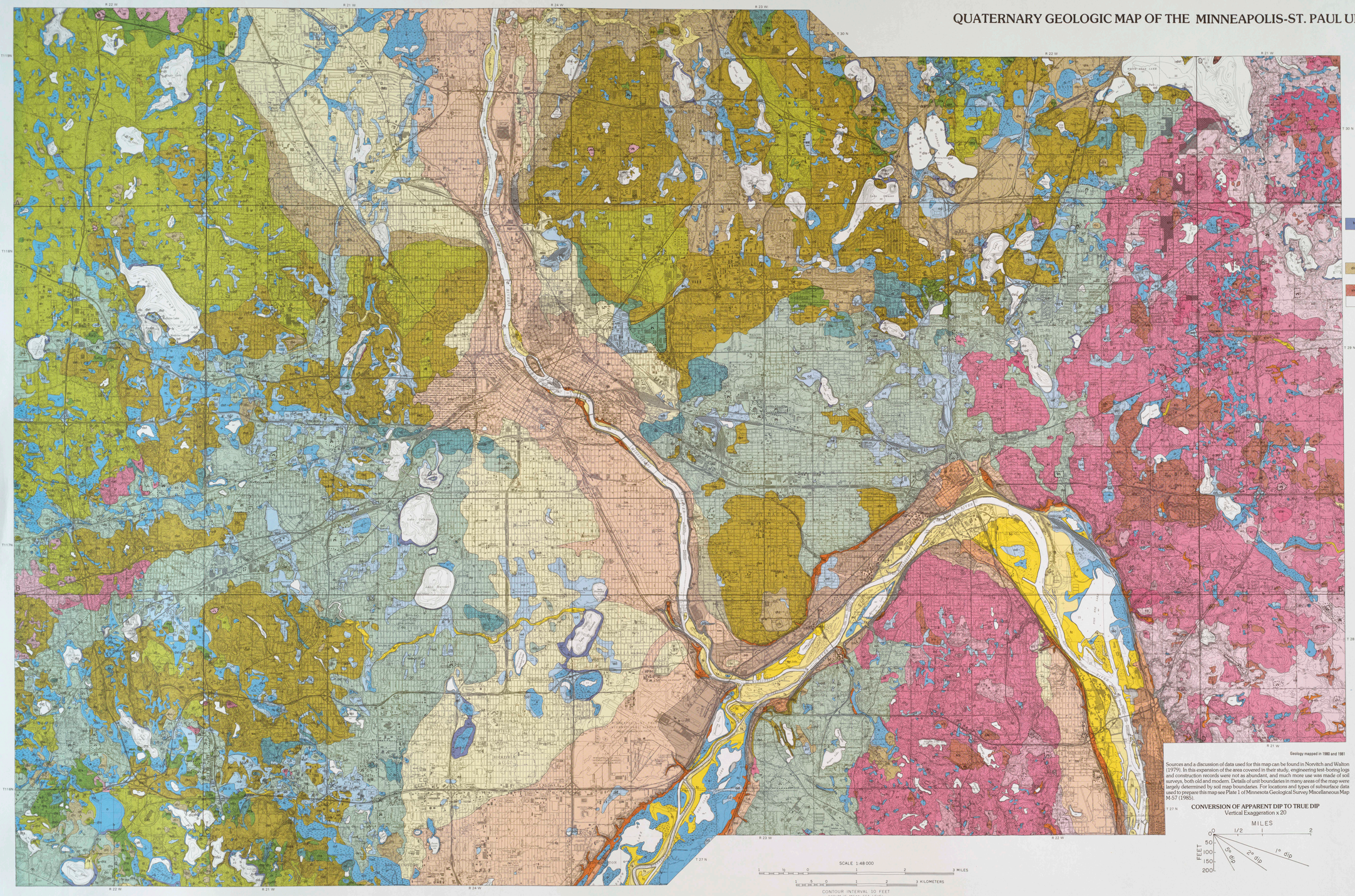
UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
Matt Walton, Director

MISCELLANEOUS MAP SERIES
M-54

QUATERNARY GEOLOGIC MAP OF THE MINNEAPOLIS-ST. PAUL URBAN AREA, MINNESOTA

By
Gary N. Meyer

1985



Base modified from U.S. Geological Survey, 1:24,000, 1967; photorevision as of 1972. See index for quadrangle names.

Geology mapped in 1980 and 1981

Sources and a discussion of data used for this map can be found in Norvitch and Walton (1979). In this expansion of the area covered in their study, engineering test-boring logs and construction records were not as abundant, and much more use was made of soil surveys, both old and modern. Details of unit boundaries in many areas of the map were largely determined by soil map boundaries. For locations and types of subsurface data used to prepare this map see Plate 1 of Minnesota Geological Survey Miscellaneous Map M-57 (1985).

SCALE 1:48 000

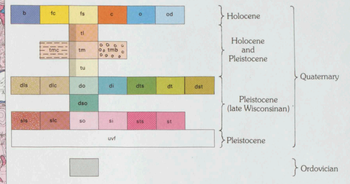
3 MILES
3 KILOMETERS

CONTOUR INTERVAL 10 FEET
DATUM IS MEAN SEA LEVEL

CONVERSION OF APPARENT DIP TO TRUE DIP

Vertical Exaggeration x 20

CORRELATION OF MAP UNITS



POSTGLACIAL DEPOSITS

- od, ORGANIC DEPOSITS, DRAINED AND FILLED—Artificial fill over organic deposits. Organic deposits largely removed prior to filling. Includes small bodies of open water, and a large area of inorganic silt and clay north of downtown St. Paul along I-35E
- o, ORGANIC DEPOSITS—Peat, organic silt and clay; includes small bodies of open water
- c, COLLUVIUM AND SMALL ALLUVIAL FANS—Variable in texture from silty sand to loam; overlain by or consists of thick fill in developed areas
- fc, FLOODPLAIN ALLUVIUM (CLAYEY)—Principally clay and silt, commonly mixed with variable amounts of very fine sand; overlain by thick fill in developed areas
- fs, FLOODPLAIN ALLUVIUM (SANDY)—Principally sand and gravelly sand with small interbeds of finer sediments; overlain by thick fill in developed areas
- b, BEACH DEPOSITS—Sand; local organic-rich layers. In places includes man-made beaches

TERRACE DEPOSITS

- tl, LOWER TERRACE DEPOSITS—Sand, gravelly sand, and silty sand; boulder zones, clay loam, and minor clay interbedded with sand. Includes some areas of thick artificial fill
- tm, MIDDLE TERRACE DEPOSITS—Sand, gravelly sand, and silty sand; in places overlain by thin deposits of artificial fill, organic deposits, clay loam, and clay. These overlying deposits commonly make up the bulk of terrace sediments where underlying bedrock or glacial till is close to the surface
- tmc, MIDDLE TERRACE CLAY FACIES—Clay and peat; locally exceeds 50 feet in thickness in center of area. Includes some alluvium of Bassett Creek. Overlain in places by artificial fill commonly exceeding 10 feet in thickness
- tmb, MIDDLE TERRACE BOULDER FACIES—Many boulders and large limestone blocks; boulders, gravel, and silty sand
- tu, UPPER TERRACE DEPOSITS—Sand, gravelly sand, and silty sand; in places overlain by thin deposits of clay loam or silt. Includes some sandy glacial till in area along river in western St. Paul that has been eroded to terrace level

DES MOINES LOBE DEPOSITS

- dlc, LACUSTRINE CLAY AND SILT—Clay and silt; only 2 to 8 feet thick in smaller mapped areas; overlies gray clayey till that locally is intermixed with reddish-brown sandy till
- dls, LACUSTRINE SAND AND SILT—Fine sand and silt; interbeds and lenses of silty clay. Coarse, gravelly sand occurs locally along boundaries. The unit has been reworked into eolian dunes in the Fridley-Columbia Heights area
- do, OUTWASH DEPOSITS—Sand, silty sand, and gravel; in places overlain by deposits of silt to clay loam, generally 2 to 4 feet thick
- di, ICE-CONTACT DEPOSITS—Sand, silty sand, and gravel; locally interbedded with complexly intermixed gray and reddish-brown till and with silt. Cobbles and boulders commonly present
- dt, GLACIAL TILL—Gray (brown where oxidized) clay loam and loam with minor inclusions of sandy clay loam and sandy loam. Commonly overlies complexly intermixed gray till and reddish-brown sandy till (dst), and is shown combined with unit dst on cross sections. Contains lenses of sand and silt, and small areas of thick loamy colluvium in gullies and depressions
- dts, SAND-CAPPED GLACIAL TILL—Outwash, ice-contact, or lacustrine sand and silty sand generally 2 to 4 feet thick, overlying gray till that locally is intermixed with reddish-brown sandy till
- dst, GLACIAL TILL OF MIXED COMPOSITION—Complexly intermixed gray and reddish-brown till, clay loam, loam, sandy clay loam, and sandy loam containing sand lenses. Includes small areas of thick reddish-brown sandy till, and thick loamy colluvium in gullies and depressions
- dso, PROGLACIAL OUTWASH—Sand and gravel; basal part commonly is recessional outwash of the Superior lobe. Called Hillside Sand by Stone (1966)

SUPERIOR LOBE DEPOSITS

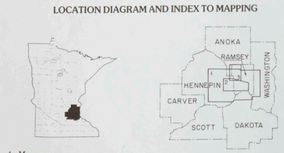
- slc, LACUSTRINE CLAY AND SILT—Clay and silt with minor interbeds of silty sand. Smaller mapped areas are mostly silt, and locally may be eolian or colluvial in origin
- sls, LACUSTRINE SAND AND SILT—Fine sand and silt, with minor interbeds and lenses of silty clay
- so, OUTWASH DEPOSITS—Sand, silty sand, and gravel; commonly overlain by a silty mantle 2 to 5 feet thick
- si, ICE-CONTACT DEPOSITS—Sand, silty sand, and gravel; locally interbedded with reddish-brown till and with silt. Cobbles and boulders commonly present
- st, GLACIAL TILL—Reddish-brown sandy loam; minor sandy clay loam. Contains sand lenses, and commonly is overlain by a silty mantle 2 to 5 feet thick
- sts, SAND-CAPPED GLACIAL TILL—Lacustrine, outwash, or ice-contact sand and silty sand, generally 2 to 4 feet thick, over reddish-brown till
- uvf, UNDIFFERENTIATED VALLEY FILL—Glacial till, outwash, and lacustrine deposits. Shown only on cross sections

BEDROCK

Exposures of Ordovician dolomite, limestone, sandstone, and shale bedrock formations and areas of discontinuously exposed bedrock thinly mantled by colluvium or artificial fill. Combined with color for units tl, tm, and tu where depth to bedrock is less than 10 feet below land surface

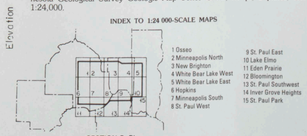
- Geological contact
- Boundary of quarry or gravel pit
- Active or intermittently active gravel pit
- Inactive gravel pit; commonly filled
- Inactive quarry; commonly filled
- Isolated patches of buried peat in developed areas. Lateral extent of peat uncertain.

LOCATION DIAGRAM AND INDEX TO MAPPING



1. Map area.
2. Mossler, J.H., and Walton, M.S., 1979, Surficial geology: Plate 2 of Norvitch, R.F., and Walton, M.S., eds., Geologic and hydrologic aspects of tunneling in the Twin Cities area, Minnesota: U.S. Geological Survey Miscellaneous Investigations Series I-1157, scale 1:24,000.
3. Stone, J.E., 1966, Surficial geology of the New Brighton quadrangle, Minnesota: Minnesota Geological Survey Geologic Map Series GM-2, 39 p., 3 plates, scale 1:24,000.

INDEX TO 1:24 000-SCALE MAPS



1 Osseo
2 Minneapolis North
3 New Brighton
4 White Bear Lake West
5 White Bear Lake East
6 Hopkins
7 Minneapolis South
8 St. Paul West
9 St. Paul East
10 Lake Elmo
11 Eden Prairie
12 Bloomington
13 St. Paul Southwest
14 Inver Grove Heights
15 St. Paul Park