

RESEARCH COUNCIL OF ALBERTA

REPORT 67-4

SURFICIAL GEOLOGY OF THE WAINWRIGHT  
AREA (EAST HALF), ALBERTA

by

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Research Council of Alberta  
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SURFICIAL GEOLOGY OF THE WAINWRIGHT  
AREA (EAST HALF), ALBERTA

Abstract

The Wainwright area lies within the east-central Alberta Plains, a relatively flat, glaciated area underlain by gently dipping detrital strata of Late Cretaceous age. In most parts of the area, bedrock is overlain by till, as ground or hummocky moraine, the most common type of surficial deposit. Till, in turn, is overlain in many places by glacio-fluvial and lacustrine deposits, aeolian sands, and thin patches of Recent alluvial and lacustrine sediments.

Examination of the glacial deposits and landforms suggests that they originated from large-scale downwasting and stagnation of the Keewatin ice-sheet, which advanced over the area during Pleistocene time. The glacial deposits are believed to be of Wisconsin age.

INTRODUCTION

This report describes the types and distribution of surficial deposits of the Wainwright area<sup>1</sup>, which forms part of the east-central Alberta Plains. The map-area, approximately 2900 square miles in extent, is located 120 miles southeast of Edmonton, adjacent to the Alberta-Saskatchewan border (Fig. 1). It covers the east half of National Topographic Series sheet 73D, between 110° and 111° west longitude and 52° and 53° north latitude.

The distribution of surficial deposits is shown on eight separate maps on a scale of 1 inch to 1 mile. These are entitled as follows:

- (73D-1) Bodo District;
- (73D-2) Neutral Hills;
- (73D-7) Czar District;
- (73D-8) Provost District;

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<sup>1</sup> The National Topographic Series map sheet 73D is called the Wainwright area. The smaller quadrangles within this larger area are called districts.

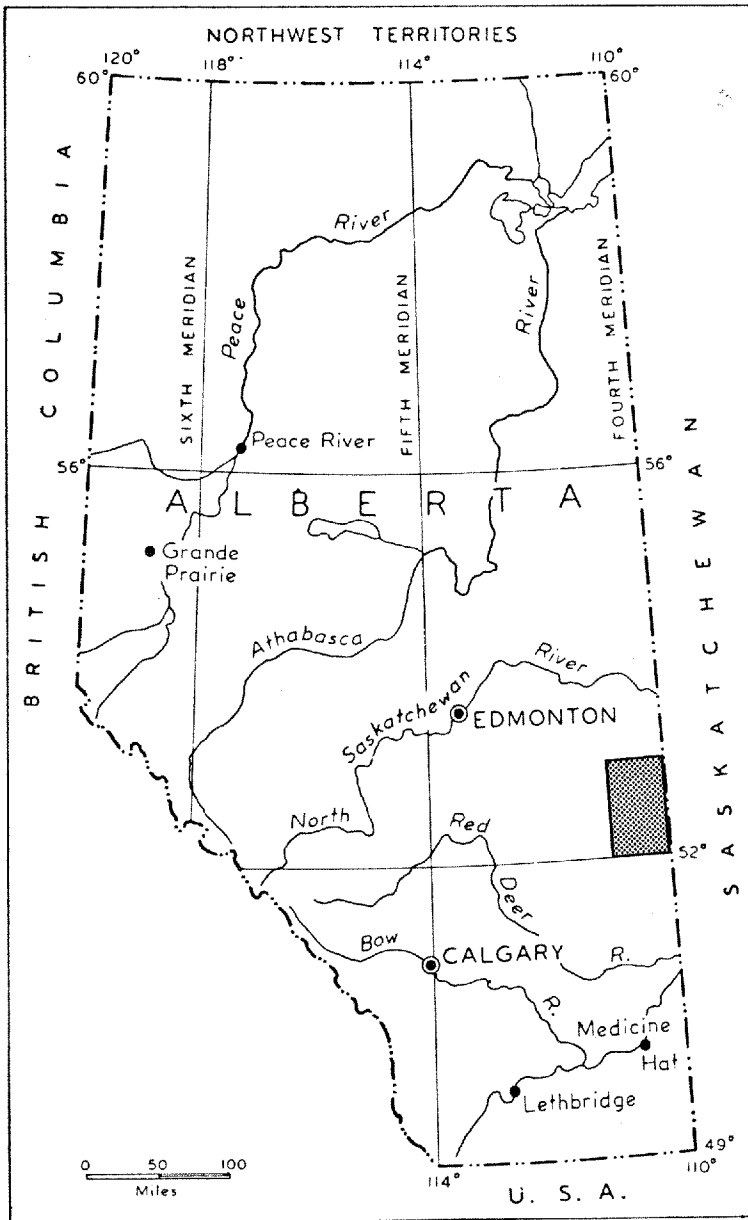


Figure 1. Location of the Wainwright area.

- (73D-9) Chauvin District;
- (73D-10) Buffalo View District;
- (73D-15) Wainwright District;
- (73D-16) McLaughlin District.

Reconnaissance studies of the glacial geology features of east-central Alberta, including portions of the Wainwright area, have been made by Warren (1937, 1954), Rutherford (1941), Bretz (1943), and Bayrock (1955). More detailed descriptions of the surficial deposits in regions adjacent to the map-area have been made by Gravenor and Bayrock (1955), Gravenor (1956), Gravenor and Ellwood (1957, Bayrock (1958a,b), and Ellwood (1962). The soils of the area have been mapped by Wyatt *et al.* (1944), whose report includes an appendix by J. A. Allan describing in general terms the geology, water supply, and origin of surficial deposits.

Mapping of the Wainwright area was carried out during the summers of 1957 to 1961. Information was collected from aerial photographs and from examination of roadcuts and river sections, supplemented by shallow digging and hand auger boring. Additional data was obtained in certain areas by drilling with a 60-foot auger-type power drill.

#### PHYSIOGRAPHY

The Wainwright area lies within the central Alberta Plains, a relatively flat, glaciated region underlain by gently dipping Cretaceous sandstones and shales.

The southern part of the area is bounded by a chain of prominent hills, the Neutral Hills, which rises in places more than 400 feet above the surrounding plain. Composed of glacially contorted bedrock, the hills form a series of discontinuous, arcuate, subparallel ridges transected in places by meltwater channels. Cut by superglacial streams, these meltwater channels carved through the ice and eroded valleys in the underlying bedrock. Two other small areas of contorted bedrock are present in the Provost and McLaughlin Districts.

In the northern part of the area, the continuity of the plain is broken by the deeply incised valley of the Battle River. Elsewhere, local relief is related to the types and distribution of surficial deposits and landforms. Areas underlain by ground moraine are level to undulating, and areas underlain by hummocky moraine are typically rolling or hilly. Outwash deposits are relatively flat-surfaced, unless reworked by wind, as are glacio-lacustrine deposits. Aeolian sand deposits are undulating to rolling, and Recent lacustrine and alluvial sediments are nearly flat. In

places, landslides have produced locally rough areas, and meltwater channels have steep banks.

## DESCRIPTIONS OF DEPOSITS

The Wainwright area is underlain by gently dipping strata of Late Cretaceous age, covered, except for scattered outcrops, by a relatively thick veneer of surficial deposits. In most parts of the area, bedrock is directly overlain by till in the form of ground or hummocky moraine. Till, in turn, is overlain in many places by other deposits: glacio-fluvial and glacio-lacustrine sediments, aeolian sands, and Recent alluvial and lacustrine sediments.

The Wainwright area was glaciated by the Keewatin ice-sheet, which advanced over and covered the region during Pleistocene time. Examination of glacial landforms and deposits in the area suggests that they formed as a consequence of large-scale downwasting and stagnation of the glacier, the recession being accompanied by minor fluctuations of the ice front. All of the glacial deposits are believed to be of Wisconsin (late Pleistocene) age.

### Bedrock

The bedrock of the Wainwright area, mapped by Warren and Hume (1939), consists of interbedded sandstone, shale, and thin coal seams of Late Cretaceous age. The rocks are poorly consolidated and bentonitic and have a regional dip of a few feet per mile to the southwest. Outcrops are scarce, the best exposures being found along the valleys of the Battle River and Ribstone Creek.

### Till

Till is an unsorted sediment deposited directly from the glacier. It is present throughout most of the Wainwright area, ranging from a few to more than 100 feet in thickness. It is usually brown near the surface, where oxidation has occurred, becoming dark grey at depths of 10 to 20 feet.

The till is composed largely of local bedrock: poorly consolidated, bentonitic, fine- to medium-grained sandstone, siltstone, and shale. The average till composition is 50 per cent sand, 30 per cent silt, and 20 per cent clay, the clay fraction containing up to 50 per cent montmorillonite. The gravel content of the till is less than 5 per cent, probably 2 to 3 per cent. Characteristically, the gravel is of two types: rocks derived from the Canadian Shield, which outcrops some 300 miles to the northeast of the area, and rocks derived from post-Cretaceous, preglacial gravels which overlie Cretaceous bedrock in scattered portions

of the Alberta Plains. These gravels are mainly quartzitic in composition; hence, the gravel content of the till contains from 30 to 50 per cent quartzite pebbles.

The salinity of the till varies from less than 5 milliequivalents per 100 grams in the northeastern part of the area to more than 25 milliequivalents per 100 grams in the southwestern part. The salts, mainly sodium sulphate, magnesium sulphate, and bicarbonates impart to the till a typical blocky structure, the highly saline areas supporting solonchic soils.

Glacial land forms composed dominantly of till have been classified on the accompanying maps as ground moraine, hummocky moraine, and till crevasse-fillings. Ground moraine has a local relief of less than 15 feet (averaging about 5 feet) with till thicknesses averaging about 20 feet. Hummocky moraine has a local relief exceeding 15 feet with till thicknesses usually over 60 feet. The boundaries between the two types of moraine are gradational.

Till crevasse-fillings are ridges of till deposited in crevasses during the final phase of recession of the glacier. This material is somewhat sandier than surrounding ground moraine and also contains pockets of sand and gravel. They have been mapped only in the two northern districts (Wainwright and McLaughlin Districts), forming in the McLaughlin District a pattern composed of two sets of ridges perpendicular to one another. They are rare elsewhere in the map-area.

### Glacio-Fluvial Deposits

#### Esker

A large esker approximately 20 miles long, up to 1 mile in width, and from 50 to 200 feet in height is present in the southern part of the area. The esker is composed of fine- to medium-grained sand, pockets of gravel being present only in the north (Czar District). The esker does not contain large commercial gravel deposits.

Small eskers present in other parts of the Wainwright area also could be classified as glacio-fluvial crevasse-fillings.

#### Kame and Kame Moraine

Glacio-fluvial deposits having positive relief are classified here as kame (except for eskers), and two or more kames are described as kame moraine. Most kames in the Wainwright area are composed of sand, with small pockets of gravel and scattered lenses of till. The only commercial gravel deposits are found in the large kame moraine in township 42, range 1, adjacent to Reflex Lake. This moraine also could be described as



a pitted outwash plain or gravel outwash plain which was in contact with the ice in many places. The gravel, found over an area of 20 square miles, is fine-grained and erratically distributed.

#### Pitted Outwash

A small area underlain by pitted outwash is present in the Czar District, adjacent to Shorncliffe Lake in township 40, range 7. Composed of sand and gravel, the deposits originated through the action of meltwaters flowing from the hummocky moraine area to the west. Commercial production of the gravel seems doubtful.

#### Outwash Sand

Outwash sand is the most common glacio-fluvial deposit in the Wainwright area. The sand is usually fine- to medium-grained with scattered pebbles in places.

Although mapped as a unit, these deposits are of multiple origin. However, it is difficult to distinguish among the different types of sand outwash plains, in part owing to the fact that their surfaces have been reworked by wind action to some extent. Sand outwash plains near the town of Edgerton are likely of deltaic origin, and those found in the Buffalo View District (townships 41, 42, 43; ranges 6, 7) also are thought to be of deltaic or partly deltaic origin. However, sand outwash deposits found in the Czar District (townships 39, 40; ranges 5, 6) and those in the Neutral Hills District are believed to be of subaerial origin.

#### Outwash Sand and Gravel

Deposits of outwash sand and gravel are found in various parts of the Wainwright area, grading laterally in many places into outwash sand or outwash gravel. The deposits are relatively coarse in the Neutral Hills District (township 36, range 7) and in the western half of the Czar District, in the area surrounding the town of Czar. However, the likelihood of finding commercial quantities of gravel in these deposits is low, although coarse sand is abundant.

#### Outwash Gravel

Outwash gravel deposits are scattered throughout the Wainwright area. Most are associated with glacial meltwater channels or spillways; as a rule, the larger the channel or spillway, the coarser the gravel. Overburden on most of the gravel deposits is quite shallow, ranging from 2 to 5 feet, and is mainly sand.

Gravel deposits in the Bodo District (township 37; ranges 1, 2) are generally quite shallow, but in township 37, range 2, sections 2

and 3, commercial deposits may be found. In township 35, range 4, large deposits are present in the middle of a spillway south of Sounding Lake. In the Neutral Hills District outwash gravels are present on both sides of Gooseberry Lake. These deposits as yet have not been properly explored for the purpose of commercial exploitation.

High-grade gravel deposits of large quantity, good quality, and considerable thickness (10 to 20 feet) are present in the Czar District. These are associated with a large spillway draining the area of hummocky moraine to the west of the map-area. In the Provost District, around and east of the town of Hayter, specifically in the vicinity of St. Lawrence Lake, commercial gravel deposits may be present. Large commercial gravel deposits, mapped as a kame moraine, are to be found in the Chauvin District, southeast of the town of Chauvin (township 42, range 1). In the Buffalo View District small gravel deposits are present along Ribstone Creek. Large deposits of outwash gravels are not present in the Wainwright and McLaughlin Districts.

#### Glacio-Lacustrine Deposits

Glacio-lacustrine deposits accumulated in superglacial and proglacial lakes. Superglacial lakes are those which developed on the surface of stagnant ice masses. Deposits from such lakes are usually contorted and mixed with underlying till and have not been distinguished from the latter material. Proglacial lakes formed when meltwater became ponded against the ice margin as the glacier receded.

Proglacial lake deposits show up reasonably well on aerial photographs and, if sufficiently thick and extensive, have been mapped as such. Generally, if lake deposits reflect the underlying till topography, they are less than 20 feet thick. If their surface is relatively flat, they are more than 20 feet thick, except in areas underlain by extremely hummocky moraine.

Two large proglacial lake basins are present in the Wainwright area. One, covering an area of approximately ten townships, is located west of the town of Provost, and the other in the McLaughlin District. A smaller lake basin is present in the vicinity of Wainwright.

The lake sediments are divided into two categories on the accompanying map, according to composition: deposits composed largely of sand, and deposits composed largely of silt and clay. The sediments are more sandy where glacial meltwater streams entered the lakes; these grade into outwash sandplains. Away from the ice margin the deposits are more silty and clayey. Pebbles, brought into the lake by icebergs, are rare. Generally the deposits made predominantly of clay or silty clay are relatively shallow (5 feet or less), whereas silty and sandy deposits are considerably thicker.

## Recent Deposits and Landforms

### Aeolian Sand

Deposits mapped as aeolian sand are limited to areas which have pronounced and easily recognizable sand dunes. Such deposits are formed by reworking by wind of the underlying glacial deposits, after the recession of the ice but before the establishment of vegetation. Most of the dune fields are now stabilized, with present aeolian activity being confined to development of scattered blowouts.

### Lacustrine Deposits

These materials are associated with existing lakes, being composed mainly of silty clay and clay, grading into organic muck in places. Some contain an appreciable portion of sand and have been mapped in some areas in combination with Recent alluvial sands, owing to similarity in composition.

### Erosional Scarp and Alluvial Fan

Together, these two landforms constitute "badlands", formed by a parallel retreat of bedrock exposures with concomitant deposition of erosional detritus as alluvial fans. Most such areas in the Wainwright region have been stabilized by vegetation, although badland formation was once quite extensive in the southern four districts.

### Alluvial Terrace

Small, discontinuous alluvial terraces are present in the valley of the Battle River. Most are capped by fluvial gravels ranging in thickness from 5 to more than 20 feet. The gravels were deposited by glacial meltwaters draining Lake Edmonton via the present valley of the Battle River.

### Recent Alluvial Deposits

Recent alluvial sediments have been mapped as one of two types: mainly sand with some silt and gravel, and mainly silty sand with some clay. Only the Battle River is large enough to carry some gravel in addition to finer alluvial material.

### Colluvium

Colluvial materials in the form of slump and landslide border the banks of the Battle River and its tributaries throughout the area. Most slumping is recent and in many places still active. Colluvial materials other than large-scale slump or landslide have not been mapped.

### Meltwater Channels

Two types of glacial meltwater channels are present, although not distinguished separately on the accompanying maps. Stream trenches or ice-walled channels are those with banks of ice and are partly floored in places by till segments formed by the collapsing and melting of adjacent blocks of ice. Spillways are channels formed away from the ice and do not contain till.

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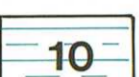
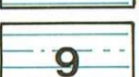







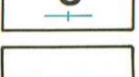

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LEGEND

RECENT

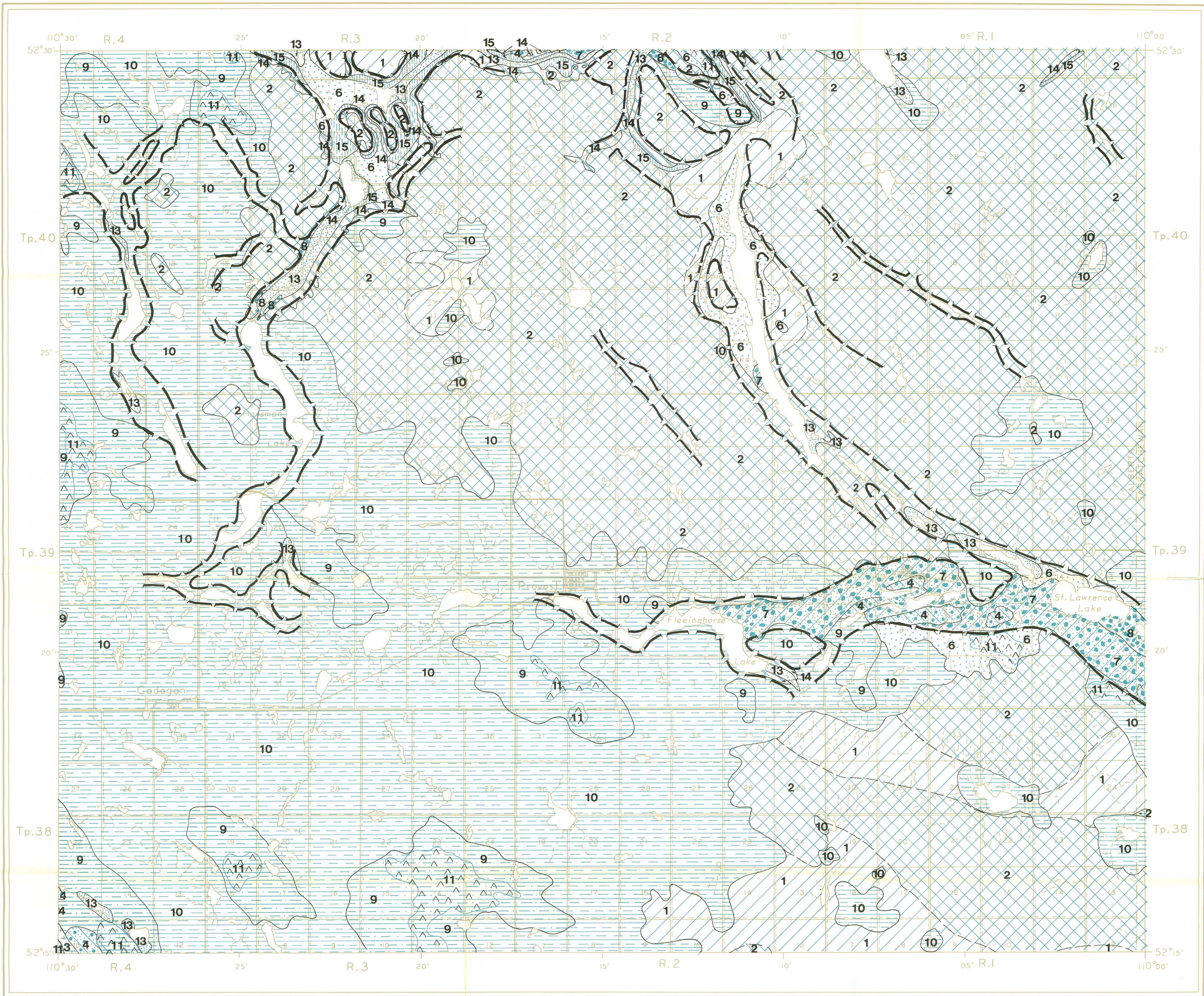
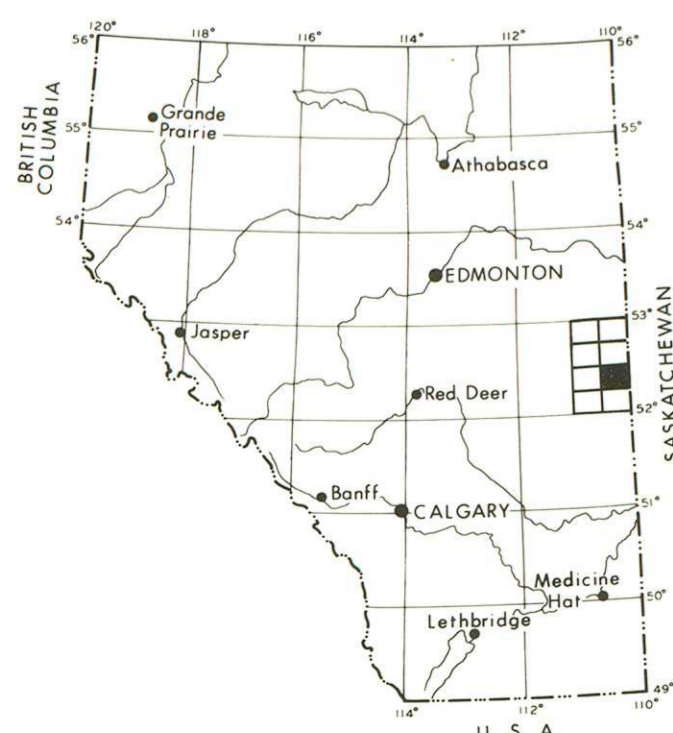
-  Slump, landslide
-  Alluvial - mainly sand, some gravel and silt
-  Alluvial - silt and sand, some clay
-  Alluvial terrace - gravel and sand
-  Alluvial fan - sand, silt and clay
-  Erosional scarp
-  Lacustrine and alluvial sand, silt and clay
-  Lacustrine - mainly clay and silt; muck
-  Aeolian sand, sand dunes

PLEISTOCENE

- Glacio-lacustrine
-  Mainly silt and clay
-  Mainly sand, some silt
- Glacio fluvial
-  Outwash gravel
-  Outwash gravel and sand
-  Outwash sand
-  Pitted outwash
-  Kame, kame moraine
-  Esker
-  Till-crevasse filling
- Glacial
-  Hummocky moraine
-  Ground moraine

- Stream-trench, spillway . . . . .
- Geological boundary - defined . . . . .
- Geological boundary - approximate . . . . .
- Sand dune field boundary . . . . .
- Crest of anticline of contorted bedrock . . . . .
- Geology by L. A. Bayrock
- Main highway . . . . .
- Local road, well travelled . . . . .
- Local road, not well travelled . . . . .
- Trail . . . . .
- Railway . . . . .
- Township boundary . . . . .
- Section line . . . . .

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with Report 67-4

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PRELIMINARY MAP 67-4D  
SURFICIAL GEOLOGY  
**PROVOST DISTRICT, ALBERTA**

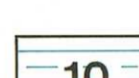







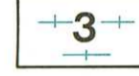




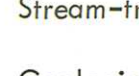
WEST OF THE FOURTH MERIDIAN  
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LEGEND

RECENT

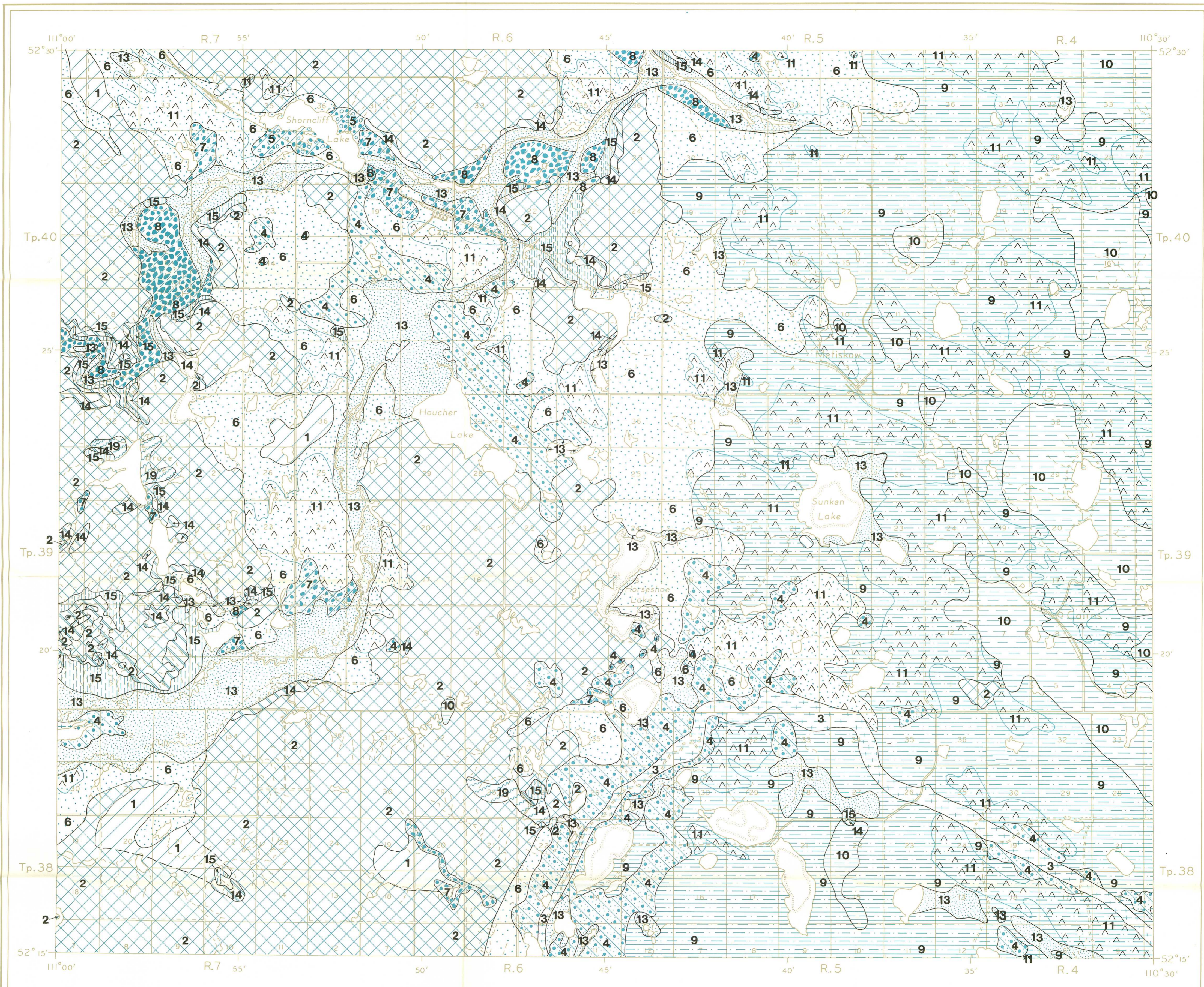
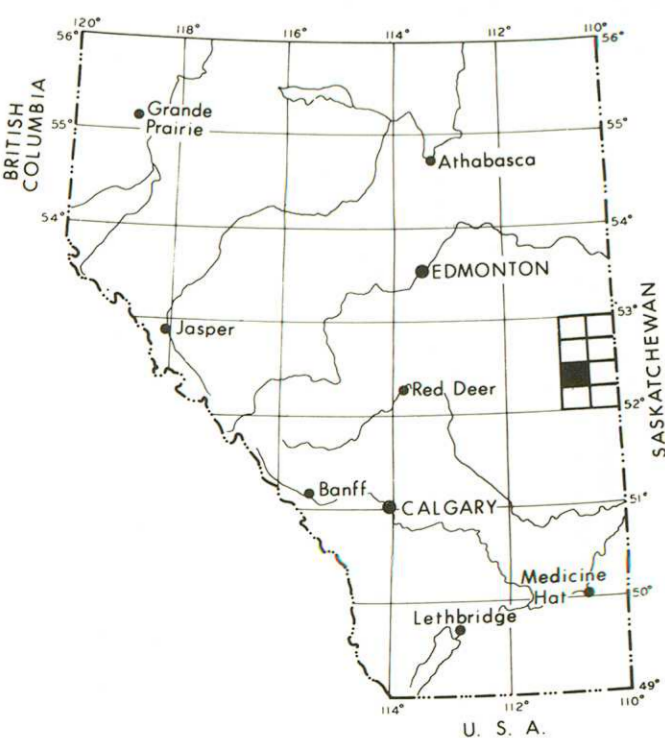
-  19 Slump, landslide
-  18 Alluvial - mainly sand, some gravel and silt
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-  16 Alluvial terrace - gravel and sand
-  15 Alluvial fan - sand, silt and clay
-  14 Erosional scarp
-  13 Lacustrine and alluvial sand, silt and clay
-  12 Lacustrine - mainly clay and silt; muck
-  11 Aeolian sand, sand dunes

PLEISTOCENE

-  10 Glacio-lacustrine
-  9 Mainly silt and clay
-  8 Mainly sand, some silt
-  7 Glacio fluvial
-  6 Outwash gravel
-  5 Outwash gravel and sand
-  4 Outwash sand
-  3 Pitted outwash
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-  1 Esker
-  0 Till-crevasse filling
-  -1 Glacial
-  -2 Hummocky moraine
-  -3 Ground moraine

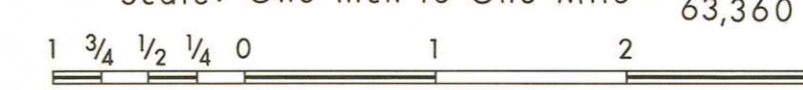
- Stream-trench, spillway . . . . . 
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- Geological boundary - approximate . . . . . 
- Sand dune field boundary . . . . . 
- Crest of anticline of contorted bedrock . . . . . 
- Geology by L. A. Bayrock
- Main highway . . . . .  13
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- Trail . . . . . 
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- Section line . . . . . 

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with Report 67-4

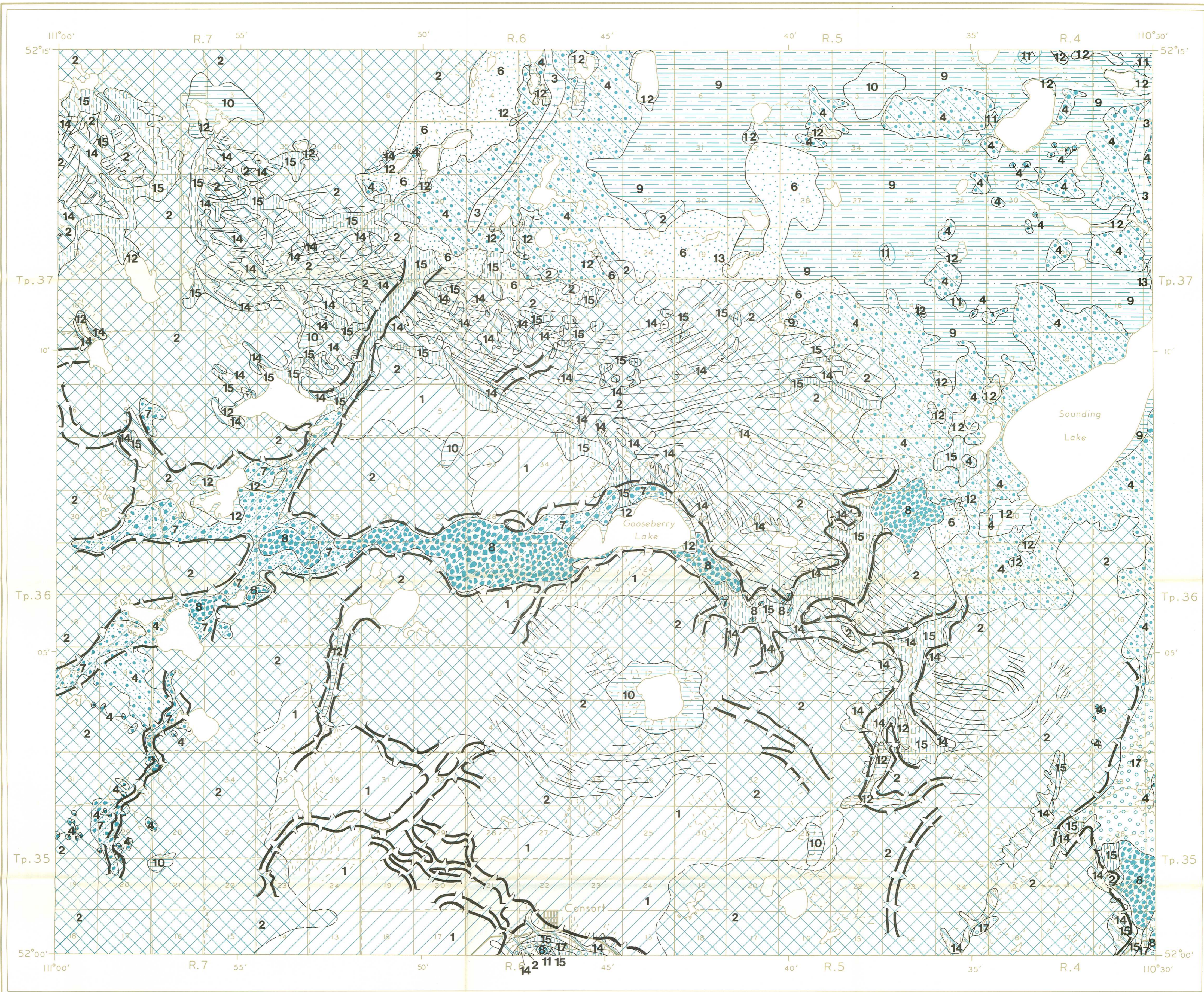
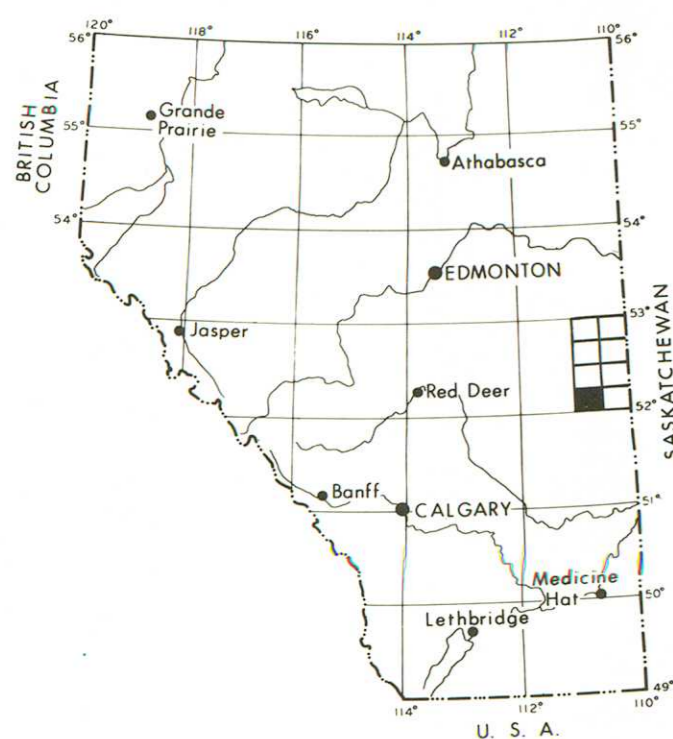
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PRELIMINARY MAP 67-4C  
SURFICIAL GEOLOGY  
**CZAR DISTRICT, ALBERTA**  
WEST OF THE FOURTH MERIDIAN  
Scale: One Inch to One Mile =  $\frac{1}{63,360}$   


LEGEND

- RECENT**
- 19 Slump, landslide
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PRELIMINARY MAP 67-4B  
SURFICIAL GEOLOGY  
**NEUTRAL HILLS DISTRICT, ALBERTA**

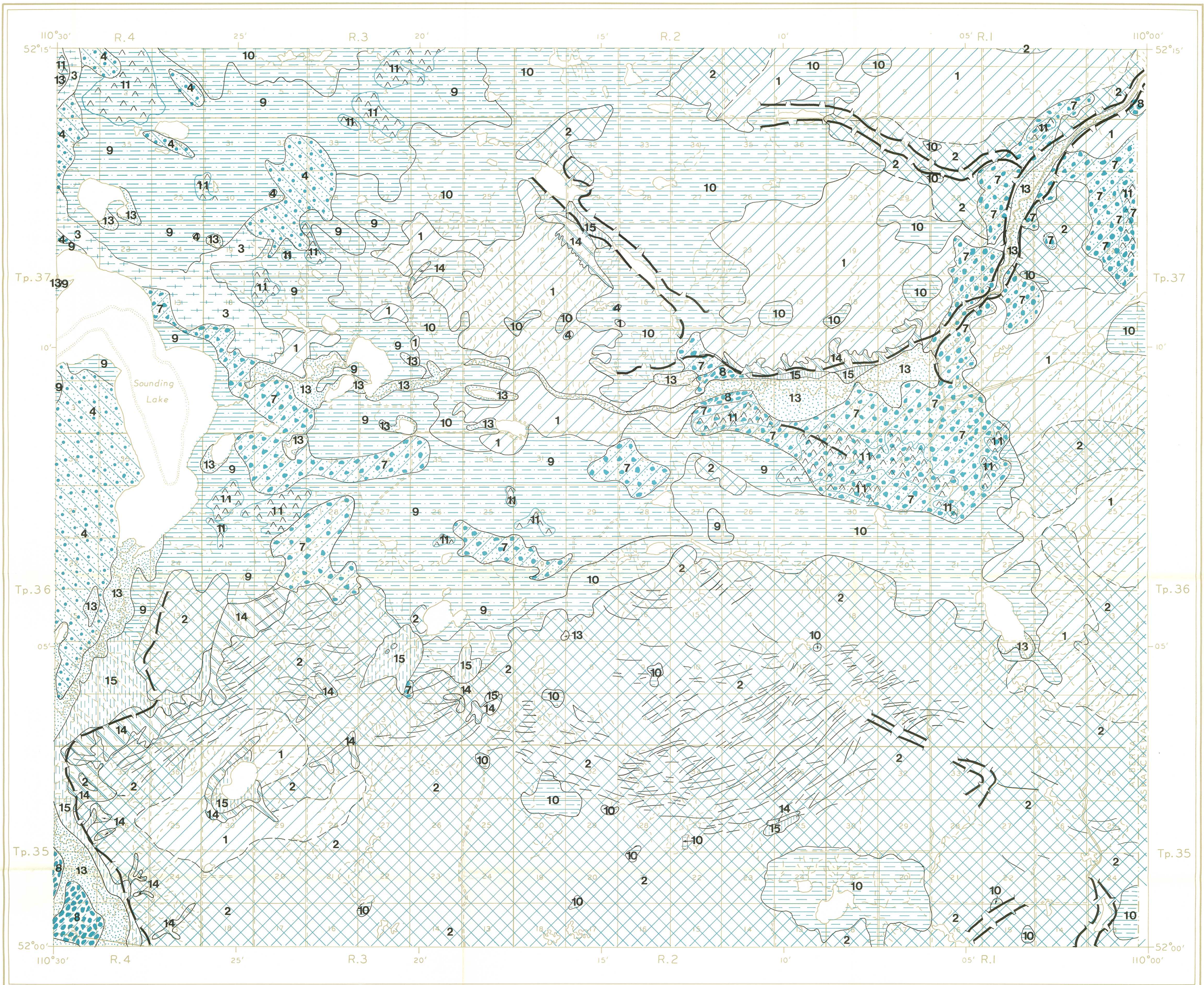
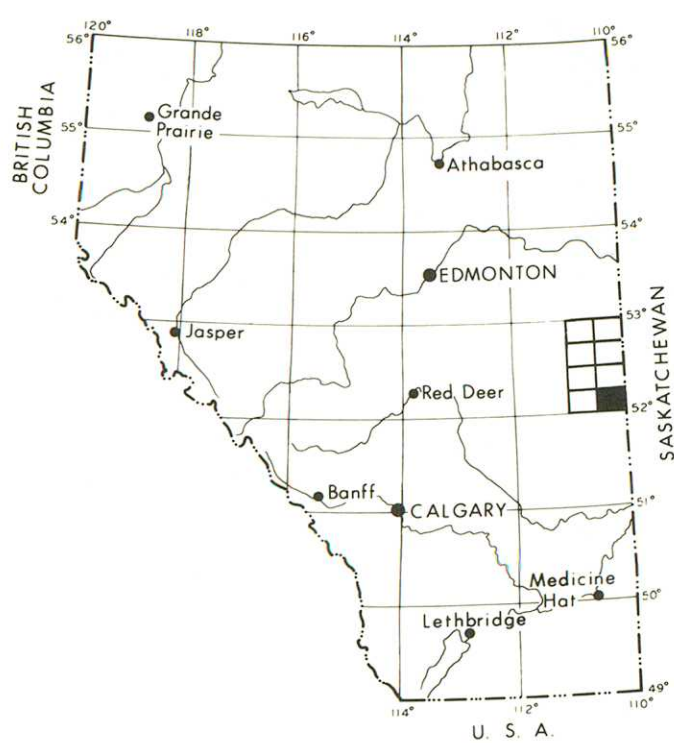
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Scale: One Inch to One Mile =  $\frac{1}{63,360}$   
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  - 12 Lacustrine - mainly clay and silt; muck
  - 11 Aeolian sand, sand dunes
- PLEISTOCENE**
- 10 Glacio-lacustrine
  - 9 Mainly silt and clay
  - 8 Glacio fluvial
  - 7 Outwash gravel
  - 6 Outwash gravel and sand
  - 5 Outwash sand
  - 4 Pitted outwash
  - 3 Kame, kame moraine
  - 2 Esker
  - 1 Till-crevasse filling
- Glacial**
- 2 Hummocky moraine
  - 1 Ground moraine
- Stream-trench, spillway . . . . .
- Geological boundary - defined . . . . .
- Geological boundary - approximate . . . . .
- Sand dune field boundary . . . . .
- Crest of anticline of contorted bedrock . . . . .
- Geology by L. A. Bayrock
- Main highway . . . . .
- Local road, well travelled . . . . .
- Local road, not well travelled . . . . .
- Trail . . . . .
- Railway . . . . .
- Township boundary . . . . .
- Section line . . . . .

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with Report 67-4

Published in 1967

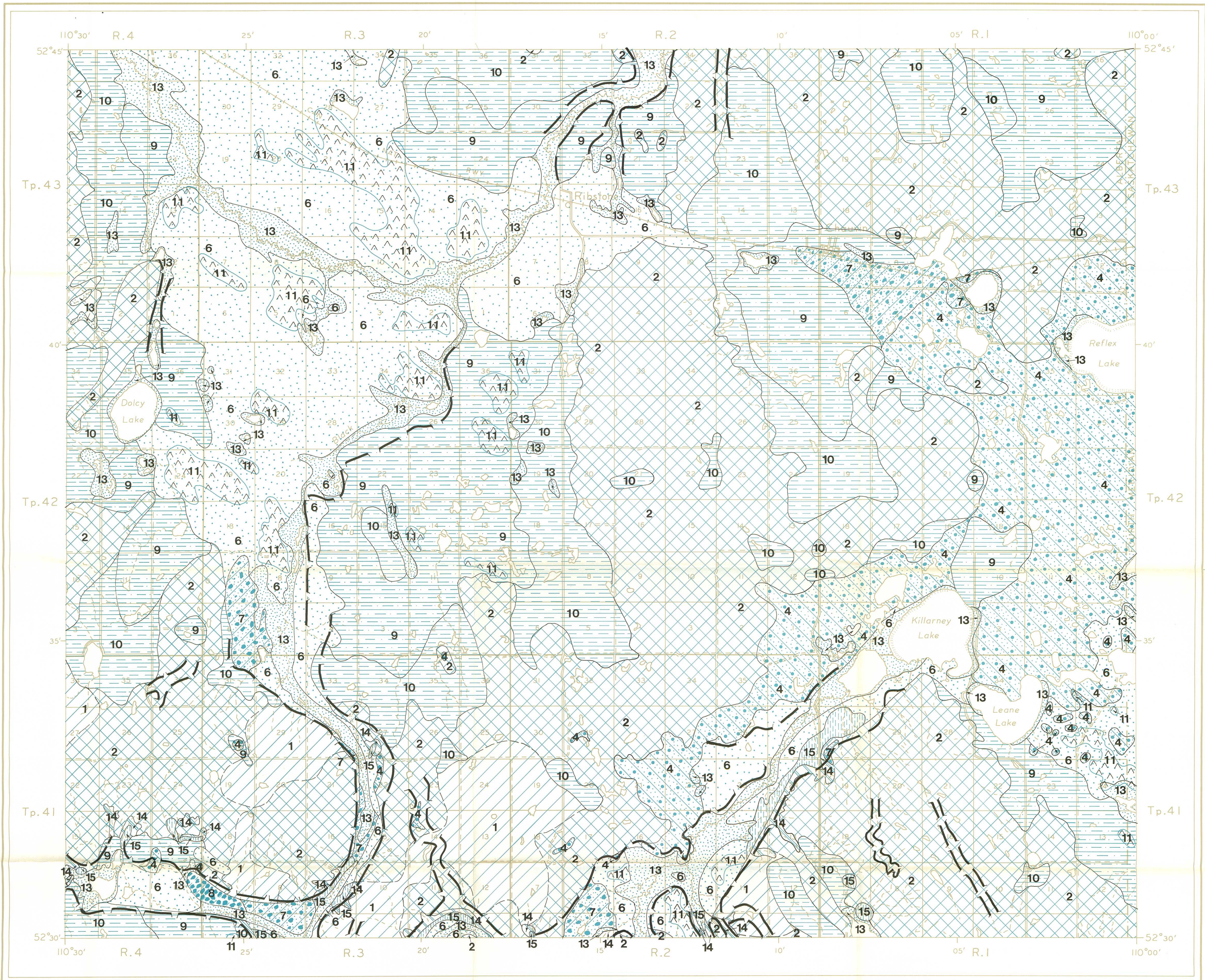
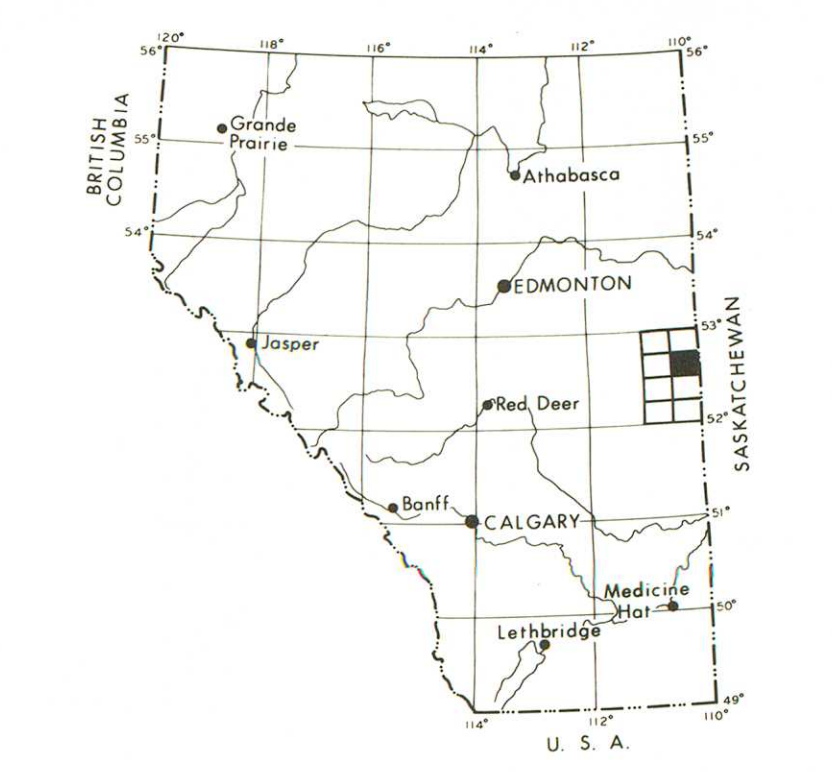
PRELIMINARY MAP 67-4A  
SURFICIAL GEOLOGY  
**BODO DISTRICT, ALBERTA**

WEST OF THE FOURTH MERIDIAN  
Scale: One Inch to One Mile =  $\frac{1}{63,360}$   
1 3/4 1/2 1/4 0 1 2 3

LEGEND

- RECENT**
- 19 Slump, landslide
  - 18 Alluvial - mainly sand, some gravel and silt
  - 17 Alluvial - silt and sand, some clay
  - 16 Alluvial terrace - gravel and sand
  - 15 Alluvial fan - sand, silt and clay
  - 14 Erosional scarp
  - 13 Lacustrine and alluvial sand, silt and clay
  - 12 Lacustrine - mainly clay and silt; muck
  - 11 Aeolian sand, sand dunes
- PLEISTOCENE**
- 10 Glacio-lacustrine
  - 9 Mainly sand, some silt
  - 8 Glacio fluvial
  - 7 Outwash gravel
  - 6 Outwash gravel and sand
  - 5 Outwash sand
  - 4 Pitted outwash
  - 3 Kame, kame moraine
  - 2 Esker
  - 1 Till-crevasse filling
- GLACIAL**
- 2 Hummocky moraine
  - 1 Ground moraine
- Stream-trench, spillway . . . . .
- Geological boundary - defined . . . . .
- Geological boundary - approximate . . . . .
- Sand dune field boundary . . . . .
- Crest of anticline of contorted bedrock . . . . .
- Geology by L. A. Bayrock
- Main highway . . . . .
- Local road, well travelled . . . . .
- Local road, not well travelled . . . . .
- Trail . . . . .
- Railway . . . . .
- Township boundary . . . . .
- Section line . . . . .

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with Report 67-4

Published in 1967









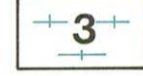




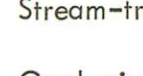
PRELIMINARY MAP 67-4E  
SURFICIAL GEOLOGY  
**CHAUVIN DISTRICT, ALBERTA**  
WEST OF THE FOURTH MERIDIAN  
Scale: One Inch to One Mile =  $\frac{1}{63,360}$   
1 3/4 1/2 1/4 0 1 2 3














LEGEND

RECENT

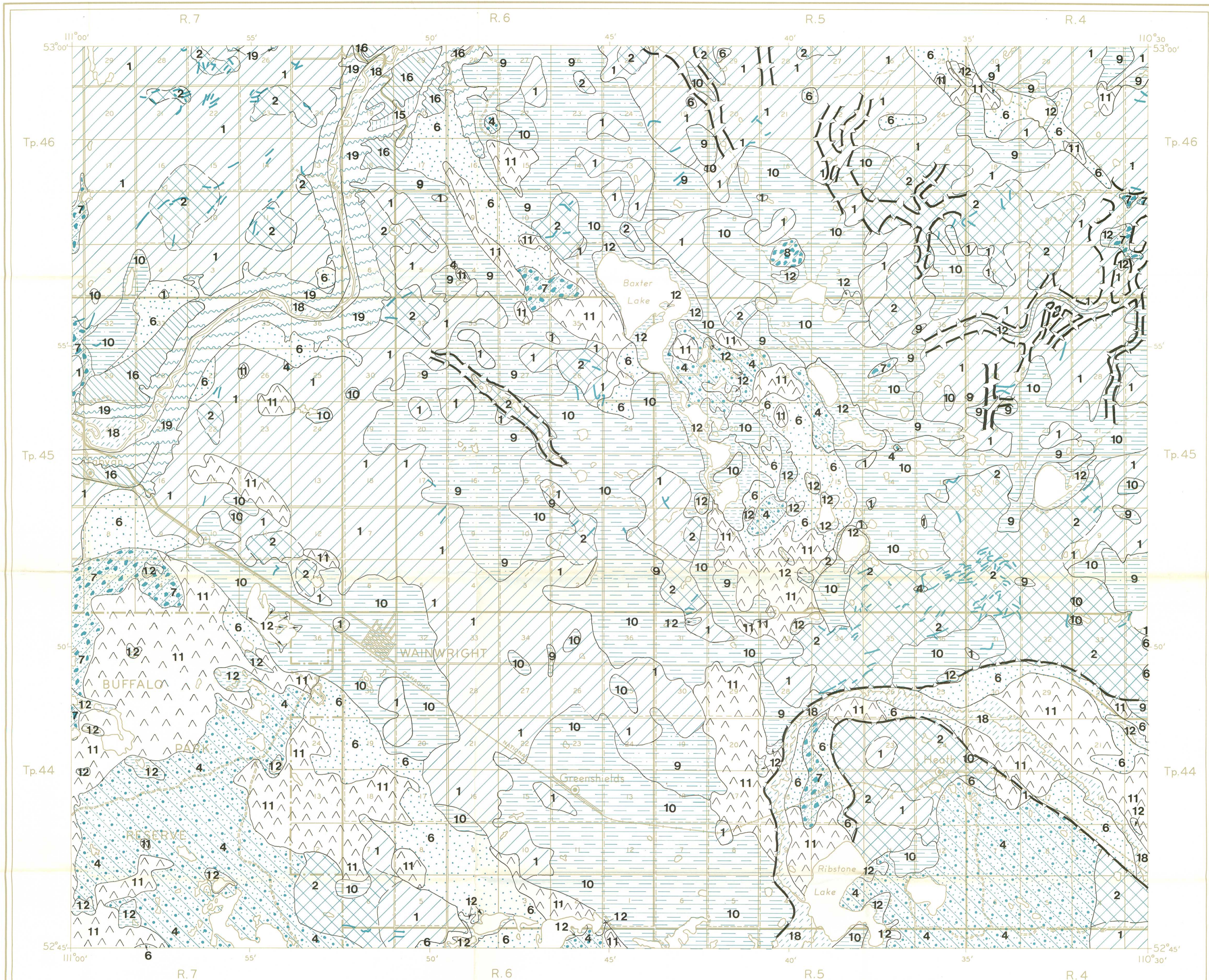
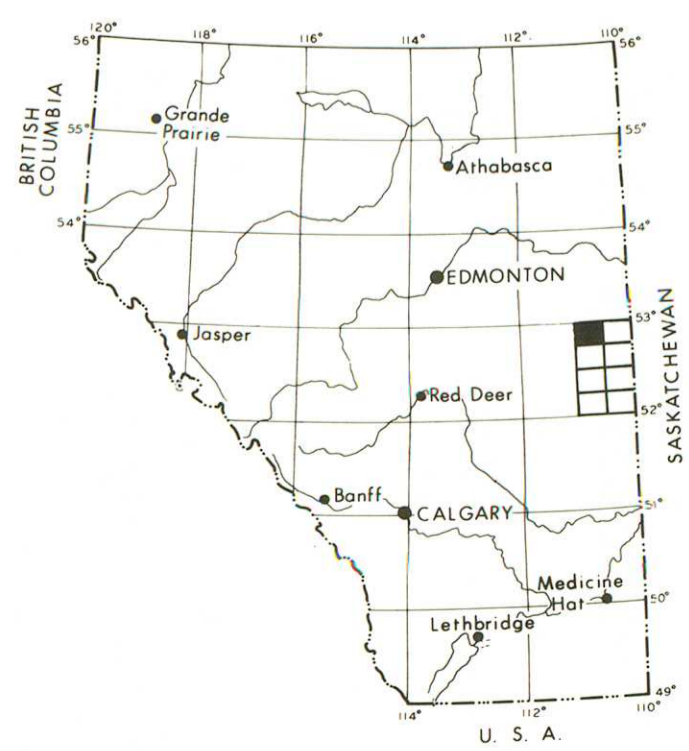
-  19 Slump, landslide
-  18 Alluvial - mainly sand, some gravel and silt
-  17 Alluvial - silt and sand, some clay
-  16 Alluvial terrace - gravel and sand
-  15 Alluvial fan - sand, silt and clay
-  14 Erosional scarp
-  13 Lacustrine and alluvial sand, silt and clay
-  12 Lacustrine - mainly clay and silt; muck
-  11 Aeolian sand, sand dunes

PLEISTOCENE

-  10 Glacio-lacustrine
-  9 Mainly silt and clay
-  8 Mainly sand, some silt
-  7 Glacio fluvial
-  6 Outwash gravel
-  5 Outwash gravel and sand
-  4 Outwash sand
-  3 Pitted outwash
-  2 Kame, kame moraine
-  1 Esker
-  0 Till-crevasse filling
-  -1 Glacial
-  -2 Hummocky moraine
-  -3 Ground moraine

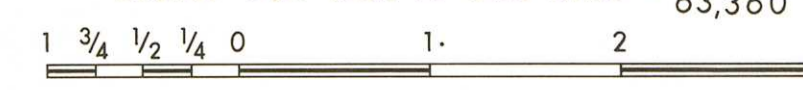
-  Stream-trench, spillway
-  Geological boundary - defined
-  Geological boundary - approximate
-  Sand dune field boundary
-  Crest of anticline of contorted bedrock
-  Geology by L. A. Bayrock
-  Main highway
-  Local road, well travelled
-  Local road, not well travelled
-  Trail
-  Railway
-  Township boundary
-  Section line

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with Report 67-4

Published in 1967

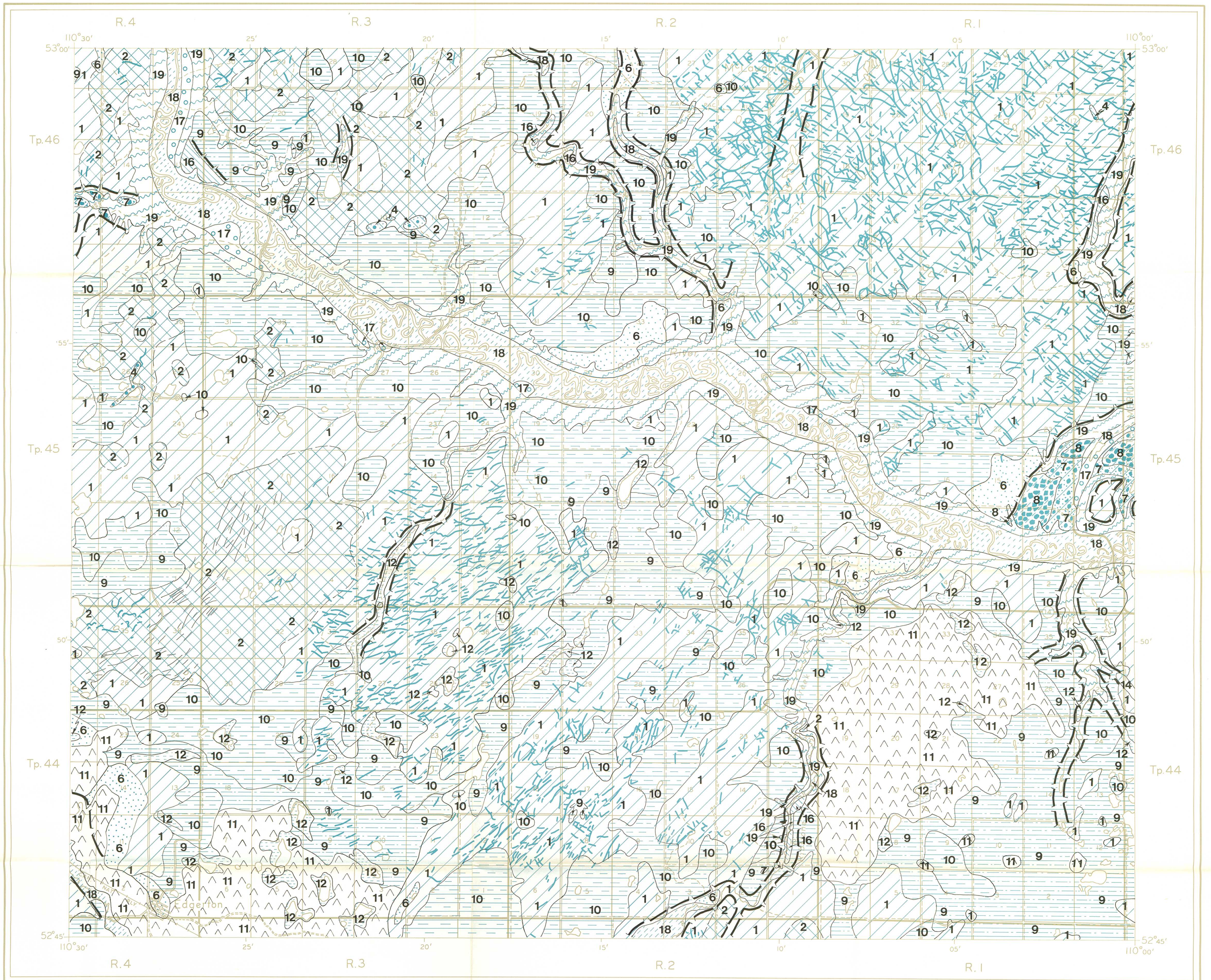
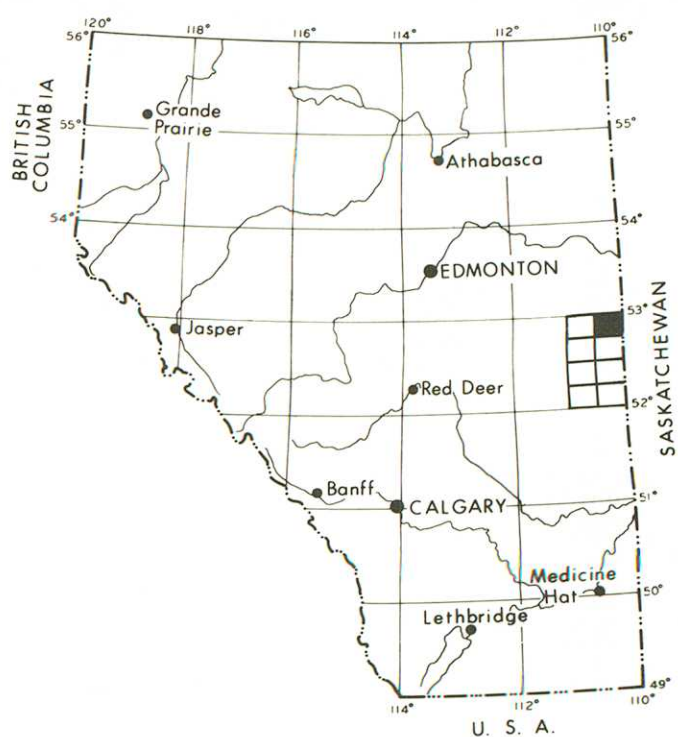
PRELIMINARY MAP 67-4G  
SURFICIAL GEOLOGY  
**WAINWRIGHT DISTRICT, ALBERTA**  
WEST OF THE FOURTH MERIDIAN  
Scale: One Inch to One Mile =  $\frac{1}{63,360}$   


LEGEND

- RECENT**
- 19 Slump, landslide
  - 18 Alluvial - mainly sand, some gravel and silt
  - 17 Alluvial - silt and sand, some clay
  - 16 Alluvial terrace - gravel and sand
  - 15 Alluvial fan - sand, silt and clay
  - 14 Erosional scarp
  - 13 Lacustrine and alluvial sand, silt and clay
  - 12 Lacustrine - mainly clay and silt; muck
  - 11 Aeolian sand, sand dunes
- PLEISTOCENE**
- 10 Glacio-lacustrine
  - 9 Mainly silt and clay
  - 8 Glacio fluvial
  - 7 Outwash gravel
  - 6 Outwash gravel and sand
  - 5 Outwash sand
  - 4 Pitted outwash
  - 3 Kame, kame moraine
  - 2 Esker
  - 1 Till-crevasse filling
  - Glacial
  - Hummocky moraine
  - Ground moraine

- Stream-trench, spillway
- Geological boundary - defined
- Geological boundary - approximate
- Sand dune field boundary
- Crest of anticline of contorted bedrock
- Geology by L. A. Bayrock
- Main highway
- Local road, well travelled
- Local road, not well travelled
- Trail
- Railway
- Township boundary
- Section line

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with report 67-4

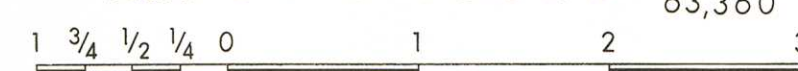
Published in 1967

PRELIMINARY MAP 67-4H  
SURFICIAL GEOLOGY

# MCLAUGHLIN DISTRICT, ALBERTA

WEST OF THE FOURTH MERIDIAN

Scale: One Inch to One Mile =  $\frac{1}{63,360}$










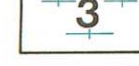
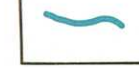

















LEGEND

RECENT

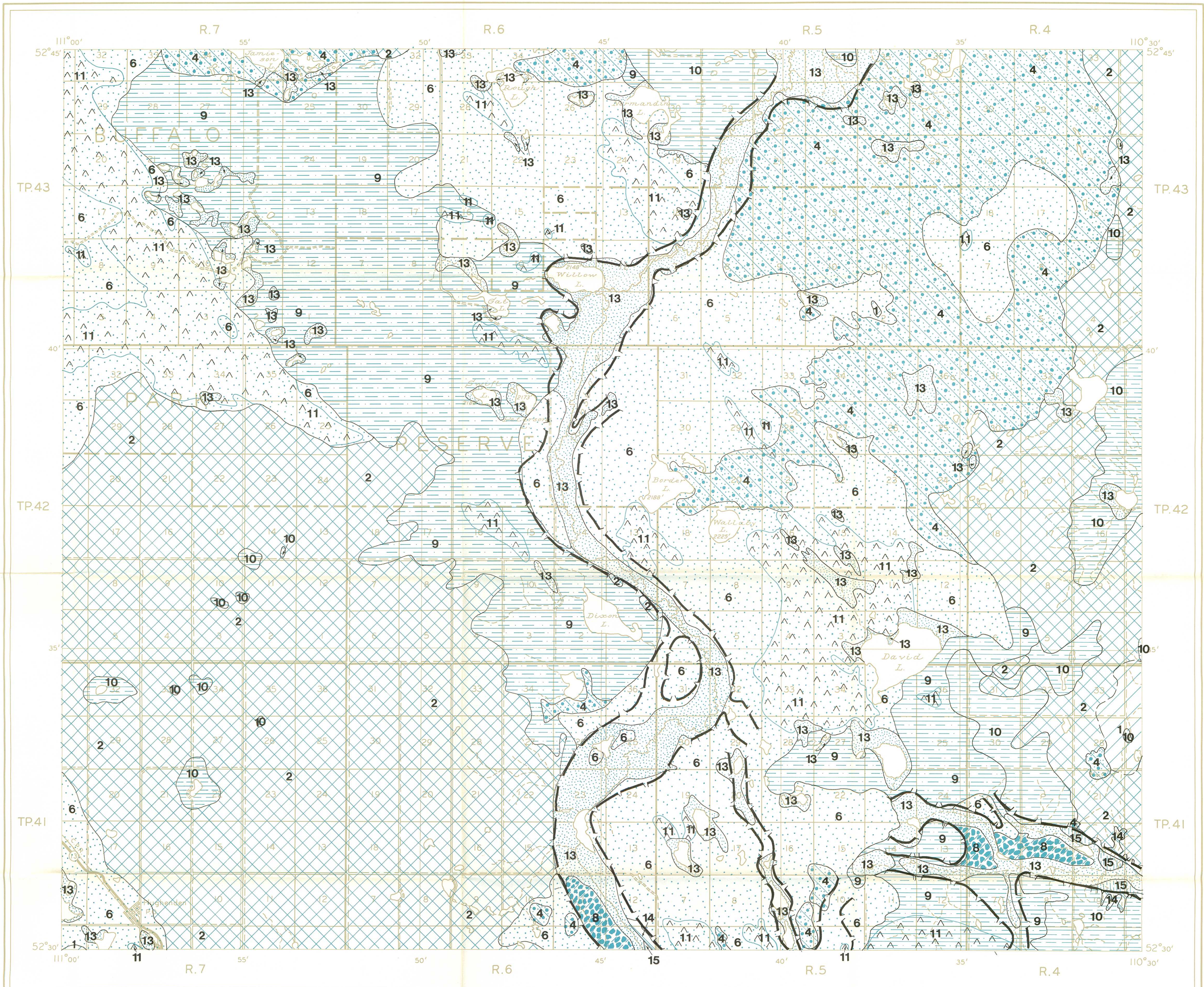
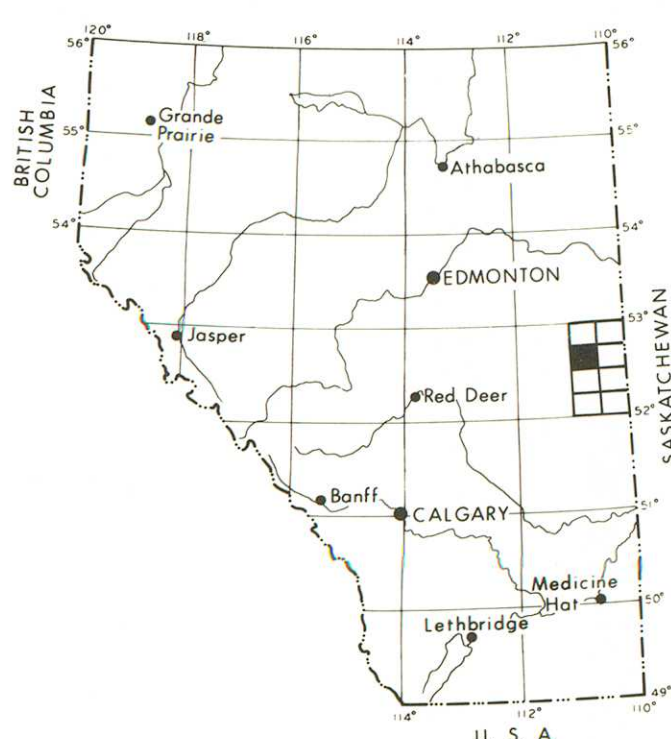
-  19 Slump, landslide
-  18 Alluvial - mainly sand, some gravel and silt
-  17 Alluvial - silt and sand, some clay
-  16 Alluvial terrace - gravel and sand
-  15 Alluvial fan - sand, silt and clay
-  14 Erosional scarp
-  13 Lacustrine and alluvial sand, silt and clay
-  12 Lacustrine - mainly clay and silt; muck
-  11 Aeolian sand, sand dunes

PLEISTOCENE

-  10 Glacio-lacustrine
-  9 Mainly silt and clay
-  8 Mainly sand, some silt
-  7 Glacio fluvial
-  6 Outwash gravel
-  5 Outwash gravel and sand
-  4 Outwash sand
-  3 Pitted outwash
-  2 Kame, kame moraine
-  1 Esker
-  0 Till-crevasse filling
-  -1 Glacial
-  -2 Hummocky moraine
-  -3 Ground moraine

-  Stream-trench, spillway
  -  Geological boundary - defined
  -  Geological boundary - approximate
  -  Sand dune field boundary
  -  Crest of anticline of contorted bedrock
- Geology by L. A. Bayrock
-  Main highway
  -  Local road, well travelled
  -  Local road, not well travelled
  -  Trail
  -  Railway
  -  Township boundary
  -  Section line

Cartography taken from Department of Lands and Forests, Alberta, planimetric maps covering the east half of National Topographic Series Sheet 73D.



Map to be used in conjunction with Report 67-4

Published in 1967

PRELIMINARY MAP 67-4F  
SURFICIAL GEOLOGY  
**BUFFALO VIEW DISTRICT, ALBERTA**  
WEST OF THE FOURTH MERIDIAN  
Scale: One Inch to One Mile =  $\frac{1}{63,360}$   
