UNIVERSITY OF MINNESOTA
MINNESOTA GEOLOGICAL SURVEY
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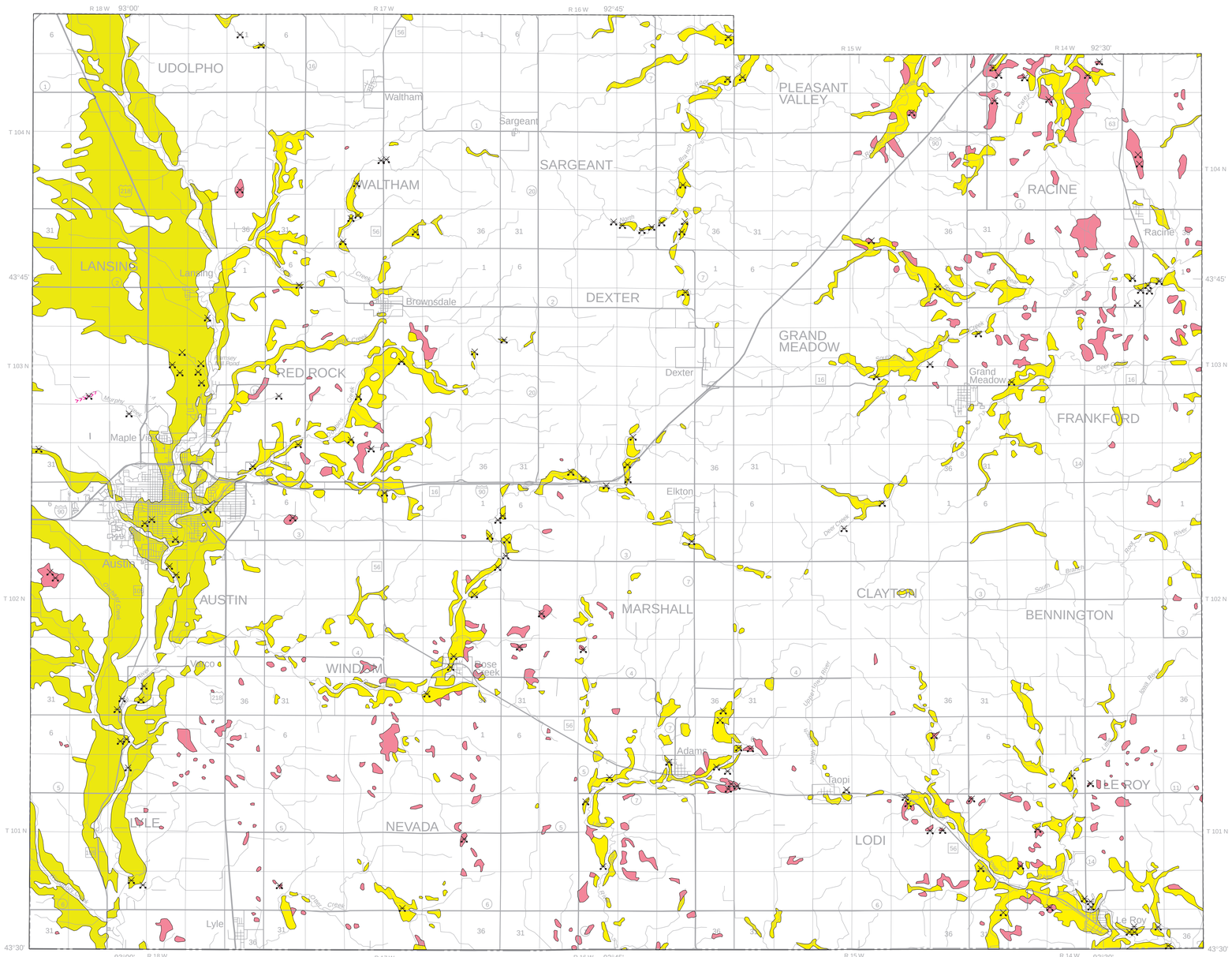
Prepared and Published with the Support of
THE MOWER COUNTY BOARD OF COMMISSIONERS AND
THE MINNESOTA DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATERS

COUNTY ATLAS SERIES
ATLAS C-11, PART A
Plate 6—Sand and Gravel Resources
***and* Bedrock Resources**



Digital base modified from 1990 Census TIGER/Line Files of U.S. Bureau of the Census (source scale 1:100,000); county border files modified from Minnesota Department of Transportation files; digital base annotation by Minnesota Geological Survey

Universal Transverse Mercator Projection, grid zone 15
1927 North American Datum

SCALE 1:100 000
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 8 KILOMETERS

Compiled 1997
Cartography by Joyce Meints and Philip Heywood
Graphic design by Philip Heywood

SAND AND GRAVEL RESOURCES

By

Gary N. Meyer

1998

INTRODUCTION TO PLATE

The maps on this plate reflect only geologic criteria. Urban development and zoning laws obviously have a major impact on the availability of resources for mining. However, a map that attempted to take these factors into account would soon be outdated. That kind of rapidly changing demographic information is best portrayed and managed with a computerized Geographic Information System (GIS).

For additional information on the geologic resources of Mower County, see Mossler (1998).

EXPLANATION TO THE SAND AND GRAVEL RESOURCES MAP

INTRODUCTION

Sand and gravel are mostly used for road construction, as in road base, in mix for concrete and bituminous pavements, and on unpaved roads. It also is used in general construction. The potential sand and gravel resources shown on the map are secondary resources, chiefly because they contain less than 35 percent gravel-size material. In addition to sufficient thickness and gravel content, and minimum of cover, a relatively wide range in size from sand to gravel is desirable in a deposit, because different size mixtures are required for different uses. Sandy recent alluvium (map unit Qas on Plate 3) is not shown as a potential resource on this map because it is generally gravel poor, and its position along rivers where the water table is close to the land surface makes extraction impossible without pumping, dredging, or use of a dragline. Eolian sand (map unit Qe on Plate 3) is not shown because it lacks gravel. Two physical properties also provide information on the suitability of sand and gravel deposits as resources. They are (1) the content of spall materials, which are rock particles that will cause a pop-out in hardened concrete or bituminous pavement, and (2) the resistance of aggregate to abrasion, which is determined by the Los Angeles Rattler (LAR) method. Data used in compiling this map were obtained from Minnesota Department of Transportation gravel-pit sheets.

DESCRIPTION OF MAP UNITS AND SYMBOLS

Areas shown in color are considered to have potential for aggregate resources, but reliable subsurface information is very limited beyond the confines of existing pits.

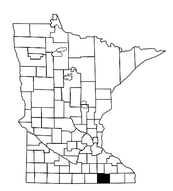
Outwash of the New Ulm Formation—Dominantly gravelly sand and sand, with generally only thin and scattered beds of gravel (map unit Qno on Plate 3). Shale grains are present and may limit the use of some deposits for concrete. However, total spall content is likely less than most other deposits in Mower County due to a lower iron-oxide content. LAR values may also be somewhat better in New Ulm outwash, despite the shale content, because the outwash has fewer weathered-rock clasts than other deposits in the county. In general, shale content decreases and locally derived weathered-rock clasts increase from west and north to south down the Cedar River.

Wisconsinan alluvium—Dominantly gravelly sand and sand; generally coarsens upwards; gravel beds in most deposits are in the upper 10 feet (map unit Qs on Plate 3). Intervals containing more than 35 percent gravel compose on average less than 10 percent of a typical deposit, and they are absent in many. Deposits having more-than-average gravel content are present along a tributary of the Little Cedar River east and northeast of Adams, and along the Upper Iowa River in the vicinity of Le Roy, where sand and gravel fills a narrow valley cut into the bedrock. A high water table limits the depth to which many deposits can be conventionally mined.

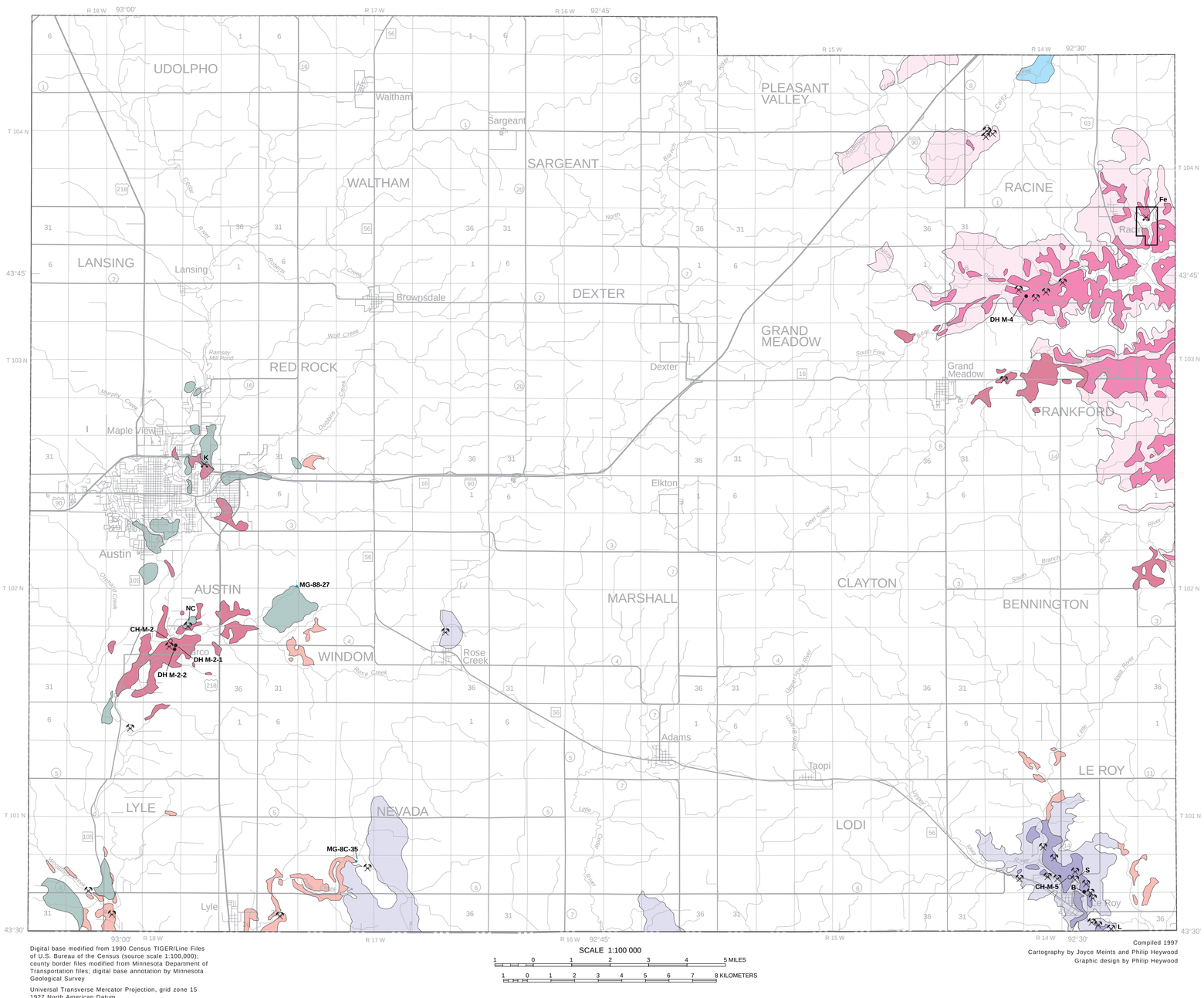
Upland sand and gravel—Dominantly gravelly sand and sand, with interbeds of gravel, silt, and till (map units Qbs, Qes, and Qrs on Plate 3). Although significant percentages of gravel are present in some deposits, iron-oxide cement and clay-coated grains, in addition to fine-grained sediment interbeds, can reduce the value of the deposit. Many of the smaller deposits are less than 20 feet thick. This unit includes small deposits of the Ostrander Member of the Windrow Formation (Plate 2) in eastern Mower County. The Ostrander gravels generally have a substantial component of iron oxide, clay, and chert pebbles.

Gravel pit—Active and intermittently active; inactive.

Esker—Sinuous ridge of sand and gravel along Murphy Creek, northwest of Maple View (sec. 20, T. 103 N., R. 18 W.). The esker was deposited under glacial ice by meltwater of the Des Moines lobe. Borings made by the Minnesota Department of Transportation indicate that this deposit is better than most in the county because parts of it contain beds greater than 20 feet thick that have greater than 35 percent gravel. Other similar narrow deposits may exist in the vicinity of Murphy Creek, but these may be covered by 10 feet or more of till; also, they likely have a high-water table.



MOWER COUNTY



EXPLANATION TO THE BEDROCK RESOURCES MAP

CARBONATE-ROCK RESOURCES

Carbonate-rock quarries—Active; inactive. The locations of some quarries mentioned in older reports could not be identified.

NC Quarry that formerly produced natural cement used in mortar.

L Quarry that formerly produced rock burned for lime.

S Quarry that formerly produced speciality products, e.g., flux, mineral food, and poultry grit.

DH M-4 **Location of drillholes sampled for chemical composition of carbonate rock**—Approximately located.

CH-M-5 **Location of section of exposed quarry wall sampled for chemical composition of carbonate rock.**

Primary Carbonate-Rock Resource—A primary resource meets the following criteria:

1. Bedrock is generally less than 10 feet below land surface. The areas were compiled from Minnesota Geological Survey data on bedrock outcrops, water-well and soil-borings data, soil maps of the U.S. Soil Conservation Service, and estimation of the areal extent of shallow subcrop as inferred from topographic maps.
2. Laboratory tests indicate that the resource has acceptable physical and chemical properties for aggregate.
3. Resource is inferred to have sufficient thickness (25 feet of more) for economic development. Many areas mapped as shallow bedrock are likely to have high water tables, making them less economically viable.

Lithograph City Formation—Area underlain by as much as 50 feet of lithographic limestone and dense dolostone having minor thin shale partings. Unit becomes progressively thinner toward northern margin of mapped area.

Spillville Formation—Area underlain by as much as 75 feet of dolostone and calcareous dolostone. The unit is thinnest near the northern and western margins of where the Spillville is mapped as a primary resource.

Secondary Carbonate-Rock Resource—Bedrock is inferred to be 10–25 feet below land surface but may be shallower in some areas.

Lithograph City Formation—The formation is about 20 to 25 feet thick in areas mapped. The upper lithographic limestone member is absent due to erosion; therefore, the formation in these areas is less desirable as an aggregate resource.

Spillville Formation—In southerly parts of where the Spillville is mapped as a secondary resource, where the formation is adjacent to the overlying Pinicon Ridge Formation, nearly the full thickness of the Spillville may be available for development. Along its northern margins, and along Bear Creek, where the Spillville is in proximity to the underlying Maquoketa Formation, the Spillville is very thin and may be absent.

Stewartville Formation—The formation is inferred to lie at shallow depths (25 feet and less) at the mapped location; however, it may be covered by a variable thickness of the shaly Dubuque Formation, and the surficial water table may be high. Tests done in neighboring counties indicate that the formation should have acceptable physical properties for aggregate.

Other Carbonate-Rock Resources—Mapped only in areas where depth to bedrock is estimated to be 10 feet or less. These resources may not be suitable for most uses due to substandard physical properties.

Coralville Formation and upper part of the Little Cedar Formation—The upper Coralville has numerous shale beds and partings; the basal 15–20 feet is principally dolostone, but may be too thin to be economical and has marginal test values. The uppermost Little Cedar also has shaly beds and unsatisfactory physical properties.

Lower part of Little Cedar Formation and Pinicon Ridge Formation—These units abrade easily and have extremely high insoluble residue contents.

FILLMORE COUNTY IRON DISTRICT

Fe **Former open-pit iron mine.**

Boundary of property leased by mining company where economic quantities of iron ore were extracted.

CLAY RESOURCES

K **Former open-pit mine in Cretaceous claystone.**

MG-8C-35 **Samples from shallow auger holes**—Samples provide information on texture, clay mineralogy, rock type, and color.

Area underlain by Cretaceous claystone and clayey siltstone at depths of less than 25 feet.

REFERENCE CITED

Mossler, J.H., editor, 1998, Contributions to the geology of Mower County, Minnesota: Minnesota Geological Survey Report of Investigations 50.

Every reasonable effort has been made to ensure the accuracy of the factual data on which this map interpretation is based; however, the Minnesota Geological Survey does not warrant or guarantee that there are no errors. Users may wish to verify critical information; sources include both the references listed here and information on file at the offices of the Minnesota Geological Survey in St. Paul. In addition, effort has been made to ensure that the interpretation conforms to sound geologic and cartographic principles. No claim is made that the interpretation shown is rigorously correct, however, and it should not be used to guide engineering-scale decisions without site-specific verification.

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BEDROCK RESOURCES

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