES BRANCH CREEK, NW¼ SW¼ SE¼ sec. 34, T. 10 N., R. 6 E. (figure 1). Haines Branch, a major tributary of Salt Creek, was straightened along its lower




A Portion of the Roca Quadrangle
Showing Locations of Stops 5 and 6

**Figure 2**

reach some years ago. However, because its new channel has not been maintained, the stream has begun to revert to its former meandering course. Visible from the bridge is the old floodplain of Salt Creek and Haines Branch. Sediments underlying this floodplain consist of a lower sand overlain by layers of successively finer grained silt. At the east end of the undercut bank that can be seen from the bridge is a cut-and-fill sequence that probably represents an old channel position of Salt Creek. Since the sediment in this channel is very young, post-settlement artifacts (bricks, pottery, etc.) show up occasionally.

The lower sand erodes readily when the stream is carrying large volumes of water, such as storm runoff. When the overlying silt is undermined and left unsupported, it falls into the stream and causes the bank to recede. Blocks of silt that have recently fallen are often visible along the banks at this location. It is by this process that meanders migrate across a floodplain. (Description by Professor William J. Wayne, Department of Geology, University of Nebraska-Lincoln.)

Stop No. 5: ROADSIDE DITCH CUT, NE¼ NE¼ NE¼ sec. 5, T. 8 N., R. 7 E. (figure 2). Till of Pleistocene age is exposed in the road ditch. Notice the similarity of the sediments with those seen at Stop No. 1.

Two tills are exposed at this site. They are similar in texture and composition but are separated by an ancient soil profile (paleosol) that can be seen as a darker band running lengthwise along the exposure. This buried soil profile developed on the lower till during an ice-free period and subsequently was buried when the upper till was deposited. The topography at this site consists of rounded hills and an elaborate drainage system of draws, creeks, and streams; it is characteristic of glaciated areas.

Stop No. 6: SCHWARCK QUARRIES, SE¼ NE¼ SE¼ sec. 8, T. 8 N., R. 7 E. (figure 2). This site is an excellent example of Pleistocene deposits overlying eroded and weathered limestones and shales of Early Permian age. (See the geologic time column on the inside front cover.) The horizontally layered marine Permian limestones and shales can easily be distinguished from the Pleistocene deposits. Notice that slumping has occurred in parts of the quarry.

Of particular interest are the basal Pleistocene deposits immediately overlying the Permian rocks. These are lake deposits characterized by varves, which are very thin alternating laminae of fine sand and silt. Such deposits are believed to show seasonal changes, the sand being a summer deposit and the silt settling in the winter when the lake is frozen over.

The limestone is quarried for use as roadstone, agricultural lime, wallstone, and riprap. On the following page is a generalized stratigraphic section of the exposure at Stop No. 6.

PLEISTOCENE DEPOSITS AT TOP OF EXPOSURE

PERMIAN SYSTEM, BIG BLUE SERIES, COUNCIL GROVE GROUP:

GRENOLA FORMATION:

NEVA LIMESTONE MEMBER

Limestone, approximately four feet thick, light gray, very fine grained, containing such fossils as crinoids, brachiopods, foraminifera, and ectoprocts.

SALEM POINT SHALE MEMBER

Shale, approximately four to five feet thick, bluish-gray.

BURR LIMESTONE MEMBER

Limestone, approximately eight to nine feet thick, light blue-gray, massive, fine grained with pyrite and calcite minerals and some ostracod fossils.