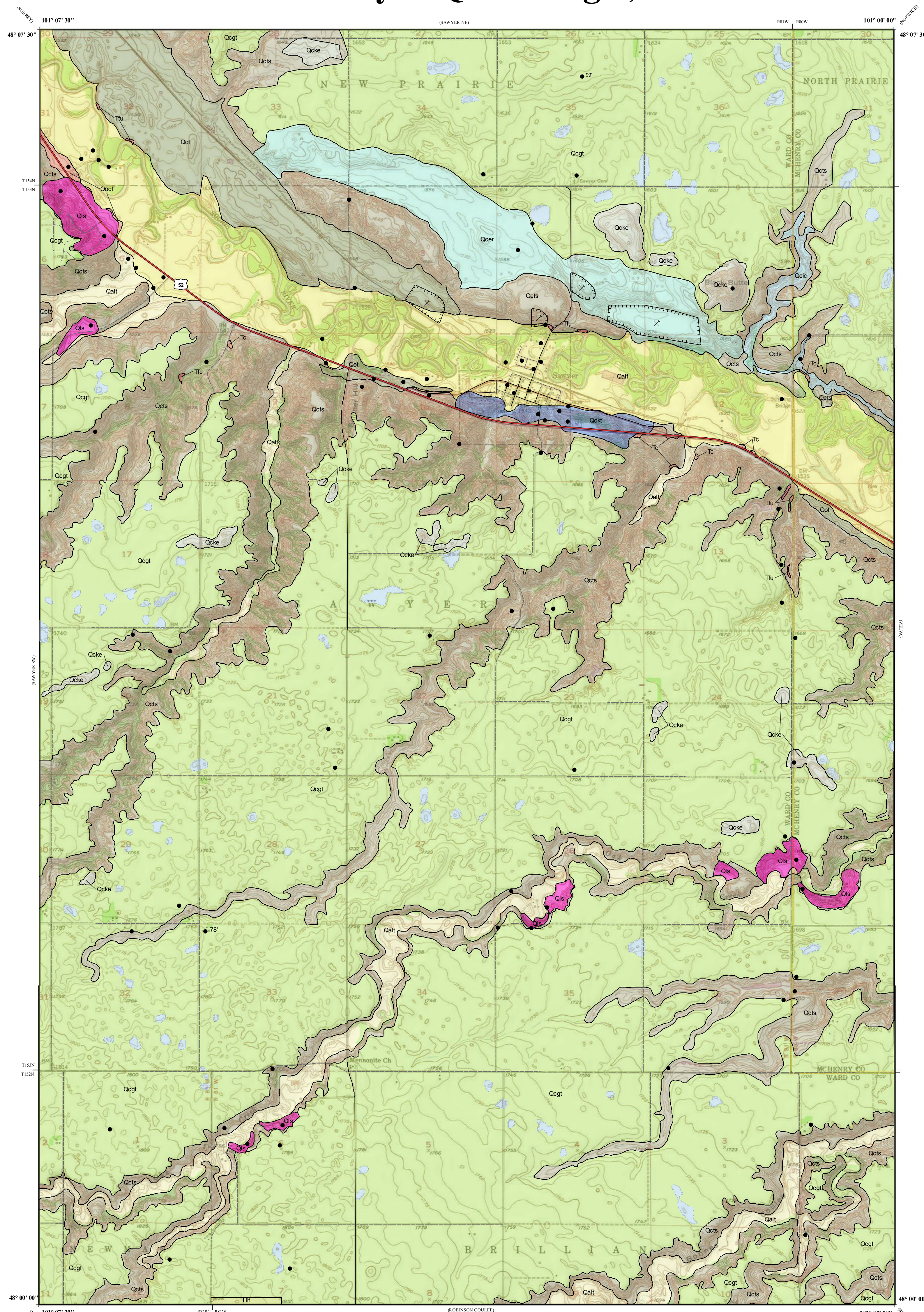


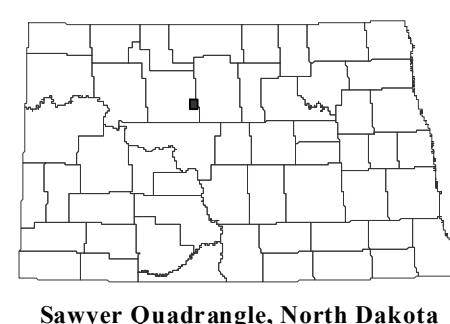
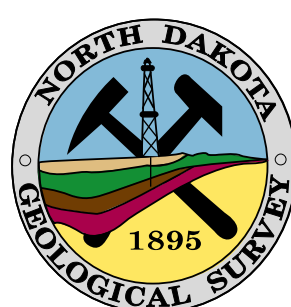
# Surface Geology Sawyer Quadrangle, North Dakota

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2016

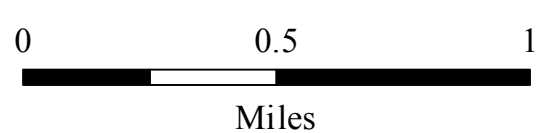
## EXPLANATION



- HOLOCENE**
- ANTHROPOGENIC (RECENT) DEPOSITS**
- Hlf Landfill Deposits**  
Anthropogenic deposits, landfill sediments and solid waste placed as fill in the Sawyer Landfill.
- QUATERNARY**
- Qls Landslide Deposits**  
Bedded and non-bedded sands, silts, and clays of the Fort Union, Coleharbor, and Oahe Formations where slumps and landslide topography is displayed.
  - Qop Modern Pond and Slough Sediment**  
Dark brown to black obscurely bedded clay, silt, and organic debris generally around one to three feet in thickness. All Modern Pond and Slough Sediments are not labeled.
  - Qocf Colluvial Fan Deposits**  
Obscurely bedded sandy and silty clay originating as channel and slope wash sediments found at the mouth of coulees and ravines in alluvial fan type deposits along the margins of the Souris River floodplain.
  - Qcke Kame and Esker Deposits**  
Generally poorly sorted bedded to non-bedded sands and gravels deposited in elongate or circular collapse deposits mantling Coleharbor Group subglacial sediments. Frequently found as scattered deposits on the south of the Souris River Valley on the higher elevation till plains.
  - Qot River Terrace Deposits**  
Planar bedded sands and gravels with abundant cobbles and boulders deposited in terrace form bars along the northern and southern walls of the Souris River valley.
  - Qalt Tributary Alluvium**  
Gray to brown fluvial channel and overbank sands, gravels, silts, and clays deposited within tributary coulees and drainageways of the Souris River floodplain as reworked slope-washed till ranging from three to 30 feet in thickness.
  - Qalf Floodplain Alluvium**  
Gray to brown loosely consolidated fluvial channel and overbank sands, gravels, silts, and clays deposited within the Souris River floodplain. Prone to slumping and instability along meander loop cutbanks along the Souris River. Commonly 100 feet or more in thickness along the central axis of the valley.
- COLEHARBOR GROUP**
- Qcer Glacial Till (River Eroded)**  
Dark-grey brown subglacial till consisting of clay with silt of low to moderate plasticity and cohesiveness, massive at outcrop consisting of clay-matrix supported diamicton with occasional fine to coarse gravel clasts with occasional clay and lignite clasts. Eroded by high-stage meltwaters.
  - Qcts Glacial Till (Slope Washed)**  
Dark-grey brown subglacial till consisting of clay with silt of low to moderate plasticity and cohesiveness, massive at outcrop consisting of clay-matrix supported diamicton with occasional fine to coarse gravel clasts and occasional clay and lignite clasts. Eroded by running water in the bottom and along the sides of meltwater trenches, coulees, and ravines. May be overlain by a thin layer of local alluvium in places.
  - Qckt Kame Terrace Deposits**  
Brown to tan ice contact sand and gravel with cobbles deposited in kame terraces along the walls of the Souris River Valley. Commonly over 200-feet in thickness with typically greater relief and elevation than surrounding sediments.
  - Qcic Ice-Contact Deposits**  
Brown to tan sand and gravel with silt, poorly sorted and generally displaying laminated or contorted bedding at outcrop. Typically overridden by subglacial diamicton (subglacial till) sediments. Exposed along lower portions of valley walls along the Souris River. Beds range in thickness from one to ten feet at outcrop.
  - Qcgt Glacial Till**  
Dark-grey brown clay with silt, generally moist with moderate plasticity and cohesiveness, massive, clay matrix supported diamicton, occasional fine to coarse gravel, cobbles, and boulders, typically oxidized and unleached for calcium carbonate with occasional clay and lignite clasts (subglacial till). Occurs within areas of low to moderate relief with undulating topography. Generally around 100 to 150 feet in thickness.
- TERTIARY**
- EROSIONAL UNCONFORMITY**
- Tc CANNONBALL FORMATION**  
Tan to orange sandstone, loosely consolidated, poorly exposed, fossiliferous (shark teeth, mollusks, pelecypods, gastropods, ostracods, forams). Individual well indurated sandstone beds common and exposed at outcrop.
  - Tfu FORT UNION GROUP (Undifferentiated)**  
Poorly exposed, weakly lithified, loosely consolidated, sandstone, siltstone, claystone, and lignite seams present beneath unconsolidated glacial sediments at and overlying the marine Cannonball Formation.
- Geologic Symbols**
- Control Point:  
Drill Holes, Outcrop Locations, Field Observation Sites
  - 78' Test Hole:  
Thickness of glacial till sediments above sedimentary bedrock (if known).
  - ☒ Sand and Gravel Pit
- Other Features**
- Paved Road
  - Unpaved Road
  - U. S. Highway
  - City
  - County Boundary



Scale 1:24,000



Lambert Conformal Conic Projection  
North American Datum 1983  
USGS 7.5 Minute Topographic Map

Standard Parallels: 48°00'00"N, 48°07'30"N  
NGVD 1988  
Contour Interval 10 Feet

