

Scale 1:50,000

Surface Materials of the Calgary Urban Area: Dalemead Sheet NTS 82-I/13

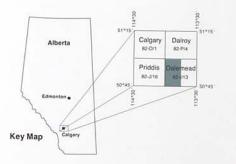
S.R. Moran

Any revisions or additional geological information would be welcomed by the Alberta Research Council

silt and clay , clay silt

DESCRIPTION OF STRATIGRAPHIC UNITS

ALBERTA RESEARCH COUNCIL



TTTT Scarp, fresh

EXPLANATION OF MAP SYMBOL STRUCTURE

gravel, and for all till units. It has not been applied to glacial fluvial or glacial lacustrine units because of difficulties in identifying stratigraphic relationships in all cases. It has not been applied to Holocome fluvial or lacustrine sediment because of difficulties in definition of the lower boundary of the Holocene and the absence of stratigraphic framework within which to treat these units.

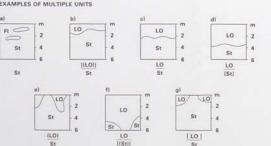
Thin and Discontinuous Units

In many instances, more than one material occurs in the upper 6 m of the landscape. Where a second material is thin and not considered significant, it was lumped into the dominant material and disregarded (example al. However, where a second, third or in rare cases, a fourth material unit occurs in the upper 6 m, it has been included in the symbol for the map unit description (examples b - gl. Additional units are shown by placing the four-character symbol for the second unit beneath that for the surface unit and separating them with a horizontal line.

Thin and Discontinuous Units
In many places, units that are thin or discontinuous occur at the top of or within the upper 6 m lexamples b. e. gl. in other places, the surface unit is only slightly less than 6 m thick and therefore only a small amount of a thick, underlying unit is present in the upper 6 m lexamples d, 1, lin order to describe these relationships, paired parentheses and brackets have been utilized to enclose the symbols. Where a unit is less than 2 m thick, or where less than 2 m of a thicker unit extends up to within 6 m of the surface, the symbol for that material is enclosed in bracketslexamples b, dl. For example, the symbol, the symbol is a state that less than 2 m of slit judicaturine offshore sediment overlies till of the Spy Hill drift; the symbol, the procupies Hill of the Porcupies Hills Formation, and that the till is glacial collapse sediment characterized by transverse ridges. In a three unit sequence the symbol, the symbol, the state that less than 2 m of fluvial overhies fluvial desired. channel gravet, which in turn rests on till of the b unit of the Balzac drift. The aggregate thickness of the silt and gravel is 4 to 6 m. The continuity of units is shown by the use of parentheses in the following way: Where parentheses are absent, as in the examples in the preceding paragraph and examples a and c, the unit is expected to be encountered in at least 75 percent of the map unit. To put this in another way, one might expect not to find the described material in one out of four places within the unit, but not more frequently. If the unit is less continuous, so that it is expected to he present in requently. If the unit is less continuous, so that it is expected to be present in settlement of the continuous of the places within the unit, the symbol is present and 25 percent of the places within the unit, the symbol is menclosed in parentheses. If the unit is present in less than one of four sites within the map unit, that is less than 25 percent, it is not included in the map unit sescription. The following examples should clarify the use of the parentheses to

description. The following examples should clarify the use of the parentheses to describe continuity. The symbol, $\frac{36.50}{4.00}$ states that the clay and silt is continuous over the entire unit for more precisely more than 75% of the unit and that in between 75 and 25 percent of the map unit the silt and clay is from 2 m to 4 m thick overlying till of the Spy Hill drift. In the remainder of the area the silt and clay unit is more than 6m thick.

By combining brackets and parentheses, information on thickness and continuity is convexed. By combining brackets and parentheses, information on thickness and continuity is conveyed as shown by the following symbols. The symbol, the first state that discontinuous patches of till of the Lochend drift less than 2 m thick overlie



DESCRIPTION OF STRATIGNAPHIC CONTROL OF STRATI northern part of the area and parts of the south and by a meltwater channel south. The Crossfield drift forms the surface unit in the eastern third of the B BALZAC DRIFT

B BALZAC DRIFT
Glacial till and associated stratified drift. Till of the Balzac drift is characteristically silty with a grain-size composition of 10-20 percent sand, 45-80 percent silt, and 20-40 percent clay. It is commonly stoney and contains abundant tan and yellow limestone and quartzite rocks in addition to rocks similar to the underlying Spy Hill drift. Red and purple banded quartzite rocks are less abundant than in the Spy Hill drift. Granitic and gneissic rocks are present but are rare. Lithologically the Balzac drift is very similar to the underlying lochend drift. The two drifts included within the Balzac drift have not been differentiated on a lithologic basis. The separation of the area underlain by sitty drift into three units. the Lochend drift and the A and 8 units of the Balzac drift, is based almost entirely on the existence of two morphologically defined ice-marginal positions that have been traced across the entire area. In the north, these margins are marked primarily by marginal ridges, across which the morphological character of the landscape changes. In the south, however, marginal melturater channels border much of the length of the margins. The two units of the Balzac drift occupy most of the north-central part of the study area and extend as a narrow belt southward through the center of the area.

LOCHEND DRIFT
Glacial till and associated stratified drift. Till of the Lochend drift is
characteristically silty, with a grain-size composition of 10-20 percent sand, 45-60
percent silt and 20-40 percent clay_It is commonly stoney and contains abundant
fragments of Tertiary and Cretaceous sandstone and siltstone. The pebble fraction
contains abundant tan and yellow limestone and quartzite rocks in addition to
rocks similar to the underlying Spy Hill drift. Granitic and gneissic rocks are
present but rare. The Lochend drift is recognized in a narrow zone along the top
and eastern flank of the Big Hill upland. To the south it is even narrower, and in
places, is overlapped by the younger Balzac drift. The western margin of the
Lochend drift is marked by a simple sharp disintegration ridge along most of the
Big Hill upland and by marginal meltwater channels in the south. S SPY HILL DRIFT

S SPY HILL DRIFT
The Spy Hill drift is the oldest of the surface stratigraphic units in the Calgary area. In the western part of the area, it consists of till and associated stratified drift that was deposited from a glacier that flowed into the Calgary area from the west via the valley of the Bow River. The till is generally heavy textured with a grain size composition of 15-20 percent sand, 40-45 percent silt and 40-45 percent clay. Pebbles are abundant along the Bow River valley. Further to the south the pebble content decreases. The pebble fraction is characterized by dark grey to black limestone and purple and pink banded quantrite. Grantic and gelesies rock types are absent. Till of the Spy Hill drift is recognized beneath lake sediment throughout the Calgary area. It occurs along the buried ancestral Bow Valley as far east as DeWinton beneath younger drifts.

In the eastern part of the area west of the mapped limit of the Lochend drift, the

Spy Hill includes a younger unit of till and associated stratified drift that was deposited by a glacier that advanced from the east. The composition of the till is gradational to that of the Lochend drift, of which it is a lateral equivalent.

This is the chronostratigraphic designation for all the sub till upland gravel in the Calgary area. Well sorted, rounded gravel containing abundant carbonate rock and quartite clasts and no granitic or genesic rocks. In many places it crops out and is cemented with secondary carbonate. Tertiary gravel caps the Big Hill and Broadcast Hill uplands.

KF CRETACEOUS FORMATIONS Brazeau Formation: sandstone, mudstone, siltstone and conglomerate (non-marine). Alberta Group: Wapiabi Formation: shale, siltstone and minor sandstone (marine).

DESCRIPTION OF LITHOLOGIC SYMBOLS

less than 45% material coarser than 0.002 mm (sand) and less than 40% of material coarser than 0.004 mm but finer than 0.0625 mm (sitt). Also includes units of interbedded clay and sitt (as defined above and below) in which the proportions of beds of clay meet the same criteria.

s sand: Sediment containing less than 15% material finer than 0.004 mm (clay) and less than 30% material coarser than 0.004 mm but finer than 0.062 mm (silt). Also includes units of interbedded sand and silt (as defined above) in which the proportions of beds of sand meet these same criteria.

ssi sand and silt: A mixture of sand and silt, as defined above, in which sand content is greater than 50% but less than 75%. In some places it consists of interbedded sand and silt in the above proportions; in other places it consists of an intimate mixture of sand-size and silt-size sediment in the above proportions.

sg sand and gravel: A mixture of sand, as defined above, and gravel, in which the gravel content is less than 30%. In some places it consists of interbedded sand and gravel, in other places it consists of an intimate mixture of sand and gravel-size material.

g gravel: Sediment containing more than 30% of material greater than 8.0 mm in diameter and less than 50% silt or clay as defined above.

DESCRIPTION OF MORPHOLOGIC SYMBOLS

SYMBOL DESCRIPTION

si silt: Sediment containing less than 50% material coarser than 0.0625 mm (sand) and less than 25%, material finer than 0.004 mm (clay). Also includes units of interbedded silt (as defined above) and clay (as defined above) or sand (as defined below) in which the proportions of beds of silt meet these same criteria.

sic silt and clay: A mixture of silt and clay, as defined above, in which clay co tent is greater than 30% but less than 55%. In some places it consist of interhedded silt and clay beds in the above proportions; in other places it consists of an intimate mixture of silt-size and clay-size sediment in the above proportions.

gently undulating: 1° to 2° maximum slope angle.

transverse ridge: glacially deposited ridges oriented perpendicular to the direction of glacial flow, commonly referred to as "washboards."

slope eroded: slope eroded by a combination of slopewash and mass

DESCRIPTION OF LITHOGENETIC SYMBOLS

ANTHROPOGENIC SEDIMENT

EOLIAN SEDIMENT

ANTHROPOGENIC SEDIMENT

-MF

Manmade fill

A highly diverse unit that can have any composition from clay to boulders.
Generally poorly sorted loamy material consisting of silt, sand and clay.
Recompacted pebble loam is a common material, which makes identification difficult in some cases. Commonly contains refuse such as fragments of concrete pavement and drainage tiles. In many places, other refuse such as car bodies and household or industrial waste is incorporated. Ranges from structureless to bedded. Ranges from loose to dense where it has been compacted. The gently inclined planar layering in some compacted fill can be very difficult to differentiate from natural sedimentary bedding even on close examination although it is generally more evidently composed of granules of material that have been pressed together. Brown to grey colour.

-MP Mammade pond sediment
Sediment in pond may be absent if sediment influx is prevented. Sediment is a
poorly sorted mixture of sand, silt and clay if natural sedimentation is allowed
after pond excavation. Sediment may be diverse if man has been adding sediment
to pond; may include sand, silt, clay, stones and household and industrial waste.

HILLSLOPE SEDIMENT Includes a wide range of sediment types from clay to boulders. Composition of material at any site is directly related to the material upstope. Abrupt compositional variation is common. Colour generally grey to brown, locally rusty red. Tough when dry; soft when wet.

HC Hillstope colluvium
Sediment is mainly completely eroded and reconstituted material moved to
deposition site by creep, or channel or sheet wash. In places clasts of recognizable
upslope sediment are present.

Includes a wide range of sediment type from clay to boulders. Composition of material at any site is directly related to composition of material upslope. Sediment of this unit varies from blocks of the original material that have slid or fallen to reconstituted sediment that bears no evidence of original form. Abrupt compositional variation is common.

EB Eolian bed-load sediment
Medium to very fine grained sand; very well sorted, loose, unbedded to obscurely
bedded in places. Organic matter may form discrete layers usually with a diffuse
lower boundary. Light grey to light brown, locally reddish brown. Commonly in
dunes and blowouts.

POND SEDIMENT

PS Pond Sediment
Poorly sorted mixture of silt, clay and sand. Loamy and silty material most

common. Commonly contains considerable disseminated organic matter. Bedding generally obscure. Colour black to grey, in places, rusty brown. Externely hard when dry, tough to soft when wet. Fossils commonly include mollusks, especially gastropods. (slough sediment). FLUVIAL SEDIMENT

AF Fluvial fan sedimen Bedded silt, sand and gravel with minor clay. Generally loamy mixtures. Bedding distinct to obscure, bedding commonly cut by overlying beds in cut and fill relationship. Organic matter accumulations occur in discrete bands within the unit. Bedding dips uniformly away from fan source. Grey to brown, locally reddish brown. In most fans, channel and overbank facies have not been distinguished. However, along the northern edge of the Broadcast Hill upland several large fans are sufficiently well developed that the channel facies could be separated out. Numerous small gravel pits are developed in this facies.

Fluvial ice contact sediment
Gravel, sandy gravel, gravelly sand and sand. Generally very poorly sorted with
large variation in grain size both within individual beds and between adjacent beds
Bedding is distinct to obscure with planer bedding, large and-small scale trough
cross bedding. Generally contains inclusions of unsorted material. Bedding
commonly contorted by folds and faults. Grey to light brown.

FO Fluvial overbank sediment Poorly sorted slit, sand and clay. Generally a loamy mixture. Contains pebbles in thin lenses near streams. Bedding present but obscure in many places. Organic matter present generally in discrete layers although disseminated throughout unit in places. Plant roots and branches are common inclusion. Grey to light grey. Hard to moderately hard when dry, moderately hard to soft when wet. LACUSTRINE SEDIMENT

Lacustrine traction-load sediment
Very fine sand, slit and minor clay. Moderately well sorted within individual beds
but adjacent beds vary from clay to fine sand in some places. Small scale troughshaped cross bedding and ripple bedding dominate in the sand and coarse slit
beds. Generally light grey in the subsurface but oxidizes readily to yellow or light
brown upon exposure. Soft where saturated.

WW Wave-washed sediment.
 Thin sandy gravel lag formed by wave erosion of underlying glacial sediment.