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DETAILED SOIL SURVEY

of

THE CAMROSE AREA

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INTRODUCTION

For more than three decades planners and engineers have used reconnaissance soil survey maps for information concerning the soils of their particular area. These maps were designed primarily for inventory purposes and as guides for determining land capability for agriculture (3). The soil properties affecting agricultural uses of soil are similar to those affecting urban uses. Detailed soil surveys (4,7) give users more information and thus are useful guides in developing comprehensive land use plans for urban development.

This report describes a detailed soil survey and soil interpretations of approximately 1100 acres in selected areas within the city of Camrose, Alberta. Camrose is located in Townships 46 and 47, Range 20, west of the 4th meridian. It is approximately 55 miles southeast of Edmonton and can be reached by Highways 14, 21 and 13.

The map, printed at a scale of 410 feet to the inch, shows the location and extent of the soil areas. The legend included with the map indicates the classification of the soils.

The report describes the cultural and physical features of the area, classification of the soils, and some of the physical properties of the soils. A list of limiting soil properties and a table of soil interpretations are also included. The soil interpretations indicate the degrees of limitations (slight, moderate or severe) that each of the soils have for designated uses.

A glossary of the more frequently used terms is included in an appendix to this report.

CULTURAL AND PHYSICAL FEATURES OF THE AREA

At present the land in the map area is being used primarily for agricultural cropland, hay and pasture with a minor amount being used for residential development and recreation.

The terrain is composed of gently undulating to undulating uplands, rough broken land adjacent to the stream courses and gently undulating river bottom land.

The soils of the upland area are developed from till and variable lacustrine and alluvial materials ranging in texture from sand to clay. Till is unsorted material deposited by the glaciers without subsequent movement by wind or water. The lacustrine materials were deposited in a glacial lake. The soils of the river bottom land have been deposited by running water in relatively recent times.

Fairly high salinity is associated with many of the soils of the area. This condition exists in areas of groundwater discharge where salts have been brought relatively near the surface by a fluctuating water table.

The area is drained by the Battle River drainage system.

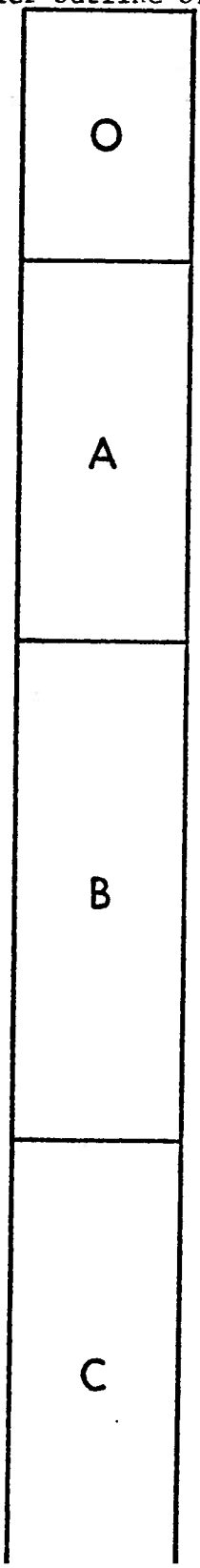
THE SOILS

I SOIL DEVELOPMENT

Soil is an organic or mineral layer (other than consolidated bedrock) thicker than 4 inches occurring naturally on the earth's surface. This layer has been subjected to the factors of soil development - climate, vegetation, living organisms, topography and the properties of its parent material over a sufficient period of time to cause changes in its chemical and physical composition. These changes are reflected in the development of a sequence of

horizons as indicated in Figure 1. The recognition of differences in the properties of each horizon permits the classification of soils.

Figure 1. A sketch of a soil profile showing major soil horizons and a brief outline of difference in properties.



O - an organic horizon at the surface. May be further subdivided on the basis of degree of decomposition. Typical of organic soils and peaty humic gleysols. Thin or absent in other soils.

A - a mineral horizon at or near the surface. May be a dark colored horizon in which there is an accumulation of organic matter or a light colored horizon from which clay and humus have been leached. May be carbonated or saline in some soils.

B - a mineral horizon below the A horizon in which there is no appreciable organic matter. There may be a change in color or structure, an accumulation of clay, or dark coatings on ped surfaces. Is mottled or gleyed in Gleysols and gleyed intergrades.

C - a mineral horizon below the B horizon which is comparatively unaffected by soil-forming processes except for accumulation of salts and carbonates. Is mottled or gleyed in Gleysols and gleyed intergrades.

II. SOIL CLASSIFICATION AND MAPPING

The legend shown on the accompanying map indicates the classification of soils in the map area. The soils were mapped and classified according to the System of Soil Classification for Canada (2).

Fifteen soil associations were mapped - four on till, four on fine textured lacustrine deposits, two on medium textured lacustrine deposits, two on alluvial parent material, one on gravelly outwash, and two on recent alluvial river bottom deposits.

Due to soil variability, soil mapping was carried out on a soil association basis. Each association may contain one or more subgroups; the dominant subgroup representing 60 per cent or more of the soils in the association and the significant less than 40 per cent. Each mapping unit of an association contains unique parent materials, terrain, and soil characteristics.

The use of soil associations is not regarded as a shortcoming of the mapping procedure because most of the inseparable units, although of significance taxonomically, are not sufficiently different in regards to soil properties to affect their use for urban development.

In the following section, a generalized description of the soil associations used in the Camrose area is presented. A detailed listing of the mapping units within each soil association is shown in the soil map legend.

III. SOIL ASSOCIATIONS

Beaumont Soil Association

The Beaumont association consists mainly of well to moderately well drained Black Chernozemic soils developed from till having a lower salt content than the parent material of the Gwynne association. They occur in the southern, western and northern portions of the area on gently undulating topography.

The surface soil (A horizon) is well granulated, slightly acidic to neutral in reaction, ranges in texture from sandy loam to loam, and is from 8 to 16 inches thick.

The B horizon of mapping unit 1 has a weak blocky structure while the B horizon of mapping unit 2 has a somewhat more pronounced blocky structure with dark coatings on its ped faces. The B horizon is neutral to mildly alkaline in reaction, ranges in texture from loam to clay and is usually from 12 to 20 inches thick.

The C horizon is calcareous, mildly alkaline in reaction, and ranges in texture from loam to clay loam. Numerous angular pebbles occur throughout this profile.

Gwynne Soil Association

The Gwynne association consists of well to imperfectly drained Black Solonetzic soils developed from weakly to moderately saline till. They occur throughout the map area on gently undulating to undulating topography.

The surface soil (A horizon) is slightly acidic to neutral in reaction, ranges in texture from sandy loam to loam, and is from 6 to 12 inches thick.

The B horizon has a strong blocky to columnar structure, is extremely hard when dry and has dark organic stainings on the ped surfaces. The B horizon is mildly alkaline in reaction and ranges in texture from loam to clay. (The B horizon in Black Solonetz soils is more impermeable to air, water, and roots than in the Black Solod soils, especially in the upper portion of the horizon.)

The C horizon is weakly to moderately saline, mildly to moderately alkaline in reaction, and ranges in texture from loam to clay loam. Stones occur throughout the profile.

Edberg Soil Association

The Edberg association consists of Saline Black soils with a significant occurrence of Black Solonetz and Black Solod soils. They are moderately well to imperfectly drained and have developed from weakly to moderately saline till. Saline Black soils have no B horizons and may have salts in their A horizons.

The topsoil (A horizon) is well granulated, mildly to moderately alkaline in reaction, and ranges in texture from sandy loam to loam.

The subsoil (C horizon) is weakly to moderately saline, moderately alkaline in reaction, and ranges in texture from loam to clay loam. Stones occur throughout the profile.

Stoney Soil Association

The Stoney association consists of poorly to very poorly drained soils developed from non-saline and/or saline till. They are found in depressional positions throughout the area. These soils may have up to 16 inches of sedge peat at the surface.

The surface soil (A horizon) is mildly to moderately alkaline in reaction, may be saline, ranges in texture from sandy loam to loam, and is from 6 to 12 inches thick.

The subsoil (B and C horizons) is moderately alkaline in reaction, may be saline, and ranges in texture from loam to clay. Stones occur throughout the profile.

Ellerslie Soil Association

The Ellerslie association consists dominantly of Black Chernozemic soils with a significant occurrence of Black Solod soils. They are moderately well to imperfectly drained and occur on gently undulating topography. The parent material is a variable, calcareous, stone-free lacustrine sediment. There is a relatively small acreage of these soils.

The topsoil (A horizon) is slightly acidic to neutral in reaction, ranges in texture from very fine sandy loam to silt loam, and is from 8 to 16 inches thick.

The B horizon is weak to moderate blocky in structure, neutral to mildly alkaline in reaction, ranges in texture from loam to clay, and is from 12 to 20 inches thick. It may be hard when dry and have dark organic stainings on ped surfaces.

The C horizon is mildly to moderately alkaline, may be weakly saline, and ranges in texture from very fine sandy loam to clay.

Mill Woods Soil Association

The Mill Woods association consists of moderately well to imperfectly drained Black Solonetzic soils occurring on gently undulating topography in the southern portion of the area. The parent material is a weakly to moderately saline, fine textured lacustrine deposit.

The topsoil (A horizon) is slightly acidic to neutral in reaction, ranges in texture from very fine sandy loam to silt loam, and is from 6 to 12 inches thick.

The B horizon forms an extremely hard clay pan, when dry, in Black Solonetz soils which severely limits the penetration of air, water and roots. In Black Solod soils, the upper portion of the B horizon is somewhat more permeable. It is mildly to moderately alkaline in reaction and ranges in texture from loam to clay.

The C horizon is weakly to moderately saline, moderately alkaline in reaction, and ranges in texture from very fine sandy loam to clay.

Argyll Soil Association

The Argyll association consists of Alkaline Solonetz soils. The soils are affected by sodium salts to a greater degree than soils of the Mill Woods

association. They are imperfectly drained soils developed from a moderately to strongly saline, fine textured lacustrine deposit and occur in level areas. A small acreage of Argyll soils is found in the northwestern and southern portions of the area.

The topsoil (A horizon) is hard and impermeable, neutral to mildly alkaline in reaction, ranges in texture from clay loam to clay, and is from 3 to 6 inches thick.

The B and C horizons resemble those of the Black Solonetz soils of the Mill Woods association.

Ohaton Soil Association

The Ohaton association consists mainly of Black Chernozemic soils with a significant occurrence of Black Solonetzic soils. They are well drained soils occurring on gently undulating topography and developed from calcareous, medium textured lacustrine sediments. Saline till is often found at fairly shallow depths. These soils occur in the eastern and southeastern portions of the area.

The topsoil (A horizon) is slightly acidic to neutral in reaction, ranges in texture from loam to silt loam, and is from 12 to 18 inches thick.

The B horizon is weak to strong blocky, mildly alkaline in reaction, and ranges in texture from silty clay loam to clay loam. Where the saline till is within 2 feet of the surface, the B horizon is hard, strong blocky, and has dark organic stainings. However, if the till does not occur near the surface, the B horizon is usually friable. In Saline Black soils, the B horizon is either very thin or absent.

The C horizon is calcareous and may or may not be saline. It is mildly to moderately alkaline in reaction and ranges in texture from very fine sandy loam to silty clay loam.

Bawlf Soil Association

The Bawlf association consists of imperfectly drained Black Chernozemic soils that have salts relatively near the surface due to the effects of groundwater discharge. They occur on level to gently undulating topography in the northeastern, eastern, and southeastern portions of the area. These soils are developed from the same parent material as soils of the Ohaton association. Saline till often occurs at fairly shallow depths.

The topsoil (A horizon) is mildly alkaline, may be saline, ranges in texture from loam to silt loam and is from 10 to 14 inches thick. The subsoil (C horizon) is saline, mildly to moderately alkaline and ranges in texture from very fine sandy loam to silty clay loam.

Hercules Soil Association

The Hercules association consists of Gleysolic soils. These are poorly drained soils developed from the same material as soils of the Ellerslie, Mill Woods and Argyll associations. These soils may have up to 16 inches of a peaty surface layer and occur in depressions in the northern portion of the area.

The topsoil (A horizon) is neutral to moderately alkaline in reaction, may be saline, ranges in texture from very fine sandy loam to silt loam and is from 6 to 16 inches thick.

The subsoil (B and C horizons) is mildly to moderately alkaline in reaction, may be saline and ranges in texture from very fine sandy loam to clay. All horizons are strongly gleyed.

Bigstone Soil Association

The Bigstone association consists of well to rapidly drained Black Chernozemic soils. They are developed on alluvial sands and occur on level to undulating topography in the northeastern and eastern portions of the area.

The topsoil (A horizon) is friable, slightly acidic to neutral in reaction, ranges in texture from fine sandy loam to loam and is from 12 to 24 inches thick.

The subsoil (B and C horizons) is neutral to mildly alkaline in reaction and ranges in texture from fine sand to loam.

Millet Soil Association

The Millet association consists of poorly drained soils developed from alluvial sands. They are found in depressional positions in the eastern and southeastern portions of the area.

The topsoil (A horizon) is neutral to moderately alkaline in reaction, may be saline, and is moderately gleyed. It ranges in texture from loamy fine sand to loam and is from 8 to 12 inches thick.

The subsoil (B and C horizons) is neutral to moderately alkaline in reaction, strongly gleyed, may be saline, and ranges in texture from fine sand to loam.

Forestburg Soil Association

The Forestburg association consists of poorly drained Gleysolic soils developed on alluvial gravels. They are found along Stoney Creek in the northwestern portion of the area.

The topsoil (A horizon) is neutral to mildly alkaline in reaction, ranges in texture from loamy sand to fine sandy loam and is from 8 to 12 inches thick.

The subsoil (B and C horizons) is neutral to mildly alkaline in reaction, and stones may range from 2 to 50 mm in diameter.

Galahad Soil Association

The Galahad association consists of imperfectly drained Regosolic soils developed from recent alluvium along Stoney Creek in the southern portion of the area. One mapping unit was recognized in this association. This mapping unit does not occur in the Galahad soil association previously described in the Ponoka area due to the relative absence of salts in that area.

The topsoil (A horizon) is neutral to moderately alkaline in reaction and may be saline. The subsoil (C horizon) is saline, neutral to moderately alkaline in reaction and ranges in texture from sand to silty clay loam. All horizons are moderately gleyed.

Menaik Soil Association

The Menaik association consists of poorly to very poorly drained Gleysolic soils developed from recent alluvium in the same area as the Galahad association. The peaty phase of these soils has organic surface layers up to 16 inches thick. The topsoil and subsoil is similar to soils of the Galahad association except for stronger gleying.

Miscellaneous Land Types

Areas disturbed by man's activities and areas that are considered too steep for urban use have been delineated as Disturbed Land and Rough Broken Land respectively. Such areas have been excluded from detailed inspection in the soil survey and may require on-site investigation where development is anticipated.

ENGINEERING PROPERTIES OF THE SOILS

Samples were taken from representative soil horizons in the area. Engineering tests were carried out on the samples and the results are shown in Table 1. A brief description of the significance of each analytical parameter is given as follows.

1. Mechanical Analyses

The mechanical analyses were made by combined sieve and hydrometer analysis. The data shows the particle size distribution with the soils; the amounts of the gravel and sand fractions are determined by sieving while the silt and clay are determined by sedimentation techniques. The amount of each soil separate contained in a soil determines its texture. Where texture is known, approximations and estimates can be made of many soil properties, such as bearing value, water-holding capacity, liability to frost-heave, adaptability to soil-cement construction etc.

2. Plasticity

In soil mechanics, plasticity is defined as that property of a material which allows it to be deformed rapidly, without rupture, without elastic rebound, and without volume change (5).

Tests have been devised to determine the moisture content of a soil when it changes from one major physical condition to another. These tests conducted on the minus No. 40 sieve-size material, have been used as key factors in classifying soils for structural purposes.

The tests used for estimating plasticity are plastic limit, liquid limit and plasticity index. The plastic limit is the moisture content at which the soil passes from a semisolid to a plastic state. The liquid limit is the moisture content at which the soil passes from a plastic to a liquid state.

Table 1. Engineering Test Data of Representative Soil Samples From Camrose Area

Mapping Associations	Mapping Units	Depth From Surface in inches	Elect. Cond. mmhos/cm	% Sulphate	Grain Size Analysis: Per Cent Passing Sieve 1"	3/4"	5/8"	No.4	No.10	No.40	No.200	Per Cent Smaller Than .05mm	.005mm	.002mm	.001mm	Atterberg Limits: Liquid Limit	Plastic Limit	Plasticity Index	Textural Classification: AASHO	Unified	USDA
Ohaton	Oht 1/t	22-66	3.0	.11	100	100	100	100	100	99	87	87	36	29	24	30	22	8	A4 (8)	CL-ML	Sil
		66-82	2.7	.09	100	100	100	100	99	96	68	68	41	34	31	36	24	12	A6 (8)	CL-ML	CL
		82-118	-	-	100	100	100	100	99	96	68	68	31	24	20	28	21	7	A4 (7)	CL-ML	CL
	Oht 1	46-94	-	-	100	100	100	100	100	99	88	88	40	28	22	34	22	12	A6 (8)	CL-ML	SiCl
	Oht 1	16-48	1.5	.02	100	100	100	99	99	96	71	71	42	34	32	39	24	15	A6 (9)	CL-ML	CL
		48-100	0.9	.01	100	100	100	100	99	96	69	69	40	32	26	35	22	13	A6 (8)	CL-ML	CL
	Oht 2/t	20-54	7.4	.35	100	100	100	100	100	97	79	78	32	27	22	30	21	9	A4 (8)	CL	Si
		54-80	4.9	.22	100	100	100	100	100	98	81	81	41	30	27	35	25	10	A4 (8)	ML	SiC
Bawlf	Bwf 1/t	20-32	7.5	.36	100	100	100	100	100	98	73	73	46	38	32	38	21	17	A6 (11)	CL	CL
		32-82	3.0	.11	100	100	100	100	99	95	71	70	42	33	27	35	24	11	A6 (8)	ML	CL
Beaumont	Bmt 2	29-61	7.6	.35	100	100	100	100	99	95	80	79	48	39	33	39	24	15	A6 (10)	CL-ML	CL
		61-79	6.2	.26	100	100	100	100	99	96	74	73	46	37	33	38	24	14	A6 (10)	CL-ML	CL
	Bmt 1	32-52	1.3	.01	100	100	99	98	97	93	72	71	43	36	31	34	20	14	A6 (9)	CL	CL
		52-92	2.1	.06	100	100	100	99	98	93	73	73	41	33	30	37	21	16	A6 (9)	CL	CL
Gwynne	Gw 2	16-46	7.8	.49	100	100	100	100	100	96	73	71	45	36	33	41	20	21	A7 (11)	CL	CL
		46-96	6.7	.41	100	100	98	98	98	94	72	72	45	37	31	38	23	15	A6 (8)	CL-ML	CL
	Gw 2	16-72	10.6	.60	100	100	98	98	97	93	70	70	44	37	32	40	24	16	A6 (9)	CL	CL
	Gw 1	12-42	12.2	.68	100	100	100	100	99	97	72	-	-	-	-	40	22	18	A6 (10)	CL	CL
		42-74	10.5	.57	100	100	100	100	98	94	74	73	45	36	30	42	25	17	A6 (10)	CL-ML	CL
	Gw 1	18-54	8.2	.41	100	100	100	100	99	95	70	70	42	37	32	43	23	20	A7 (11)	CL	CL
		54-90	7.2	.35	100	100	100	100	99	95	67	66	40	32	28	37	22	15	A6 (10)	CL	CL

The plasticity index is the numerical difference between the liquid limit and the plastic limit. This parameter gives the range in moisture contents at which a soil is in a plastic condition. A small plasticity index, such as 5, indicates that a small change in moisture content will change the soil from a semisolid to a liquid condition whereas a large plasticity index, such as 20, shows that considerable water can be added before a soil becomes liquid.

3. Activity Number

Activity is a term applied to plastic soils in reference to a change in volume that takes place in the presence of varying moisture conditions. The more active a soil, the greater, in general, will be its change in volume when passing, for example, from the liquid limit to the shrinkage limit. The activity number is defined as the plasticity index divided by the per cent by weight of clay size particles. Clays for which the activity number is less than .75 are considered relatively inactive; normal activity is associated with values between .75 and 1.5; values greater than 1.5 indicate progressively more active clays (5).

4. Soil Classification

a. AASHO Classification System

The American Association of State Highway Officials system is an engineering property classification based on field performance of highways. In the AASHO system soil material is classified into seven groups. Each group having about the same general load-carrying capacity. The groups are designated A1 to A-7; the best soils for road subgrades are classified as A-1, with the poorest soils classified as A-7. In recent years these seven basic groups have been divided into subgroups with a group index devised to approximate within group evaluations. Group indexes range from 0 for the best subgrades to 20 for the poorest.

b. Unified Soil Classification System

In the Unified Soil Classification System, the soils are identified according to their textures and plasticity and are grouped according to their performance as engineering construction materials. In this system, soil materials are divided into coarse grained soils, fine grained soils and highly organic soils. The coarse grained are subdivided into eight classes, the fine grained into six classes, and there is one class of highly organic soils.

Coarse grained soils are those having 50 per cent or less of material passing the No. 200 sieve; fine grained have more than 50 per cent material passing the No. 200 sieve. The letters G, S, C, M, and O stand for gravel, sand, clay, silt, and organic material respectively. The designation CL, for example, indicates silts mixed with clays whereas SC shows sands with an appreciable amount of fines. Also recognized in the Unified System are organic silts (OL), organic clays (OH), and peat or other highly organic soils (PT).

c. United States Department of Agriculture System

The system of textural classification used by Canadian soil scientists is known as the USDA system. There is some variation in the size limits of the particles between the USDA system and the two engineering systems but the differences are not great. A comparison of the different systems is given in the PCA Soil Primer (6).

SOIL SURVEY INTERPRETATIONS

During the course of a soil survey pedologists make numerous soil observations and descriptions to assist with the compilation of the soils map and report. The soils map, as a result, may appear complex to people not familiar

with pedology. Soil survey interpretations are therefore included with the report so that the soils information may be more easily understood.

Soil survey interpretations should be treated as evaluations of soil performance not as recommendations for the use of soils. They are useful in aiding site selection and assisting the planner, engineer or developer. However, the interpretations are not intended to eliminate on-site investigations for specific structures but are intended to be an aid in planning these investigations to reduce their number and minimize cost.

For each use the soils are rated in terms of degree of limitation - slight, moderate or severe. These categories are defined as follows: slight- soils with few known limitations for the use indicated, moderate- soils that have one or more properties that limit their use. Correcting these factors will increase construction costs but if not corrected maintenance costs will increase. Severe - soils that have one or more properties that seriously limit their use. The cost of development may be very high but using these soils without employing corrective measures could result in failure. The decision as to whether or not a soil will be used for a specific purposes, regardless of the soil limitation, is beyond the scope of this report.

The four main components of community development considered most important to this study are: (1) lawns and landscaping, (2) sewage disposal, (3) homesite locations with basements, and (4) streets and roads.

Soil properties and landscape features that appear important in affecting the designated uses of the soils in the Camrose area are presented in Table 2.

Table 2. Limiting Properties of Soils

1. Seasonal or permanent high water table
2. High subsoil salinity
3. High topsoil salinity
4. Low permeability
5. Poor trafficability
6. Steep slopes
7. High flooding hazard
8. Thin topsoil

The suitability of various mapping units for the selected uses are shown in Table 3. These ratings - slight, moderate or severe - are determined on the basis of the properties listed in Table 2. The principal limiting properties are shown by figures that correspond to the numbers in Table 2.

LAWNS AND LANDSCAPING

The soils are rated for this use assuming they will be used for growing turf, shrubs and/or trees. Suitable soils are those capable of supporting a turf that can withstand traffic and control erosion. Soil properties considered in rating the soils for this use are surface texture as it relates to trafficability, topsoil salinity, thickness of topsoil, depth to a seasonal high water table, and steep slopes. Soils with the highest potential for this use are those of the Beaumont, Ellerslie, Ohaton, and Bigstone associations. Table 3 shows the limitations of each mapping unit for lawns and landscaping.

SEWAGE DISPOSAL

The successful operation of a septic tank tile disposal field depends upon the ability of the soil to absorb and filter the effluent that passes through the field. At the same time consideration must be given to the possible contamination of groundwater systems in areas characterized by extremely permeable soils. Soil rating properties considered for this use are depth to a seasonal high water table and the texture as it relates to absorption and groundwater contamination.

Table 3. Soil Suitability for Selected Uses

Soil Associations	Mapping Units	Soil Limitation For: Lawns and Landscaping	Sewage Disposal	Homesite Locations with Basements	Street, Road and Parking Lot Locations
Beaumont	Bmt 1	S	S	S	S
	Bmt 2	M4	M4	M2	S
Gwynne	Gw 1	V4,5,8	V4	V2	S
	Gw 2, Gw 4	M-V,4,5,8	V4	M-V2	S
	Gw 3	V1,4,5,8	V4	V2,1	M1
Edberg	Edg 1	M-V3	M4	V2,1	S
Stoney	Sy 1	V1	V1	V1	V1
	Sy 2	V1,3	V1	V2,1	V1
Ellerslie	Ell 2	S	S	S	S
Mill Woods	Ms 2, Ms 2/t	M-V4,5,8	V4	M2	S
Argyll	Ag 2	V4,5,8	V4	V2	S
Dhaton	Oht 1	S	S	S	S
	Oht 2/t	M3	M4	M-V2	S
Bawlf	Bwf 1, Bwf 1/t	M-V3	S	V2,1	S
Hercules	Hrl 1	V1	V1	V1	V1
	Hrl 2	V1,3	V1	V2,1	V1
	Hrl 4	V1,3,6	V1,6	V2,1,6	V ,6
Bigstone	Bgt 1, Bgt 3	S	S	S	S
Millet	Mlt 2	V1,3	V1	V2,1	V1
	Mlt 3	V1	V1	V1	V1
Forestburg	Fbg 1	V1,5	V1	V1	V1
Galahad	Gld 4	V7,1,5	V1,7	V7,2,1	V7
Menaik	Mnk 4, Mnk 4p	V7,1,5	V1,7	V7,2,1	V1,7
Rough Broken	RB	V6	V6	V6	V6

Slight - S; Moderate - M; Severe -V. 1 - seasonal or permanent high water table; 2 - high subsoil salinity; 3 - high topsoil salinity; 4 - low permeability; 5 - poor trafficability; 6 - steep slopes; 7 - high flooding hazard; 8 - thin topsoil.

Soils considered to have only a slight limitation for this use are those of the Beaumont, Ellerslie, Ohaton, and Bigstone associations. The rating of the other mapping units for this use are shown in Table 3.

HOMESITE LOCATIONS WITH BASEMENTS

The soil properties having the greatest significance for this use are subsoil salinity, depth to a seasonal or permanent high water table and steep slopes. A major concern in this area is the potential corrosion of concrete structures because of subsoil salinity. The principal soluble salt in the soil solution is sodium sulphate. The mechanism of the destructive action of the sulphate ion on concrete is well documented. Soils of the Gwynne association have C horizons with sulphate contents that range from 0.30 to 0.80 per cent.

The Concrete Manual of the United States Bureau of Reclamation (8) recognizes the following concrete corrosion categories: negligible attack - less than 0.10 per cent; mild but positive attack - 0.10 to 0.20 per cent; considerable attack - 0.20 to 0.50 per cent; severe attack - greater than 0.50 per cent. Preventive measures should include the following; use of sulphate resisting cement, low water-cement ratio, high cement content, waterproof coatings, drainage and reinforcing cover.

Soils with the highest potential for homesite locations are those of the Bigstone association, mapping unit 1 of the Beaumont association, the Ellerslie association, and mapping unit 1 of the Ohaton association. The ratings of the other soils are shown in Table 3.

STREETS, ROADS AND PARKING LOT LOCATIONS

The soil properties considered in rating the soils for this use include texture, drainage and steep slopes. Generally the soils in this area have good bearing strength. Wet soils such as those of the Hercules, Millet and Stoncy associations require special engineering practices wherever this use is planned.

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Mr. Z. Widtman drafted the final soils map. Messrs. J. Beres and C. Veauvy determined the physical properties and Messrs. W. McKean and A. Schwarzer the chemical properties of the soils. Mrs. C. Novasky edited and typed the report. Field assistance was given by Messrs. E. Stolarchuk, A. Twardy, and Z. Widtman. Special acknowledgment is given to the many property owners whose cooperation allowed soil investigations to be conducted on their land.

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APPENDIX

Aeolian material - material deposited by wind.

Alluvial material - material deposited by water.

Association, Soil - a group of soils geographically associated in a characteristic repeating pattern in the landscape.

Calcareous material - material containing free carbonates which effervesces visibly when treated with dilute hydrochloric acid.

Cation - an ion carrying a positive charge of electricity. The common soil cations are calcium, magnesium, potassium, sodium and hydrogen.

Eluviation - the removal of soil material in suspension or in solution from a layer or layers of a soil.

Field capacity - the amount of moisture held in a soil after the free water has been drained away into drier soil material below.

Gleying - a reduction process that takes place in soils that are saturated with water for long periods of time.

Horizon - a layer in the soil profile approximately parallel to the land surface with more or less well-defined characteristics that have been produced through the operation of soil-forming processes.

Illuviation - the process of deposition of soil material from an upper to a lower horizon in the soil profile.

Intergrade - a soil that possesses moderately well-developed distinguishing characteristics of two or more soil Orders.

Lacustrine materials - material deposited in lake water and later exposed by a lowering of the water or uplift of the land.

Liquid limit - the water content at which a pat of soil, cut by a groove of standard dimensions, will flow together for a distance of 12 mm. under the impact of 25 blows in a standard liquid limit apparatus.

Peat - unconsolidated soil material consisting largely of undecomposed to partially decomposed organic matter accumulated under conditions of excessive moisture.

Ped - a unit of soil structure such as a prism, block or granule formed by natural processes (in contrast to a clod which is formed artifically).

Pedology - those aspects of soil science involving the constitution, distribution, genesis and classification of soils.

Permeability - the ease with which gases, liquids or plant roots penetrate or pass through a bulk mass of soil or a layer of soil.

pH - a notation used to designate the relative acidity or alkalinity of soils and other materials. A pH of 7.0 indicates neutrality, high values indicate alkalinity, lower values acidity.

Plastic limit - water content at which a soil will just begin to crumble when rolled into a thread approximately 3 mm. in diameter.

Plasticity index - the numerical difference between the liquid and plastic limits.

Profile - a vertical section of the soil throughout all its horizons and extending into the parent material.

Saline material - material whose saturated extract has an electrical conductivity greater than 4 mmhos/cm. The grades of salinity are: weakly saline - 4 to 8 mmhos/cm., moderately saline - 8 to 15 mmhos/cm., and strongly saline - over 15 mmhos/cm.

Soil moisture classes - defined in terms of (a) actual moisture in excess of field capacity and (b) the extent of the period during which excess water is present in the plant root zone.

(1) Rapidly drained - soil moisture content seldom exceeds field capacity except immediately after water additions.

(2) Well drained - soil moisture content does not normally exceed field capacity in any horizon, except possibly the C horizon, for a significant part of the year.

(3) Moderately well drained - soil moisture in excess of field capacity remains for a small but significant part of the year.

(4) Imperfectly drained - soil moisture in excess of field capacity remains in subsurface horizons for moderately long periods of the year.

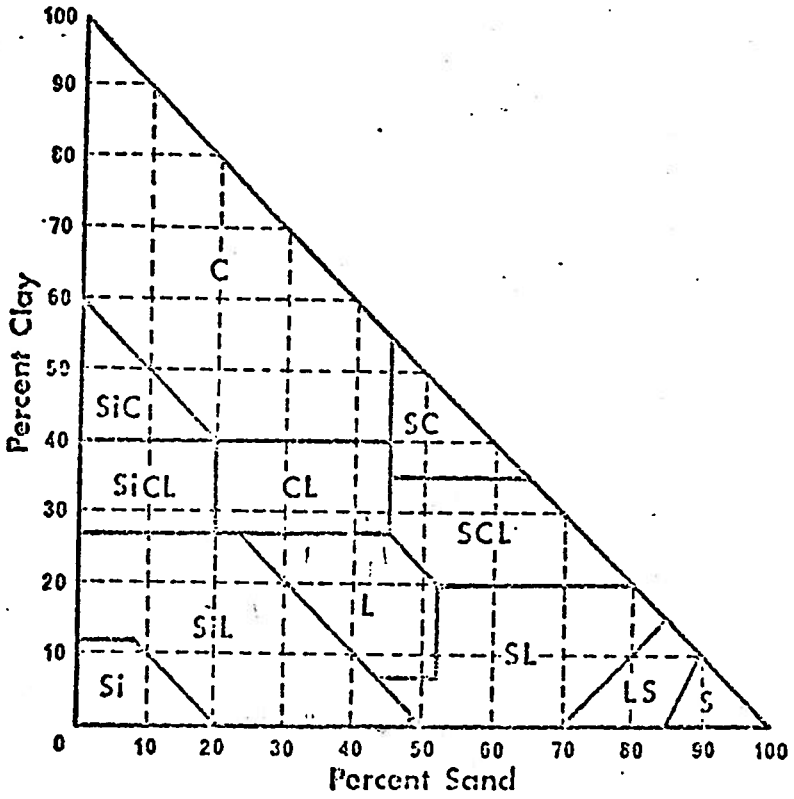
(5) Poorly drained - soil moisture in excess of field capacity remains in all horizons for a large part of the year.

(6) Very poorly drained - free water remains at or within 12 inches of the surface most of the year.

Texture - the composition of the soil on the basis of the per cent of the different soil separates. The soil separates or particle sizes on which textural classes are based are:

Separates	Diam. in mm.*
Gravel (G)	more than 2.0
Very coarse sand (VCS)	2.0 - 1.0
Coarse sand (CS)	1.0 - 0.5
Medium sand (MS)	0.5 - 0.25
Fine sand (FS)	0.25 - 0.10
Very fine sand (VFS)	0.10 - 0.05
Silt (Si)	0.05 - 0.002
Clay (C)	less than 0.002
Fine clay (FC)	less than 0.0002

* USDA Classification



The various textures are grouped as follows: coarse textured - sands (S) and loamy sands (LS); moderately coarse textured - sandy loams (SL) and fine sandy loams (FSL); medium textured - loams (L), very fine sandy loams (VFSL), silt loams (SiL), and silts (Si); moderately fine textured - sandy clay loam (SCL), clay loam (CL), and silty clay loams (SiCL); fine textured - sandy clays (SC), clays (C), and silty clays (SiC); very fine textured - heavy clays (HC).

Topographic classes and symbols -

Simple Topography Single Slopes (regular surface)		Complex Topography Multiple Slopes (irregular surface)	Slope (%)
A	depressional to level	a nearly level	0 to 0.5
B	very gently sloping	b gently undulating	0.5+ to 2
C	gently sloping	c undulating	2+ to 5
D	moderately sloping	d gently rolling	5+ to 9
E	strongly sloping	e moderately rolling	9+ to 15
F	steeply sloping	f strongly rolling	15+ to 30
G	very steeply sloping	g hilly	30+ to 60
H	extremely sloping	h very hilly	over 60

Water holding capacity - the ability of a soil to hold water.

Water table - the upper limit of that part of the soil that is wholly saturated with water.

SOIL SURVEY OF SELECTED AREAS WITHIN THE CITY OF CAMROSE

1972

Soils Legend:

Parent Material	Soil Association	Mapping Unit	Surface Texture	% Slope	Dominant Subgroup	Significant Subgroups
Till	Beaumont	Bmt 1	L	0 - 2	Eluviated Black	Orthic Black
		Bmt 2	L	0 - 2	Solodic Black	Black Solod
	Gwynne	Gw 1	L	0 - 2	Black Solonetz	Black Solod, Saline Rego Black
		Gw 2	L	0 - 2	Black Solod	Black Solonetz, Saline Rego Black
		Gw 3	L	0 - 2	Gleyed Black Solod	Gleyed Black Solonetz
		Gw 4	L	2 - 5	Black Solod	Black Solonetz
	Edberg	Edg 1	L	0 - 2	Saline Rego Black	Black Solod, Black Solonetz
	Stoney	Sy 1	L	0	Orthic Humic Gleysol	
		Sy 2	L	0	Saline Humic Gleysol	
Lacustrine	Ellerslie	Ell 2	SiL	0 - 2	Solodic Black	Black Solod
	Mill Woods	Ms 2	SiL	0 - 2	Black Solod	Black Solonetz
	Argyll	Ag 2	C	0 - 2	Alkaline Black Solonetz	Gleyed Alkaline Black Solonetz
	Ohaton	Oht 1	SiL	0 - 2	Orthic Black	
		Oht 2	SiL	0 - 2	Solodic Black	Black Solod, Saline Rego Black
		Oht 3	SiL	2 - 5	Orthic Black	Black Solod, Solodic Black
	Bawlf	Bwf 1	SiL	0 - 2	Saline Rego Black	
	Hercules	Hrl 1	CL	0	Orthic Humic Gleysol	
		Hrl 2	CL	0	Saline Humic Gleysol	
		Hrl 4	CL	5 - 9	Saline Humic Gleysol	
Alluvial and Aeolian Sand	Bigstone	Bgt 1	FSL	0 - 2	Orthic Black	
		Bgt 3	FSL	2 - 5	Orthic Black	
	Millet	Mlt 2	FSL	0	Saline Humic Gleysol	
		Mlt 3	FSL	0	Carbonated Humic Gleysol	
Alluvial Gravel	Forestburg	Fbg 1	FSL	0	Orthic Humic Gleysol	
Recent Alluvium	Galahad	Gld 4	SiL	0 - 2	Gleyed Saline Rego Black	
	Menaik	Mnk 4	CL	0	Saline Humic Gleysol	

SCALE:

410 0 410 820 1230 1640 2050 FEET

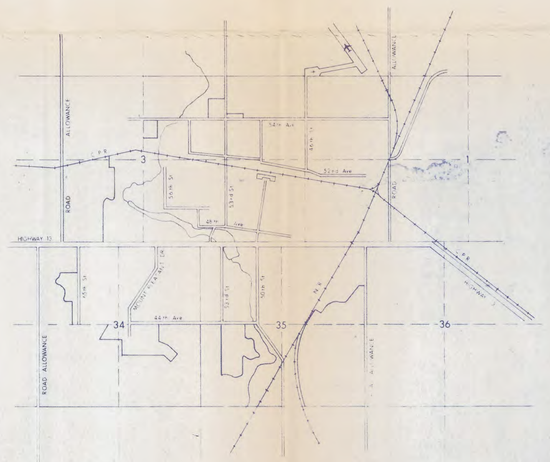
LEGEND:

- DL - Disturbed Land
- RB - Rough Broken Land
- p - peaty phase
- /t - overlying till
- Soil line
- City limits
- River - Lake

Mapped and Compiled by: M.D. Scheelar
Soils Division
RESEARCH COUNCIL OF ALBERTA
1972

City of Camrose

Tp - 46 and 47, R - 20
W - 4



Location Map