North Dakota Geological Survey
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Surface Geology
Fargo North Quadrangle, North Dakota

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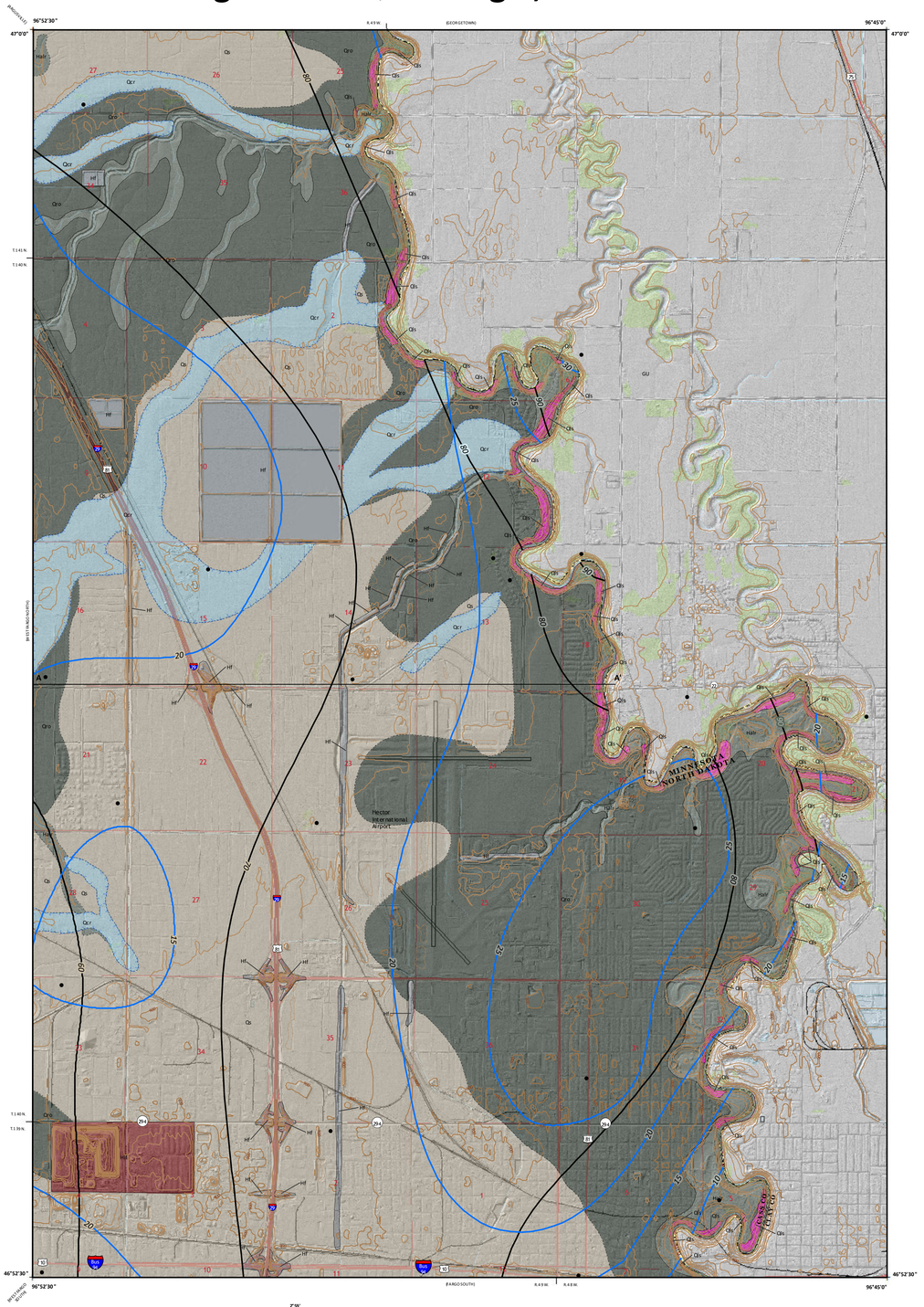

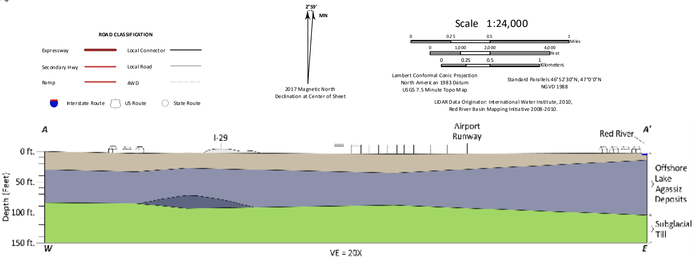

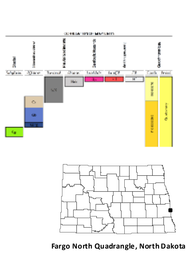

Fred J. Anderson

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EXPLANATION

GEOLOGIC UNITS IN MAP AREA

Qls **Landslide Deposits**

QUATERNARY SYSTEM

A mass of material that has moved downslope. Includes earth flows, slumps, and areas of soil creep.

HOLOCENE

Hlf **Landfill Materials**

Area of the City of Fargo municipal solid waste landfill.

Hf **Fill**

Cut/Fill materials consisting dominantly of silts, clays, and sands from adjacent nearsurface formations placed by artificial means.

OAHE FORMATION

Halr **Red River Alluvium**

Channel alluvium reworked and deposited by the Red River during recent flow and flooding events. Consists of brown to gray bedded sands, silts, gravels, and clays. Constrained to areas within the Red River floodplain and along adjacent tributary drainages. Prone to slope failure and cutbank erosion.

PLEISTOCENE

Qro **River Sediment (Overbank)**

Clay, silt, sand, and disseminated organic debris, obscurely bedded; dark colored; in many places associated with sand and gravel of older river channel sediment; commonly more than three feet (1 m) thick. Deposited on ancient rivers on the Lake Agassiz Plain.

COLEHARBOR GROUP

Qs **SHERACK FORMATION**

Glaciolacustrine, yellow gray, thinly laminated silt, clay, and silty clay. Generally the most ubiquitious surface lithostratigraphic unit within the quadrangle. Deposited as offshore sediments of Glacial Lake Agassiz. Commonly more than 25 feet (7.6 m) thick.

GEOLOGIC UNITS IN CROSS-SECTION

Qb **BRENNA FORMATION**

Glaciolacustrine, brown to very dark-gray, slightly laminated to unbedded, clay, and silty clay, soft white and pink calcareous nodules abundant locally, slickensides common, soft to very-stiff. Deposited as offshore sediments of Glacial Lake Agassiz. commonly more than 60 feet (18.3 m) thick.

Qarg **ARGUSVILLE FORMATION**

Offshore Lacustrine Sediment – Silty clay, clay, sand; gray-dark-gray; massive, clay stingers; silt and pebble loam inclusions; gritty appearance; stiff to very-stiff. Deposited as offshore lacustrine sediment of Late Wisconsinan Age.

Qgr **SUBGLACIAL TILL**

Gray to dark-gray silty pebble loam. Sediment deposited by glacial ice of Late Wisconsinan age. The Red Lake Falls Formation is the uppermost till (diamicton) in this area.

Qcr **COMPACTION RIDGE**

Glaciofluvial compaction ridge mapped from topographic expression in LiDAR surface model.

GU **Geology Undifferentiated**

• **Control Points**

Test holes and well locations

Geologic Symbols

Known contact between two geologic units

Approximate contact between two geologic units

Depth contour (feet) on the top of the Brenna Formation

Isopach contour (feet) of the Brenna and Argusville Formations

GEOLOGY OF THE FARGO NORTH QUADRANGLE

The geology in the Fargo area consists of flat lying offshore glaciolacustrine sediments associated with the former Glacial Lake Agassiz in the shallow subsurface along with recent fluvial and overbank sediments from the main stem of the Red River which flows from south to north across the quadrangle along its highly circuitous meandering path. Slumping along cutbank meanders are frequent along these riverbanks and are shown for the North Dakota side only on this map as generalized landslide areas. Topography in this quadrangle is minimal and essentially flat to the ground observer. Seasonal (spring) flooding is the greatest geologic hazard found in the Red River Valley and occurs nearly annually.

The Sherack and Brenna Formations are the two dominant glaciolacustrine units in the quadrangle. The Sherack Formation commonly consists of tan to gray laminated silts and clays which overlay the dark gray, soft and expansive clays of the Brenna Formation. The Brenna formation clays have proven to be problematic throughout the Red River Valley with respect to their weak load bearing capacities and tendency to deform when placed under load. Slumping is common within these units along the Red River and is responsible for much of the damage to residential structures and loss of yard area due to ongoing riverbank erosion.

Depth and Isopach (thickness) contours drawn on the Brenna Formation are also depicted on this map. The Brenna Formation is generally between 10 and 25 feet (3 and 7.62 m) below land surface and tends to slightly deeper depths from west to east. Thickness of the Brenna Formation ranges from 60 feet in the southwest thickening to as much as 90 feet (27.43 m) in the east and is underlain by subglacial diamicton (till) of the lower member of the Red Lake Falls Formation at depths from 80 to 100 feet (24.38 to 30.48).

Glaciofluvial compaction ridges can be readily mapped in the northwestern portion of this quadrangle from high-resolution topographic data collected using LiDAR methods. Commonly these ridges consist of water-saturated sand, deposited along former flow pathways meandering over the glaciolacustrine lake bottom sediments. The sands in these ridges are capable of flow when encountered during shallow exploratory drilling and can be problematic for building foundations and structures as they also may exhibit weak load-bearing characteristics.

Cartographic Compilation: Navin Thapa