CLINTON TOWNSHIP

A REGIONAL APPROACH to the STUDY OF LAND UTILIZATION

by

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PREFACE

This work involves not only a study of the mode and pattern of land utilization as it exists in Clinton Township in 1953 but also a consideration of the reasons why man is making use of the land in the manner that he is.

It has been found that even in a micro-study of this nature, positive correlations can be made between the various ways that man is making use of the land and the diverse factors of his environment. In some cases he has overcome adverse physical conditions by artificial means and so altered the physical environment to suit his needs. In other cases the physical conditions have been unalterable and man has been forced, therefore, to adapt his activity to conform to them.

As regards the human environment, it has become evident that man himself creates difficulties which are almost as serious as those of the physical sphere and which, in some instances, may curtail freedom of economic activity considerably.

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A REGIONAL APPROACH

to the

STUDY OF LAND UTILIZATION

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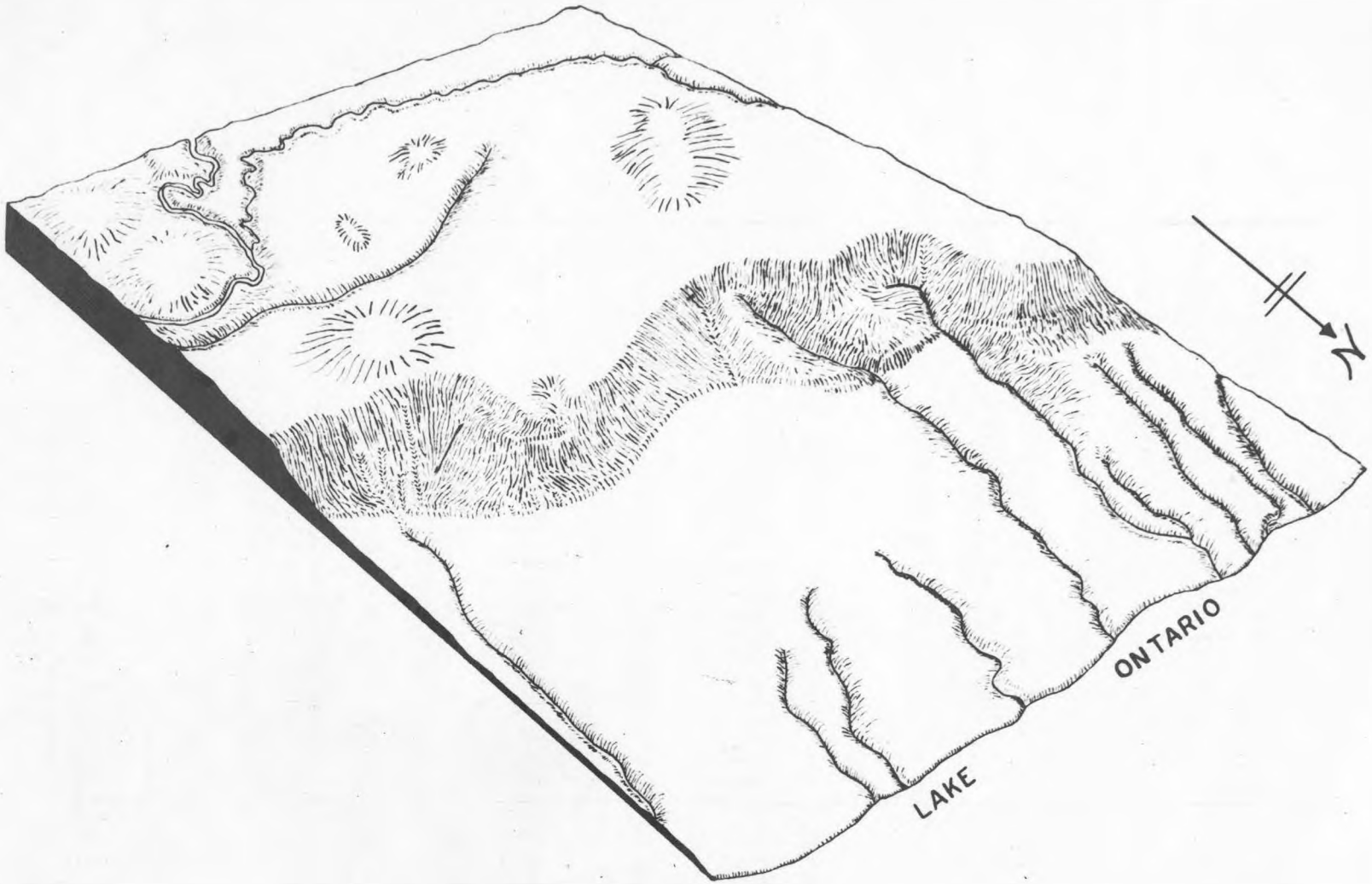

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CLINTON TOWNSHIP

CHAPTER ONE

LOCATION

Clinton township is a political subdivision situated in south-central Ontario. It is one of five townships in Lincoln County and its northwest corner is approximately fifteen miles to the east-southeast of the city of Hamilton at the head of Lake Ontario.

More specifically, it extends from 79° 3½′ to 79° 22½′ west longitude and from 43° 12′ to 43° 5½′ north latitude.

This location puts Clinton in the Niagara Peninsula--that narrow neck of land separating Lake Ontario from Lake Erie. The northern part of the township lies within the heart of the fruit growing area of the peninsula which extends as a narrow belt along the southern shore of Lake Ontario from Hamilton on the west to the Niagara River on the east.

Clinton township is rectangular in shape and covers an area of about forty-two square miles or 25,600 acres. It is bounded on the north by Lake Ontario; on the west by North and South Grimsby townships; on the south by Gainsborough township; and on the east by the township of Louth.

GENERAL LOCATION MAP

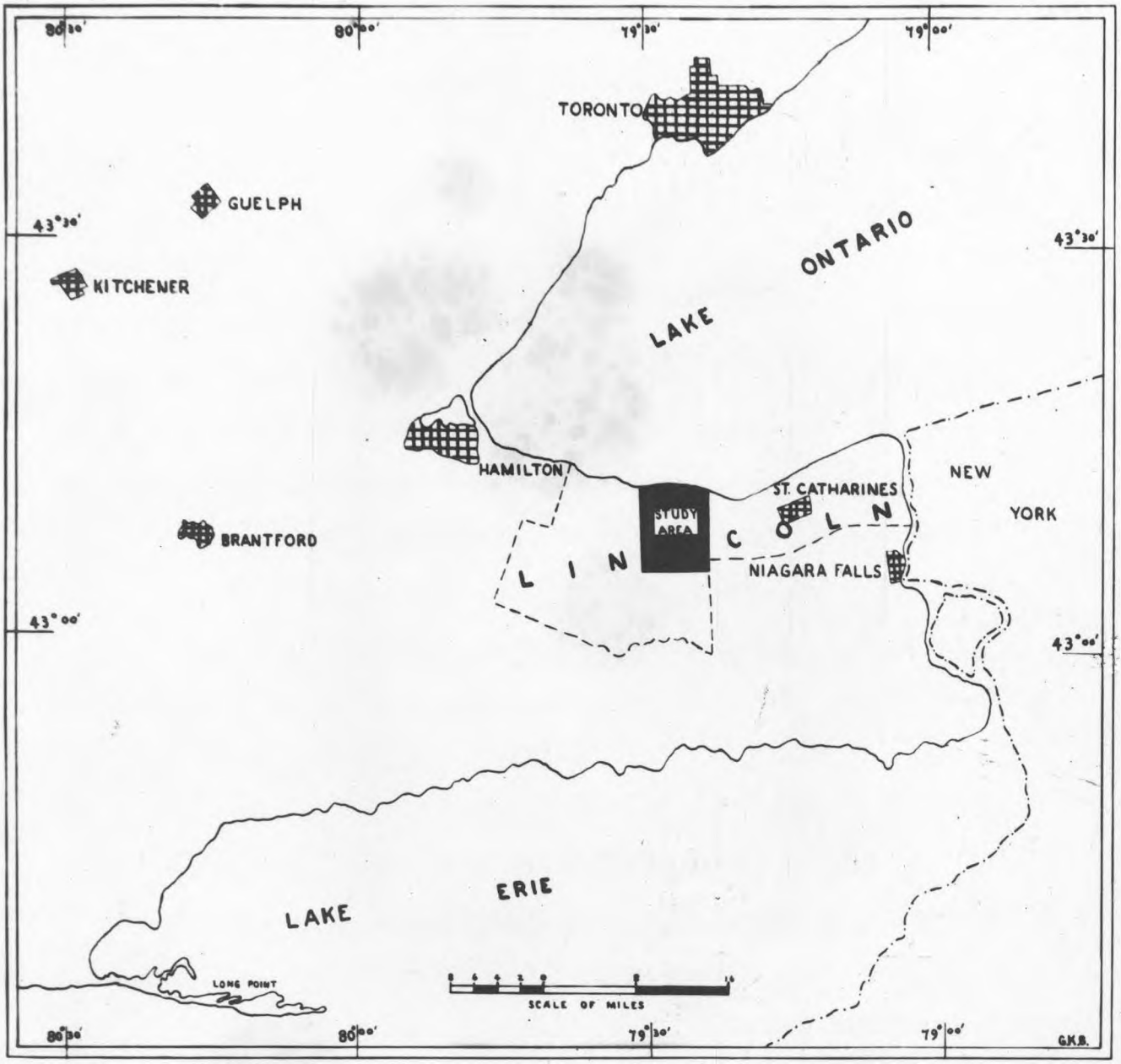


PLATE 2

CHAPTER TWO

PHYSICAL GEOGRAPHY

Stratigraphy

Clinton township is uniformly underlain by sedimentary strata of the Palaeozoic era. Rock formations from the Ordovician and Silurian systems are represented. These sediments rest upon an uneven surface of Precambrian igneous and metamorphic rocks which outcrop approximately 120 miles to the north as the Canadian Shield.

The lower Ordovician strata consist primarily of limestones and dolomites. These are overlain by great thicknesses of shale capped by thin limestone bands. The youngest Ordovician formation is the Queenston red shale which composes the base of the Niagara escarpment.

The oldest Silurian rocks consist of sandstone and shales; the middle Silurian is characterized mostly by dolomite; while the youngest rocks of Silurian age are represented by shales and interbedded platy dolomites.

The Palaeozoic strata of Clinton township have undergone no strong deformation. Their attitude is a general dip almost due south at the average rate of about 30 feet per mile. Owing to this slight tilting the strata occur in belts which trend in an east-west direction.[1]

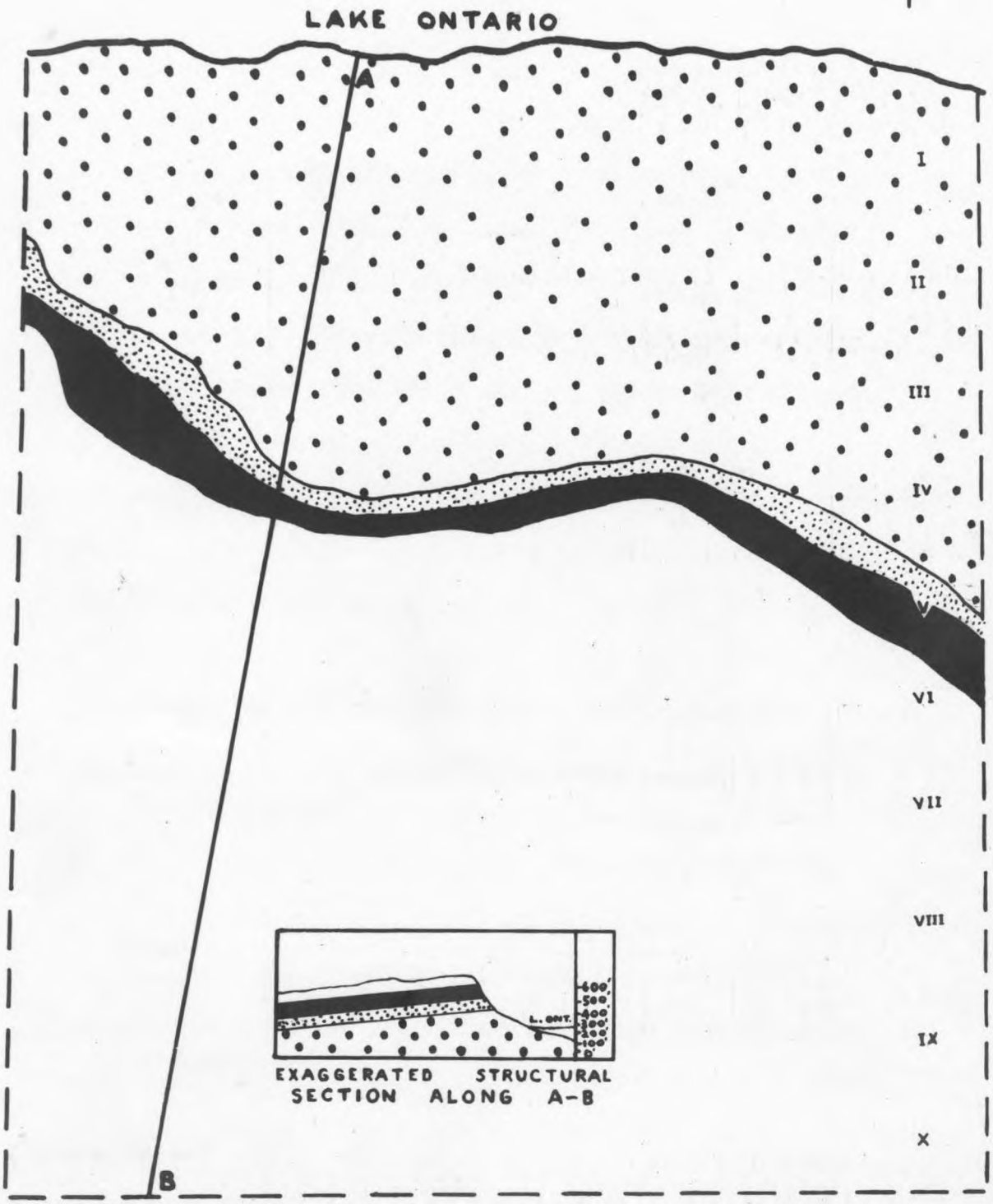
The Niagara escarpment, which faces in a northeasterly direction, is the most prominent physiographic feature of the township. It is an erosional landform owing its origin

[1] J.F. Caley, Palaeozoic Geology of the Toronto-Hamilton Area, Ontario; pp. 10 - 11

Fig. 1 An exposure of the bedrock along a road cut on the scarp-face south of Beamsville. The Lockport dolomite may be seen capping the Clinton formation.

GEOLOGY

CLINTON TOWNSHIP



QUEENSTON SHALE
MEDINA SANDSTONE
ROCHESTER SHALE
CLINTON DOLOMITE
LOCKPORT DOLOMITE

ORDOVICIAN
SILURIAN

SCALE - 1:63,360

PLATE 3

G.Ks.

to the differential weathering of the Palaeozic rocks. The lower portion of the escarpment is composed of soft shales which are subject to relatively rapid erosion. These shales are overlain by hard and more resistant limestones and dolomites. Since the beds of the escarpment are tilted at a low angle the weathering of the lower rocks undermines the upper layers which break off, thus preserving the steep scarp-face.

Throughout the township the average difference in elevation between the area below the escarpment and the dip slope is 150 feet. The width of the scarp-face varies from place to place but everywhere the Lockport dolomite forms an upper vertical surface. Below this capping rock the softer formations form a slope the steepness of which depends upon the resistance they offer to the agents of weathering and erosion.

The nature of the bedrock in Clinton township is significant in this study primarily because it is responsible for the formation of the escarpment and because the surface of the dip slope reflects the general attitude of the underlying Lockport dolomite, owing to the comparative shallowness of the glacial and lacustrine materials in this area. In a few small sections of the central part of the dip slope the bedrock is important also since the overburden is locally so shallow that the Lockport dolomite is exposed.

Glaciology

The entire Niagara Peninsula was subjected to glaciation and while visible evidence of more than one ice advance in this area is fragmentary, a legacy of landforms has been left by the last or Wisconsin glacier.

As the ice sheet advanced southward from what is now the Lake Ontario basin a large amount of debris was picked up and carried forward. Some of this material was unevenly deposited on the face of the escarpment as the ice moved up on to the dip slope. In the sections in the vicinity of Beamsville and Vineland, for example, the scarp-face was relatively deeply buried under the till, whereas in the central part of the township much less overburden is to be found on the face of the escarpment. This till also extends from the base of the escarpment to the present shoreline of Lake Ontario and continues on under the lake.

As the Pleistocene climate became warmer the ice started to recede and a belt of recessional moraine was thereby deposited on the dip slope near the brow of the escarpment in Clinton township. This moraine* is composed of shaly material derived in large measure from the red and grey beds occuring below the escarpment, and it is usually not more than 50 feet in depth. The Vinemount moraine rises perceptibly above the surrounding country and has a gently rolling configuration.

As the glacier continued to recede some of its

*Hereafter referred to as the Vinemount moraine after the term applied by Chapman and Putnam.

melt-water flowed southward and gradually formed glacial Lake Warren which then occupied the Erie basin. Lake Warren increased in size until it inundated all of that part of Clinton township south of the Vinemount moraine. Stratified clays were laid down in this body of water upon the glacial deposits and a large undulating clay plain is now in evidence.

North of the escarpment the melt-water from the receding glacier slowly filled up what is now the Ontario basin and so formed glacial Lake Iroquois. The waters of this lake inundated the glacial materials near the base of the escarpment. Wave action along the shoreline then undercut the till slopes and thus a shore-cliff was formed which averages about 35 feet in height in the township. Gravel and sand were deposited along the base of this shore-cliff and a well marked beach was built up which now appears as a terrace formation sloping gradually downward to the north.

Sand was also deposited in irregular patches in the shallow waters off-shore. There are three of these areas of sand now in evidence in the township. They are relatively level in nature and appear as small sand plains at present. Two occur adjacent to the present shoreline of Lake Ontario in the northeast and northwest parts of the township; the other is to be found in the area between them and about a mile to the south of the lake.

The till which is now exposed between these sand plains was modified by the waters of Lake Iroquois inasmuch as irregularities were smoothed out so that now the surface is only slightly undulating.

Climate

The proximity of the Niagara Peninsula to the moderating influence of the Great Lakes and its location in the path of the westerlies as well as of the cyclonic storms are the chief factors in determining the specific climate of the region.

The summers are cooler and the winters more moderate than they would be if the Great Lakes were not present. Moreover, the frequent passage of cyclones and anti-cyclones brings about rather extensive changes in weather every two to five days.

According to Koppen's climatilogical classification the Niagara Peninsula falls within a region, extending across the whole of southern Canada east of Alberta, which has a subarctic climate with adequate precipitation in all months. The criteria Koppen uses are the mean temperatures of the warmest and coldest months plus the seasonal distribution of rainfall.

Thornthwaite designates the climate of the Niagara Peninsula and the Great Lakes as humid, microthermal with sufficient rainfall in all seasons. He uses three criteria: (1) precipitation effectiveness, (2) temperature efficiency, and (3) seasonal distribution of effective precipitation.

The factor for precipitation effectiveness is computed by ascertaining the average monthly rainfall that remains in excess from a free water surface, over the average monthly evaporation. The temperature efficiency is based upon the average monthly temperature above 32° F. divided by four.

The area above the escarpment, in Clinton township, has a slightly more rigorous climate than the scarp-foot plain. This may be explained partly by the fact that the dip slope is 150 feet higher in elevation than the section below the escarpment. Also, the dip slope lies further from the lake shore than the scarp-foot plain and, therefore, the moderating influence of the lake is not as strongly felt. Although these two factors bring about only microclimatical differences they are sufficiently important as to affect land utilization in the two sections of the township.

The mean annual temperature in Clinton is 46° F., Breaking this down into seasons we find that there is a winter mean of 25° F., a spring mean of 43° F., a summer mean of 68° F., and an autumn mean of 51° F. By and large, there is a difference of ½° F. to 1° F. between the average temperatures below the escarpment and those above.

The moderating effect of Lake Ontario is reflected in the maximum and minimum temperatures experienced. Below the escarpment temperatures seldom go as low as -16° F. while on the dip slope -20° F. is about the coldest temperature recorded. The highest temperature ever recorded is 104° F. giving an extreme temperature range of 124° F. for the two sections.

The annual mean daily range of temperature on the scarp-foot plain is 17° F. which is 2° F. higher than on the dip slope.

It is when one considers the length of the growing season and period of frost expectancy between the two sections of the township that the greatest differences occur. On the

dip slope the growing season (i.e. the period with temperatures above 42°F.) lasts from about April 15 to November 2, making it approximately 200 days in length. On the plain below, on the other hand, the growing season has an average length of 212 days, beginning about April 10 and continuing until November 9.[1]

Below the escarpment the last spring frost usually occurs before May 8 and the first frost in the autumn may be expected any time after October 8. This gives a total frost-free period of 158 days.

Above the escarpment frost will probably occur about a week earlier in the autumn and a week later in the spring giving a total of 144 days which are free of frost.

All of Clinton township receives about 30 inches of precipitation a year with the growing season getting slightly over half the total. The average annual snowfall on the scarp-foot plain is 38 inches while the section above receives perhaps 2 inches more.

According to Thornthwaite, Clinton township falls within the belt which has a potential evapotranspiration rate of 12.5 inches of rainfall for the months June, July and August. Since this area has only 8 inches of rain in these months there is a deficiency of 4.5 inches. Owing to the accumulation of snow and the heavy spring rains, however, the soil is able to store enough water to prevent drought conditions occuring in the summer. In the last fifty years there

1. D.F. Putnam and L.J. Chapman, The Climate of Southern Ontario; Scientific Agriculture, pp. 401-466; April 1938.

have been only thirty months in the period from May to September that have had 1.0 inches or less of rain giving rise to drought conditions.

It is not surprising, when one remembers Clinton township's location with respect to the cyclonic storm belt, that there are on the average, 100 rainy days per year and that cloud cover occurs about 50 per cent. of the time.

Fortunately most of the bright sunshine comes in the growing season. Of the possible total this period receives about 54 per cent. of the bright sunny days.

Since the Niagara Peninsula lies in the path of the prevailing westerlies the greatest proportion of winds come from that quadrant. In Clinton township most winds come from the southwest and have an average velocity of 7 to 10 miles per hour.[1]

It is common to have a number of gales with wind velocities reaching 45 miles per hour each year. The maximum wind velocity recorded in the region was slightly over 70 miles per hour.

Since no climatic statistics are available for Clinton township, data from the weather station at Grimsby have been included. This town is located only two and one-half miles west of the southwestern boundary of Clinton township. As a result of this close proximity, therefore, the climatic statistics may be considered to reflect the general

[1] Putnam and Chapman, pp. 401-446.

climatic conditions of the scarp-foot plain in Clinton township.

Table I

Weather Records at Grimsby[1]

(19 years observation)

	Temperature (in degrees F.)			Precipitation (in inches)		
	Max.	Min.	Mean	Snowfall	Rainfall	Total
January	32	18	25	7.3	2.08	2.81
February	31	17	24	11.6	1.07	2.23
March	41	25	33	5.0	1.87	2.37
April	54	36	45	0.2	2.99	3.01
May	65	43	54	—	2.89	2.89
June	75	53	64	—	3.18	3.18
July	81	60	71	—	2.81	2.81
August	78	59	69	—	3.01	3.01
September	72	53	62	—	2.71	2.71
October	60	42	51	0.1	2.81	2.82
November	47	33	40	0.9	2.89	2.38
December	36	23	29	6.3	1.37	2.00
Annual average	56	39	47	Tot. 32.22	31.4	29.08

Incorrect

1. Ontario Soil Survey Report

Natural Vegetation

According to W.E.D. Halliday, Clinton township falls within the Niagara Section of the Deciduous Forest Region.

Broad leaved trees are characteristic of the natural vegetation of the township and include beech, sugar maple, basswood, red maple, and (northern) red, white and bur oak. Other deciduous forest species which are less well developed and occur singly or in small stands within the broad-leaved association are the chestnut, pignut hickory, scarlet, black and pin oaks, black walnut and shagbark hickory.[1]

Coniferous species are also poorly developed and are thinly scattered throughout the township. They include: hemlock, white pine and red juniper. Apparently the climatic differences in Clinton township between the area below the escarpment and the dip slope are not sufficiently significant to limit the growth of any of these tree species to one or the other section. Coniferous trees were observed throughout the township as were the various deciduous types.

As practically all of the arable land in the township is now supporting crops, stands of trees are to be found mainly in small farm woodlots. In most cases trees have remained on land which is poorly drained or has a very shallow soil cover; i.e. land which is too poor to support crops. Some farmers, however, have kept a stand of timber on poten-

1. W.E.D. Halliday, A Forest Classification for Canada; p. 28

tially good crop land because of its commercial value or in order to have a supply of wood for heating purposes during the winter.

In Clinton, woodland is also found all along the face of the escarpment. Soils here are too shallow and the slope is too steep to allow cultivation. Thus, there is a long sinuous belt, interrupted very rarely, running across the township which has permanent forest cover.

The township has perhaps 3 per cent. of the total area under forest, most of which is found on the scarp-face and in the section above the escarpment on land too poor for agricultural use.

Differentiation of the Soils of Clinton Township According to Soil Materials and Drainage[1]

A. Soils Developed from Outwash Materials

Almost all of the sandy soils in Clinton township occur on the three areas of sand plain in the section below the escarpment.

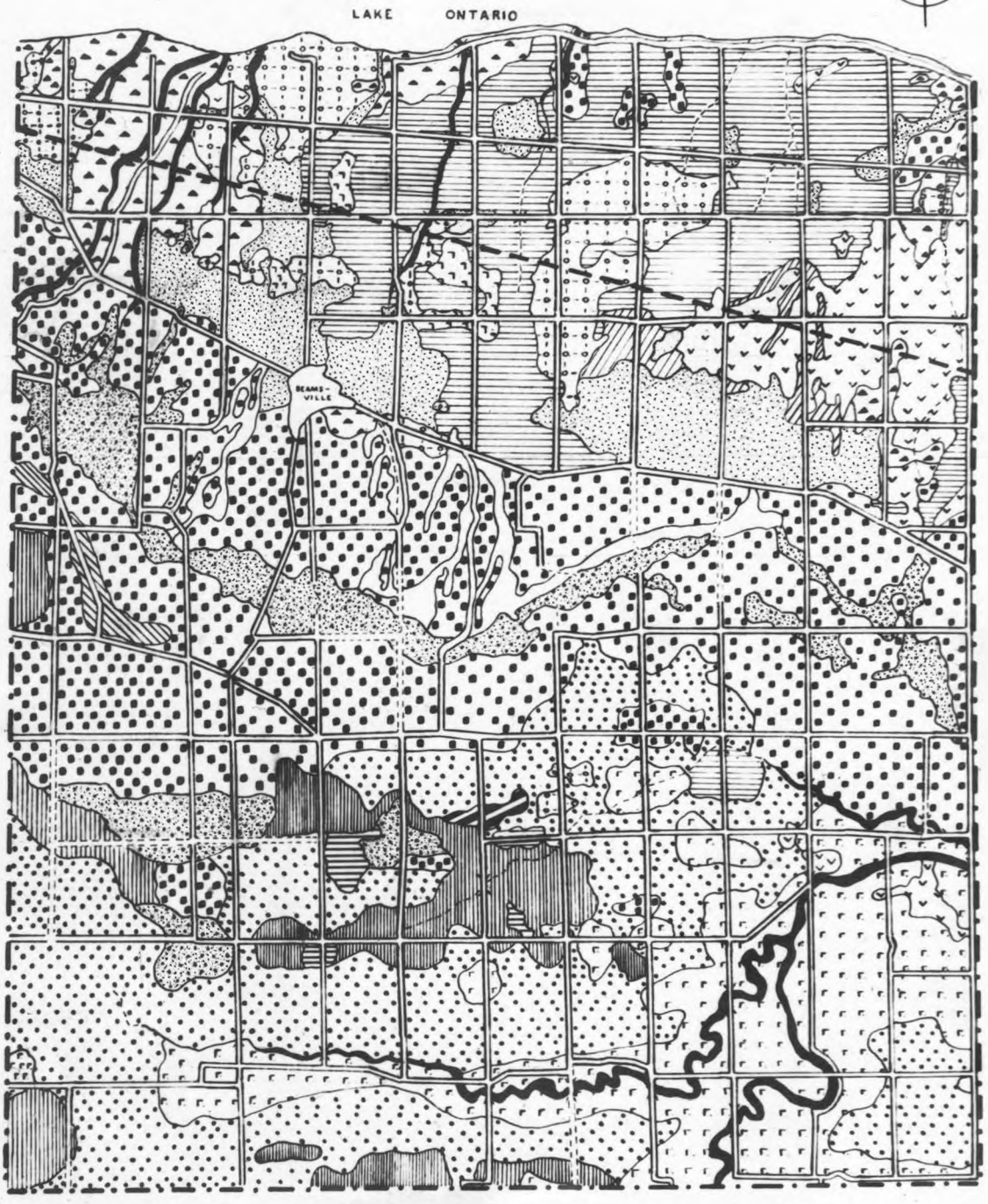
The upper soil layers are medium to strongly acid and carbonates are found only to a depth of from four to six feet. The organic matter content is from medium to low. The texture ranges from a sandy loam to a fine sandy loam. The terrain is predominantly of a level nature but in local areas gently sloping relief may be found. The greater part of the area is imperfectly drained, with small sections of well drained soils and moderately well drained soils.

1. The information in this section is based largely upon an unpublished report by the Soils Department of the Guelph Agricultural College, on the soils of Lincoln County.

SOILS

CLINTON TOWNSHIP

AFTER O.A.C. SOILS SURVEY



GRIMSBY SANDY LOAM
CLINTON SANDY LOAM
VINELAND SANDY LOAM
VINELAND FINE SANDY LOAM
VINEMOUNT CLAY LOAM
TRAFALGAR CLAY
CHINGUACOUSY CLAY LOAM
CHINGUACOUSY SILT LOAM
VIRGIL CLAY LOAM
JEDDO CLAY LOAM

BEAMSVILLE CLAY
HALDIMAND CLAY
CAISTOR CLAY
LINCOLN CLAY
CAMPDEN CLAY
FARMINGTON CLAY
BOTTOM LAND
ROAD
RAILROAD
BRIDGE

SCALE — 1 MILES

TOWNSHIP BOUNDARY

PLATE 4

(i) Clinton Sandy Loam.

This soil type occurs on the sand plain in the northwestern part of the township. This section has been dissected by stream action giving rise to gently sloping relief. The internal and external drainage is medium and there is only slight mottling in evidence in the lower A horizon.

The surface texture varies from a sandy loam to a fine sandy loam. The reaction at lower levels is usually strongly acid except where lime has been applied. Carbonates may be encountered at depths of from four to six feet.

The Clinton sandy loam has the following profile characteristics;

A_o -- 0 - 8 inches of brown sandy loam; fine crumb structure; very friable consistency; stone-free; p.H. 4.6.

A_2 -- 8 - 25 inches of yellowish-brown sand; slightly mottled; very weak platy structure; extremely friable consistency; p.H. 4.5.

B_1 -- 25 - 32 inches of dark bwown sandy loam; mottled; weak, fine nuciform structure; very friable consistency; p.H. 5.2.

B_2 -- 32 - 42 inches of reddish-brown sandy loam; weak, medium nuciform structure; very friable consistency; p.H. 6.0.

C -- Grey-brown sand; calcareous; p.H. 7.0.

(ii) Vineland Sandy Loam;

The Vineland series is the imperfectly drained member of the Grimsby catena.

The Vineland sandy loam occurs in the central sand plain and a part of the western sand plain in the area below the escarpment. The relief is very gently undulating to level. The organic matter content is medium and mottling is found throughout the profile. The profile is always imperfectly drained.

A typical Vineland sandy loam profile would appear as follows:

A_o — 0 - 7 inches of dark grey-brown sandy loam; weak, fine crumb structure; very friable consistency; p.H. 5.4.

A_2 — 7 - 12 inches of dark brown to yellow mottled sand; weak, platy structure; very friable consistency; p.H. 5.2.

B_1 — 12 - 18 inches of reddish-brown highly mottled sandy loam; weak, medium nuciform structure; friable consistency; p.H. 6.4.

C — dark yellowish-brown; p.H. 6.8.

(iii) Vineland Fine Sandy Loam.

The major difference between this type and the Vineland sandy loam is that the materials in each horizon are coarser in texture in the latter.

There is considerable variation in colour from one location to another as well as in the amount of organic matter present.

Mottling occurs in varying degrees in the A and B horizons. During dry weather the upper layers of the Solum become very hard and porous.

The largest area covered by this soil type is below the escarpment on the eastern sand plain. Very small areas have also developed on the alluvial material in the valley of the Twenty Mile Creek.

B. Soils Developed on Fine Textured Limestone-Shale Till.

Soils of this group are developed on a very heavy stony till which has a characteristic grey to greyish-brown colour, and contain numberous reddish-brown shale fragments.

Most of the soils of this group are poorly to moderately poorly drained and are contained in the Dark Grey Gleisolic Great Soil Group. Those imperfectly drained to moderately well drained associates that do occur belong to the Grey Brown Podzolic Great Soil Group.

(1) Chinguacousy Clay Loam.

This soil type has developed on the dissected till plain which occurs along the base of the escarpment and also on the Vinemount moraine near the brow of the escarpment on the dip slope.

Chinguacousy clay loam is the imperfectly drained member of the Oneida catena. The upper layers of the Solum are distinctly mottled and the profile is somewhat shallower than the Oneida profile.

The natural vegetation found on the Chinguacousy is elm, maple, oak and locust.

A cultivated section has the following profile appearance:

A_p — 0 - 4 inches of dark grey-brown clay loam; fine crumb structure; friable consistency;

Fig. 2 A Virgil Clay loam profile exposed along the Lake Ontario shore-cliff. The light coloured A horizons and the darker B horizon are scarcely distinguishable. The parent material is till.

Fig. 3 A profile of the Chinguacousy clay loam which is developed on limestone-shale till. The mottling of the upper horizons is not evident here.

few stones; p.H. 5.0

A_2 — 4 - 7 inches of pale brown slightly mottled clay; medium nuciform structure; firm consistency; few stones; p.H. 4.8.

B_2 — 7 - 13 inches of brown to dark brown clay; mottled; large blocky structure; plastic consistency; few stones; p.H. 6.0.

C — dark grey-brown clay; calcareous; p.H. 7.4.

(ii) Jeddo Clay Loam.

This type occurs in a number of small patches on the till plain north of Highway No. 8. It has developed on the nearly level parts of this area and consequently the profile is poorly drained.

The organic matter content of this soil type is low. The surface layers dry out very rapidly and may become exceedingly hard. The natural vegetation is elm, oak, hawthorn and shagbark hickory.

A virgin profile displays the following characteristics:

A_1 — 0 - 4 inches of very dark clay loam; medium granular structure; friable consistency; few stones; p.H. 5.0.

B_1 — 4 - 13 inches of grey to brownish-yellow mottled clay; large nuciform structure; sticky and plastic consistency; few stones; p.H. 4.5.

B_2 — 13 - 19 inches of yellowish-brown and dark

grey-brown highly mottled clay; massive structure; p.H. 4.6.

C — grey and brown calcareous stony clay till; p.H. 7.4.

Vinemount clay loam and Virgil clay loam also occur in this association. The former has developed in a very small area in the western part of the Vinemount moraine. The surface configuration here is more rolling than in other sections of the Vinemount moraine. Consequently the Vinemount clay loam is moderately drained which contrasts with the imperfectly drained conditions of the Chinguacousy clay loam.

The Virgil clay loam occurs over a large part of the till plain north of Highway No. 8. This area, in general, is characterized by gently undulating relief. The soil profile is moderately poorly drained.

C. Soils Developed on Fine Textured Reddish Shaly Till.

Soils of this group are found below the escarpment and have developed from shaly till derived from the shale bedrock.

Erosion is very common on the soils of this group and in some places the A horizon has been removed exposing the deeper coloured B layer.

Very few stones are found in the profile, but numerous boulders are present on the surface.

The natural vegetation of the association is elm.

(1) Trafalgar Clay.

This type occurs in several relatively large patches on the till plain north of Highway No. 8.

The terrain has a level to gently undulating relief giving rise to imperfect drainage. The organic matter content of this soil is low and the soil structure is very poor.

A cultivated profile appears as follows:

A_o — 0 - 3 inches of dark grey-brown clay; coarse granular structure; friable consistency; few stones; p.H. 5.0.

A_1 — 3 - 7 inches of reddish-brown slightly mottled clay; platy structure; friable consistency; p.H. 4.6.

B_1 — 7 - 13 inches of weak, red, slightly mottled clay; medium blocky structure; firm consistency; p.H. 4.6.

B_2 — 13 - 22 inches of dark reddish-brown clay; massive structure; plastic consistency; p.H. 4.8.

C — dark red clay+ calcareous; p.H. 7.2.

D — red and grey shale rock

The Beamsville clay is also included in this group. It has developed on the more nearly level sections of the till plain. The profile is moderately poorly drained.

D. <u>Soils Developed on Lacustrine Materials</u>.

These soils for the most part are very low in organic matter and display a characteristic light grey colour when cultivated and dry. They are extremely acid in reaction with carbonates occuring at a depth of 20 inches. The surface texture varies from a clay loam through a silty clay to a heavy clay.

These soils bake hard when dry and have a very poor physical structure. Boulders may be found scattered over the surface but very few stones are found within the profile.

The better drained members of this group occur in areas where the relief is gently rolling. The poorer drained soils on the other hand have developed where the terrain is level or gently undulating.

(i) Haldimand Clay.

This type is found on the clay plain in areas that have gently rolling relief as a result of stream dissection. The external drainage is medium while the internal drainage is slow. The profile development is not as good as that which would occur with coarser textured materials.

The surface reaction is usually very strongly acid. Carbonates occur at about 20 to 24 inches. The organic matter content is very low. Very few boulders are found on the surface and almost no stones or grit occur within the profile.

The natural vegetation is maple, oak, elm, white pine and shagbark hickory.

A cultivated profile has the following characteristics:

A_o-- 0 - 4 inches of light brownish-grey clay and heavy clay; medium granular structure; friable (wet), hard (dry) consistency; very few stones; p.H. 5.0.

A_2-- 4 - 6 inches of light brownish-grey clay; fine nuciform to weak platy structure; very friable consistency; p.H. 4.8.

A_{22} — 6 - 12 inches of pale brown clay; slightly mottled; large blocky structure; firm consistency; p.H. 4.8.

B_2 — 12 - 20 inches dark brown clay or heavy clay; slightly mottled; prismatic and large blocky structure; sometimes massive; hard consistency; p.H. 6.5.

B_3 — 20 - 23 inches of dark clay or heavy clay containing lime concentrations; highly calcareous; generally stonefree; p.H. 7.4-.

(ii) Campden Clay.

The Campden series is the poorly drained member of the Haldimand catena. It is limited to a few very small sections of the clay plain and has developed where the terrain is level and low lying.

The soil breaks into hard clods when dry and it is very difficult to cultivate unless moisture conditions are optimum.

The natural vegetation is swamp oak, elm and silver maple.

A virgin profile would have the following appearance:

A_0 — 0 - ½ inch of partly decomposed leaf litter.

A_1 — ½ - 4 inches of very dark grey-brown clay; medium granular structure; friable consistency; p.H. 6.8.

B_1 — 4 - 11 inches of very dark grey mottled clay; massive structure; hard consistency; p.H. 6.5.

B_2 — 11 - 22 inches of dark grey and yellowish-brown mottled clay and heavy clay; massive to large blocky structure; hard consistency; p.H. 7.0.

C — grey heavy clay; calcareous; stonefree; p.H. 7.4.

Also included in this association are the Caistor clay and Lincoln clay soils. The former is imperfectly drained while the latter is moderately poorly drained. They occur over relatively large areas of the clay plain in sections with gently undulating relief.

E. Shallow Soils Over Limestone Bedrock.

(1) Farmington Clay.

The Farmington clay is developed directly from underlying limestone. It is found along the scarp-face and in sections along the brow of the escarpment as well as in those parts of the clay plain where the Lockport dolomite outcrops.

Drainage is variable and the soil supports mixed deciduous tree growth.

F. Miscellaneous Soils.

(1) Bottom Land.

This type occurs along stream valleys. As a result of periodic flooding alluvium is deposited on the flood plain at least once or twice a year. This means that the soils do not have a chance to mature and the soil profile is thereby either extremely shallow or non-existent.

LAND TYPES
CLINTON TOWNSHIP

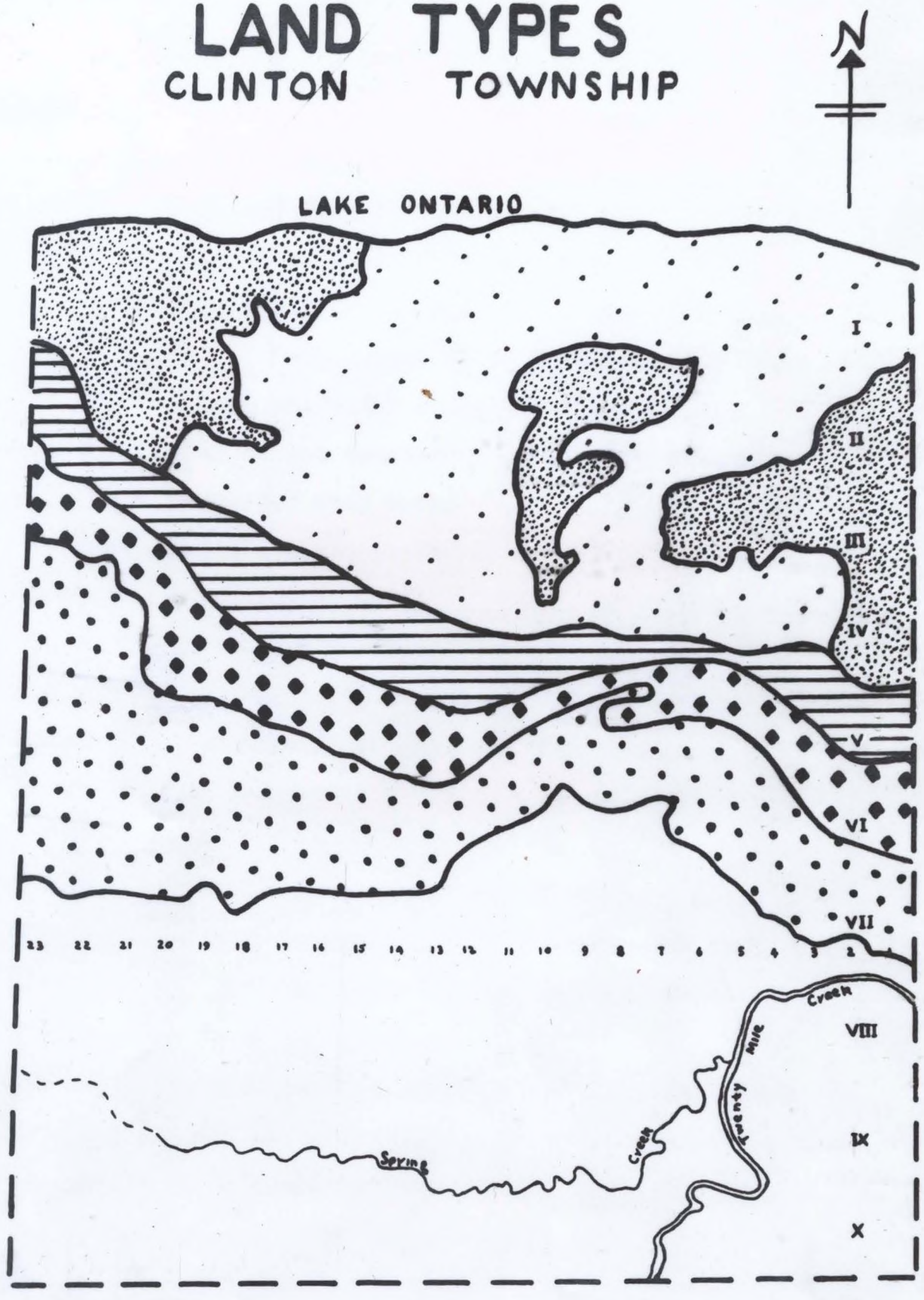


PLATE 5

G.K.B.

Land Types

1. Iroquois Sand Plains

This land type occurs in three areas on the lake plain, lying north of Highway No. 8, which have sandy and fine sandy loam soils and moderate to imperfect drainage.

This sandy material is of lacustrine origin, but was not laid down uniformly along the shore of Lake Iroquois. The three sections are relatively small being separated by clay soils developed over till.

The sand plain in the northwestern part of the township has been dissected considerably by stream action and, therefore, has a more rolling appearance than the other two areas. The general slope in the central and eastern sand plains is approximately 36 feet per mile southward, whereas in the western section it is 67 feet per mile southward.

2. Till Plain

The till plain covers all of the area north of Highway No. 8 that is not overlain by sand. The soils here are predominately clay loams and the drainage varies from imperfect to poor.

The till was deposited by the Wisconsin glacier as it moved up over the escarpment. After the glacier had retreated the till plain was inundated by the waters of Lake Iroquois, which modified the surface by levelling out any irregularities. Consequently the present appearance is one of flatness although there is a general slope southward of about 36 feet per mile.

3. Dissected Till Plain

This land type extends from the foot of the escarpment to the Iroquois terrace and varies from one mile in width at Beamsville to only 1/8 of a mile west of Vineland.

Again the material in this area was deposited by the advancing Wisconsin glacier but unlike the till plain below there was no inundation by Lake Iroquois. As a result the surface configuration is more rolling. This uneven appearance has been intensified in some sections by the action of streams descending the escarpment especially in the western part of the township and in the area around Vineland.

The shore-cliff which runs between the Iroquois terrace and the section at the base of the escarpment is the one exception to the relief pattern. Here, there is a rise of 50 feet in a horizontal distance of approximately 300 feet throughout the township except in the Beamsville area where the vertical rise is reduced to approximately 25 feet in the same distance. As a result of the steepness of the slope, deep gullying has developed in sections where permanent grass cover has not been maintained.

Clay loams are the predominant soils in this land type with the texture changing to silt loam along the stream courses and although the drainage is imperfect it is generally better than on the till plain below.

Fig. 4 A view of the Dissected Till Plain. Pasture fields may be seen in the foreground with vineyards in the background beyond which are the outskirts of Beamsville.

Fig. 5 Looking along the face of the Iroquois shore-cliff east of Beamsville.

4. Niagara Escarpment

The face of the escarpment is obscured in some sections due to the fact that it has been buried under a mantle of glacial debris. This is the case around Beamsville and Vineland. Thus, the slope between the dissected till plain and the top of the escarpment, in these two sections, is relatively gradual, rising about 125 feet in a mile. About a mile west of Vineland, on the other hand, the upper scarp-face is exposed or very thinly mantled with till. Thus the slope here is steeper and rises 125 feet in a horizontal distance of 330 feet.

In the areas with sufficiently gentle slopes to allow soil formation Farmington clay has developed. The internal drainage is variable and ranges from imperfect to poor but the external drainage is everywhere excessive. In some sections deep gullying has resulted due to the rapid run-off.

5. Vinemount Moraine

The Vinemount moraine runs along the brow of the escarpment and varies from two miles in width at the western boundary of the township to only one-quarter of a mile northwest of Campden.

The moraine rises perceptibly above the clay plain to the south and has a gently rolling relief. Clay loam soils with imperfect internal drainage predominate in this land type.

Fig. 6 A view showing the gradual slope of the scarp-face just south of Beamsville.

Fig. 7 Another view of the gradual slope of the scarp-face, this time south of Vineland.

Fig. 8 The Niagara Escarpment as seen from the Dissected Till Plain about a mile west of Vineland.

6. Clay Plain

The Campden road may be taken as the northern limit of this land type and the clay plain extends from that road to the southern boundary of the township.

The parent material was deposited in glacial Lake Warren and except for two or three very small sections of sandy loam soils the area is covered by clay and clay loam soils.

The clay plain is generally quite flat except in the southeast where dissection by the Spring and Twenty Mile Creeks has given a local gently rolling relief. Internal and external drainage throughout the area are imperfect to poor.

In a few small areas in the central part of the clay plain the overburden is very shallow and in places the bedrock is exposed. These sections, as a result, are characterized by exceptionally poor drainage and vegetation is confined to scrub or grass.

Fig. 9 A section of the gently undulating clay plain as seen looking southward from the Vinemount Moraine.

CHAPTER THREE

HUMAN GEOGRAPHY

The Geography of Settlement and Agricultural Development

It was not until 1776, when the American War of Independence broke out that settlement began in the Niagara Peninsula and more particularly in Clinton township. Prior to that date the only inhabitants of the region were Seneca Indians living in scattered villages.

One of the first pioneers to come to Clinton was William Walker, a Loyalist from Virginia, who settled in 1780. By 1788 several other families including the Tuffords, Culps, Konkles, Buchners, Corwins, Martletts and Clouses had also chosen Clinton as their place of settlement.

These first pioneers chose the lake plain on which to locate. This section was more easily accessible because of its proximity to the lake, and the soils were lighter in texture, more easily cleared of timber and better drained than the heavier clays on the dip slope.

As each family received a grant of 200 acres it did not take long for the land on the lake plain to be fully occupied. Consequently by 1790 new settlers were forced on to the dip slope where they had to be satisfied with soils which were somewhat more difficult to work and a climate which was a little more rigorous.[1]

These first settlers above the escarpment located

[1] Illustrated Historical Sketch of the Counties of Lincoln and Welland, Ontario; p. IX

along streams in order to have a ready water supply for their cattle. The Books, Teeters, Freeses, Zimmermans, Bartrams and the Johnsons from New York and New Jersey were among the first to settle along the Spring and Twenty Mile Creeks. In 1800-12 these people were followed by several German Mennonite families from Pennsylvania.

To answer the need for mill services some of the new immigrants turned from farming to the operation of grist and saw mills. The first of these was a grist mill built on the Twenty in 1790 near the eastern boundary of the township. In 1796 this was followed by the erection of a saw mill on Spring Creek. Other mills were built on these two creeks in subsequent years so that by 1800 there were no less than seven grist and saw mills in Clinton above the escarpment.[1]

At first communication for the settlers was, by necessity, via Indian trails. These were few in number and often circuitous but they were the only well beaten paths through the wilderness.

By 1812, however, according to Lieutenant W. A. Nesfield's map of the Niagara District, four dirt roads passed through Clinton. One above the escarpment ran along the Vinemount moraine and continued eastward to connect with a net work of roads leading to Fort Drummond on the Niagara River. Another road passed along the Iroquois terrace and

[1] Illustrated Historical Sketch of the Counties of Lincoln and Welland, Ontario; p. IX.

was the forerunner of the present Highway No. 8. It carried most of the traffic on the scarp-foot plain that was bound for Fort George which was also on the Niagara River. A third road, again leading to Fort George, followed closely upon the lake shore and was probably not used as extensively as the one on the Iroquois terrace because detours had to be made around the embayments made by the Twenty and Twenty-Six Mile Creeks. The fourth road extended from the lake shore up over the escarpment in the vicinity of the Thirty Mile Creek near the western boundary of the township. Undoubtedly this location was chosen because the slope of the scarp-face here is not so steep as in other parts of Clinton. The road intersected the one on the dip slope traversing the area in an east-west direction and it must have been used considerably because it was the only means of access to the scarp-foot plain in the township.

None of these roads extended westerly beyond the Forty Mile Creek which now runs through the town of Grimsby. Beyond this point only foot-paths existed to join these roads with the main road running between Dundas at the Head of the Lake and York or Toronto.

Thus, it is evident that in these early days of development the settlers of Clinton were more closely dependent upon the settlements on the Niagara River than they were on villages like Ancaster and Dundas in the west. If a farmer had cattle or grain to sell or basic necessities to buy he would probably have preferred to go east to Fort

George than to Dundas because of the relative ease of travel. It will be shown in a later section that the people of Clinton even to-day look more to St. Catharines and Niagara Falls than to Hamilton although perhaps for different reasons.

It is not until 1851 (the first census year) that we can begin to get a clear picture of the settlement pattern in the township. In that year there were 2,462 people in Clinton, most of whom were rural dwellers since the communities of Campden and Beamsville were still very small. Although there is no specific information available the land still unoccupied was probably in the central part of the township above the escarpment on the poorer clay soils.

By 1876, however, the village of Beamsville had developed until it had a population of approximately 600. It provided the farmers on the lake plain with some of the goods and services they required and at this time, it had a public and high school, a post office, blacksmith shops, a saw and grist mill, a harness maker's shop, hotels, tailor shops and a druggist and a doctor.

In 1876 also, Campden was answering the basic needs of the farmers on the dip slope. It had a population of about 150 and within the community there were blacksmith shops, a chopping mill, shoemakers, a doctor, a public school, churches and a post office.[1]

By 1881 the population of Clinton had risen to

1. Illustrated Historical Sketch of the Counties of Lincoln and Welland, Ontario; p. IX

3,074 and, according to the Historical Atlas, all of the land in the township was at least occupied if not cultivated. The atlas also indicates that at this time the road network was practically the same as it is at the present.

A perusal of a map in the same atlas showing land holdings in Clinton in 1876 gives indication of the influence of fruit culture (which had its beginnings in this period) on the size of farm holdings. Farms along the lake shore were becoming long and narrow and relatively small in size. The census statistics for 1881 show that of 392 farms in the township 192 were no larger than 50 acres. As 1,431 acres out of a total of 16,480 acres under crops were in orchards or vineyards it is safe to assume that by far the greatest percentage of land under tree fruits and grapes was to be found on the small farms indicated in the atlas as being along the lake shore.

The primary factor determining the location of the orchards and vineyards on the lake plain is the climatic one. As was seen in a previous section, the growing season is longer and there is less danger of extreme winter temperatures here than on the dip slope. Since fruit trees are very intolerant of early frosts and very low temperatures it is precarious to attempt growing them above the escarpment.

The reason for a reduction in farm size when a change is made from mixed farming to fruit growing is found first in the relative intensification of labour required per

acre of land. It takes so many more hours to prune, cultivate and harvest the crop of fruit that the farmer must work with less land than he would on a mixed farm. Thus, in this period of transition from mixed farming to fruit farming on the lake plain, a farmer with 100 acres of land would probably find that he could work only 20 acres of his farm efficiently and successfully. The remaining 80 acres would be sold to other prospective fruit growers in small parcels rather than be allowed to lie idle.

The second reason for the reduction in size of the farm was the increased capital investment necessary per acre. The initial cost of fruit trees or grape vines was high. In addition, for fruit trees which are intolerant of poor drainage, such as peaches and cherries, tile for draining the land had to be purchased and installed. Also, some of the trees would be periodically lost due to disease and would have to be replaced. All of these factors meant that the farmer had to spend much more money per acre of land to produce a crop with which to make a living than he would if he were operating a mixed farm. Thus, in addition to the labour factor, the average individual had not the available capital to plant and maintain a fruit farm larger than approximately 20 or 30 acres.

On the mixed farms the census statistics for 1881 indicate that the main crops were wheat, oats, hay, corn and potatoes in about that order of importance. No figures for the number of cattle and sheep are given for 1881 but in

1891 there were approximately 2000 cattle and 2,100 sheep of all types in the township.

By the end of the first decade of the 20th century there were 3,477 people in Clinton. This was an increase of only 429 in the 20 years since 1891. Beamsville increased from a population of 911 to 1,096 in the same period. The increase in the rural population of 344 was probably due, for the most part, to the further breakdown of mixed farm units into smaller fruit farms.

There was a steady, though not a spectacular, increase in agricultural production until in 1921 we find that out of a total of 15,487 acres under crops 3,787 were in orchards and vineyards. The population had similarly risen and in the same year it had reached 4,148--an increase of 671 over the 1911 figure.

The only year after 1921 for which there are statistics given for the acreages of various crops is 1941. Orchards and vineyards by then covered a total of 6,842 acres of land in the township. This was an increase of almost 50 per cent. since 1921. A reflection of this increased emphasis on fruit culture is also seen in the fact that out of 664 farms in Clinton, 497 of them were under 50 acres in size.

This increasing specialization was undoubtedly in response to the increasing markets for agricultural products caused by the steady growth of urban centres in the 1930's and more particularly during and after World War II.

By 1951 there were 5,787 people living in the township and of these 1,712 lived in the village of Beamsville.

Summarizing we note then that although most of the land in Clinton was occupied by 1881 this did not mean that the rural population had reached its maximum. The discovery that the physical environment was favourable for the growing of fruit led to a steady breakdown of larger farms into small fruit growing units which gave rise to a steady growth of population. Significantly, this transition was accomplished without a major reduction in the number of farms over 50 acres. In 1891, for example, there were 216 farms above 50 acres in size. By 1941 this figure had been reduced to only 166. Since the lake plain has over 90 per cent. of the fruit farms of the township at present, the difference between the two figures would be taken up by the disappearance of farms over 50 acres in that section.

Upon examination of aerial photographs of the township and a study of the area in the field it would seem that the rural population has now virtually reached its maximum density. There are no longer any mixed farms on the lake plain and further reduction in the size of the already small fruit farms into smaller units seems improbable. Unless large scale fruit farming on the dip slope is found to be feasible in the future as a result of the development of more resistant varieties of trees, future population increase can only come through the growth of the urban centres.

COMMUNICATIONS
CLINTON TOWNSHIP

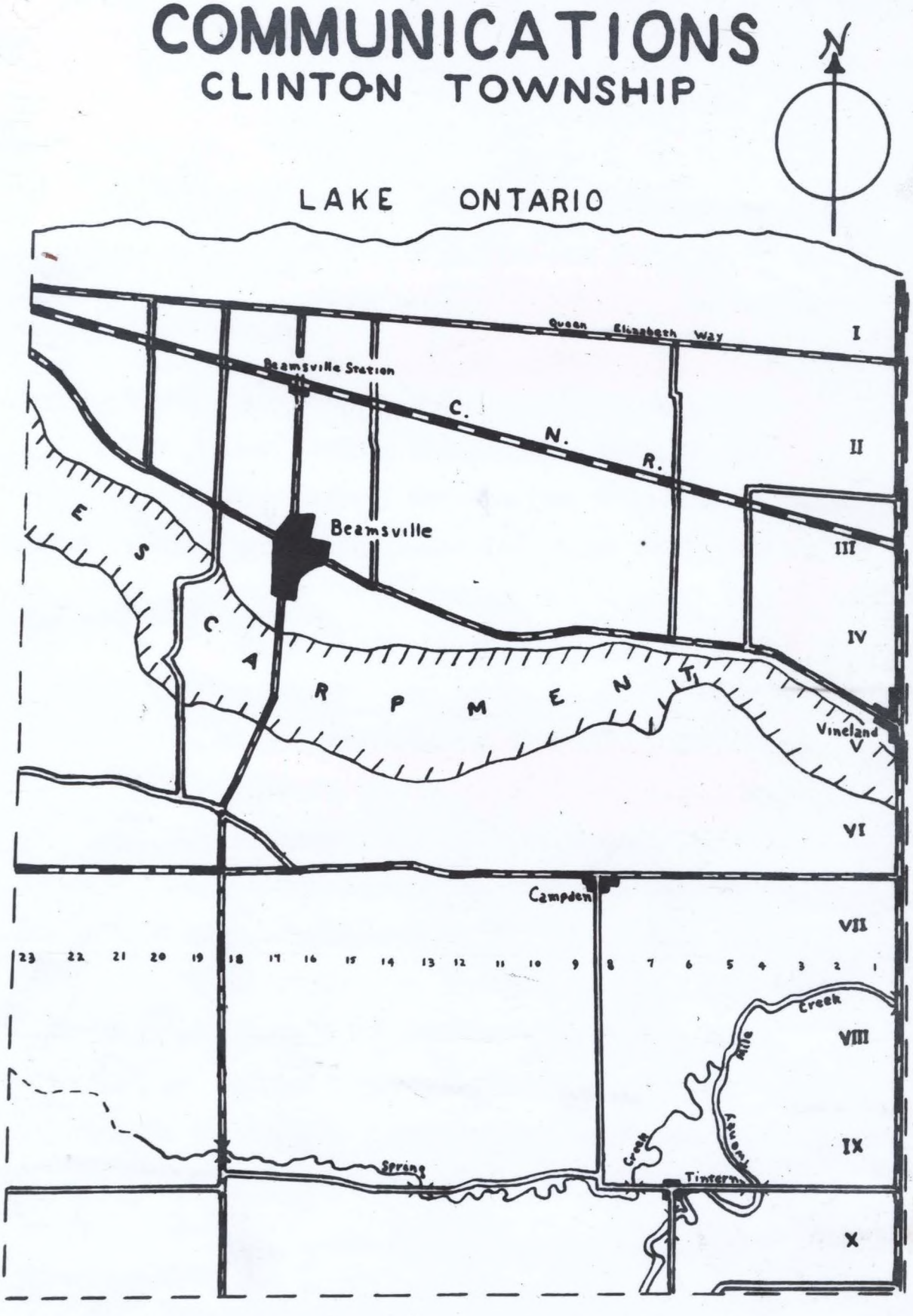


PLATE 6

e.Ka.

CHAPTER FOUR

TRANSPORTATION FACILITIES

There is considerable land devoted to transportation facilities in Clinton township. In fact, the road network is so well developed that no section is inaccessible.

As regards volume of traffic, the most important highway in the township is the Queen Elizabeth Way. It is a through speedway running about a mile south of the lake shore and it joins Toronto and Hamilton with Niagara Falls. Since vehicles may travel along it without going through any urban centres, however, it does not significantly affect the economic development of the township.

Highway No. 8, which is built on the Iroquois beach, is the second main highway and unlike the Queen Elizabeth Way it passes through all of the main towns. This road also connects Hamilton with Niagara Falls but since the Queen Elizabeth Way was completed in 1939 it has been of only secondary importance in respect to through traffic. Highway No. 8, however, is an important transportation route for farmers taking produce to the urban markets and for wholesale distributors which ship their goods to Beamsville and Vineland by truck.

The most important paved road joining the area below the escarpment with the dip slope is one which runs southward from Beamsville over that part of the scarp-face where the slope is most gradual. This road gives access to the interior of the dip slope and for that reason is used

Fig. 10 A section of the Queen Elizabeth Way near Vineland.

more by the farmers of Clinton than the paved road along the eastern boundary of the township extending southward from Vineland.

There are four other roads which ascend the escarpment but in each case they do not have a paved surface. They all occur in the vicinity of Beamsville where the escarpment presents less of a barrier; but they are used only by those farmers living in close proximity to them.

The well developed road network throughout the township is a reflection of the fact that most of the land is relatively productive and occupied. One difficulty, however, is that many of the farm roads have not yet been gravelled and consequently travel on them is rather precarious in periods of wet weather. This difficulty is especially prevalent on the clay plain in the southern part of the township.

The Canadian National Railroad line, running between Hamilton and Niagara Falls, is the last major means of communication. It is a double track railroad and runs parallel to and between the Queen Elizabeth to the north and Highway No. 8 to the south. It is of especial economic value to the industries of Beamsville, both in bringing in raw materials and shipping out finished products; and to the fruit growers since much of the fruit produced in the township is sent to the large urban centres in southern Ontario.

CHAPTER FIVE

URBAN LAND USE

Beamsville

The village of Beamsville is located in the northwest part of Clinton township on Highway No. 8. The community first developed along the Iroquois terrace, upon which the highway runs, but as it grew it spread southward up over the dissected till plain, at the base of the escarpment, and northward over a section of the relatively level lake plain below.

There is a sharp rise of approximately 50 feet from the Iroquois terrace to the till plain throughout the township except at the place where the village is situated. Within the village limits the dissected till plain is about 300 feet south of the highway but here it is only 25 feet above it. Thus, although one must make a rather steep ascent in going from the highway (King Street) to the southern section of the village the slope is not as abrupt as it would be in other parts of the township. In going from King Street northward there is very little gradient because the terrace levels off gradually to the lake plain.

It is difficult to determine exactly when Beamsville first began to develop. Historical maps of the region are few but a sketch map of the Niagara Peninsula by E. W. Dumfer indicates that no concentration of settlement had begun before 1827. No other maps of the Beamsville area are available for any year after that until 1863. By that time the community

was sufficiently large for Lieutenant-Colonel Henry Malet to include it in his military sketch of the shore of Lake Ontario.

Records show that in the 1840's there was one large hotel and a post office where the village is now situated. The hotel, undoubtedly, was a stopping place for people travelling between the settlements on the Niagara River and the town of York. By the middle of the century the road had a macadamized surface and traffic on it must have been quite heavy. With travellers stopping for rest and refreshment it is logical to assume that a blacksmith shop would be established to service horses and conveyances that needed attention. This was probably followed by a livery stable, a general store or a druggist shop. Whatever the sequence of development, however, by 1876 Beamsville had grown to a population of about 600 and had three blacksmiths, three hotels, one foundry, one tinsmith, three shoemakers, two carriage shops, one cabinet maker, one saddler and harness maker, one jeweller, two carpenters and builders, one painter, one druggist, one baker, three tailors, two dressmakers, two conveyancers, two butchers, one livery stable, one saw mill and grist mill, one grain dealer, one feed store, a post office, a telegraph and express office, an insurance office, one wine manufactory, a doctor, a high school and public school, and three churches.[1]

[1] Illustrated Historical Sketch of the Counties of Lincoln and Welland, Ontario; p. IX

The existence of specialized commercial establishments such as a jewelry store, tailor shop, bakery and insurance office indicates that the townspeople and farmers in the surrounding region were prosperous. Moreover, the fact that there was no extensive industrial development at this time indicates that Beamsville, as to-day, was serving primarily as a service centre.

The railroad which passes through Beamsville Station about a mile north of the village of Beamsville was built around 1853 and seems to have had little effect on the early development of the community. The village, as we have seen, was first stimulated by its location on the main highway. The only industry that would have been dependent on the railroad in 1876 was the wine manufactory. Significantly, it was not until after the turn of the century that a few industries developed which would have benefited by its existence.

In 1879 Beamsville was incorporated as a village and although no population statistics are available for that year, by 1881 there were 685 people living in the settlement. The population from that date until 1921 seems to have grown slowly although steadily. As the number of farmers in the township increased, as a result of a continued breakdown in farm units on the lake plain, there was a proportionally greater demand for commercial and industrial services. New people settled in the village to meet these increased needs and thus the population was raised slightly.

By the 1920's the fruit growing industry in the township had advanced sufficiently to warrant the establishment of a canning factory, a basket factory and a company to manufacture sprays for fruit trees. At that time also the Niagara Rubber Company was in operation. These industries gave employment to a total of approximately 250 persons.[1]

In 1921 there were 1,256 people residing in Beamsville and during the next ten years there was a slight drop in population to 1,203. This was probably due to the economic depression which began in 1929. Industries were forced to close down or reduce production so drastically that many people turned to larger centres like Hamilton and Toronto to seek employment.

With the slow return to prosperity in the 1930's and the sudden conversion to a wartime economy in 1939, however, the population by 1941 had risen to 1,309. Owing to a maintenance of that prosperity after the war, two lumber and building supply companies, a factory manufacturing screws, a small machine industry, a feed and fuel supply company and a factory making building blocks were added to the industries of Beamsville.

It is significant to note that three of these new companies are connected with the building trade. This is a direct result of Beamsville's population growth from 1941 to 1951 when the size of the village increased from 1,309 to

[1] A.E, Coombs, History of the Niagara Peninsula; p. 97.

Fig. 11 One of the few industries of Beamsville.

1,712--the greatest development in any ten year period in its history. Out of a total of 460 homes in Beamsville 100 of them have been built in the last three or four years. Indeed, Crescent Avenue, in the west end of the village, is an entirely new street containing twenty or thirty of these modern homes.

Since the new industries have a total of approximately 50 employees it is obvious that they are not the primary reason for the addition of 403 people to the population of Beamsville in the last ten years. Evidence seems to point to the fact that there are numerous individuals building homes in the community who commute to Hamilton, and more particularly, to St. Catharines to work. These are people who prefer the advantages of living in a small town and are willing to travel relatively long distances to their places of employment. The most important of these advantages seem to be lower taxes and a friendlier atmosphere. Although both Hamilton and St. Catharines are some 15 miles distant from Beamsville, one civic official estimated that there were about four times as many people commuting to the latter city as to Hamilton.

It is difficult to assess the reason for this. It is possible, perhaps, that since Beamsville is the closest centre to St. Catharines which possesses all of the major goods and services that a city would offer and yet is small enough to have the small town atmosphere, most of the people from St. Catharines who want to commute

locate there while Beamsville must compete with communities like Stoney Creek and Grimsby which are closer to Hamilton.

As will be seen in table II there are approximately 192 people employed on a year round basis in industry. Since the canning factory operaties at full capacity only in the summer months, the number of its employees fluctuates. Thus, in the summer period the number employed in industry in Beamsville increases to about 267.

Table II

Industries of Beamsville

Name of Industry	Products Manufactured	Number of Year-round Employees	Addit. summer Employ.	Total
1. Stad Company	Lumber, ladders, fruit graders	10		10
2. Beamsville Lumber & Supply Company	Lumber	8		8
3. Peninsual Masonry Supplies	Building Blocks	12		12
4. Beamsville Preserving Co.	Canned goods	25	75	100
5. Canadian Wood Products, Ltd.	Fruit baskets	90		90
6. Bartlett Mfg Company	Sprays, fruit graders	30		30
7. McKnight Machinery Co.	Machine tools	6		6
8. Babcock Bros. Feed and Fuel		5		5
9. National Socket Screw Company	Screws	6		6
Total		192	75	267

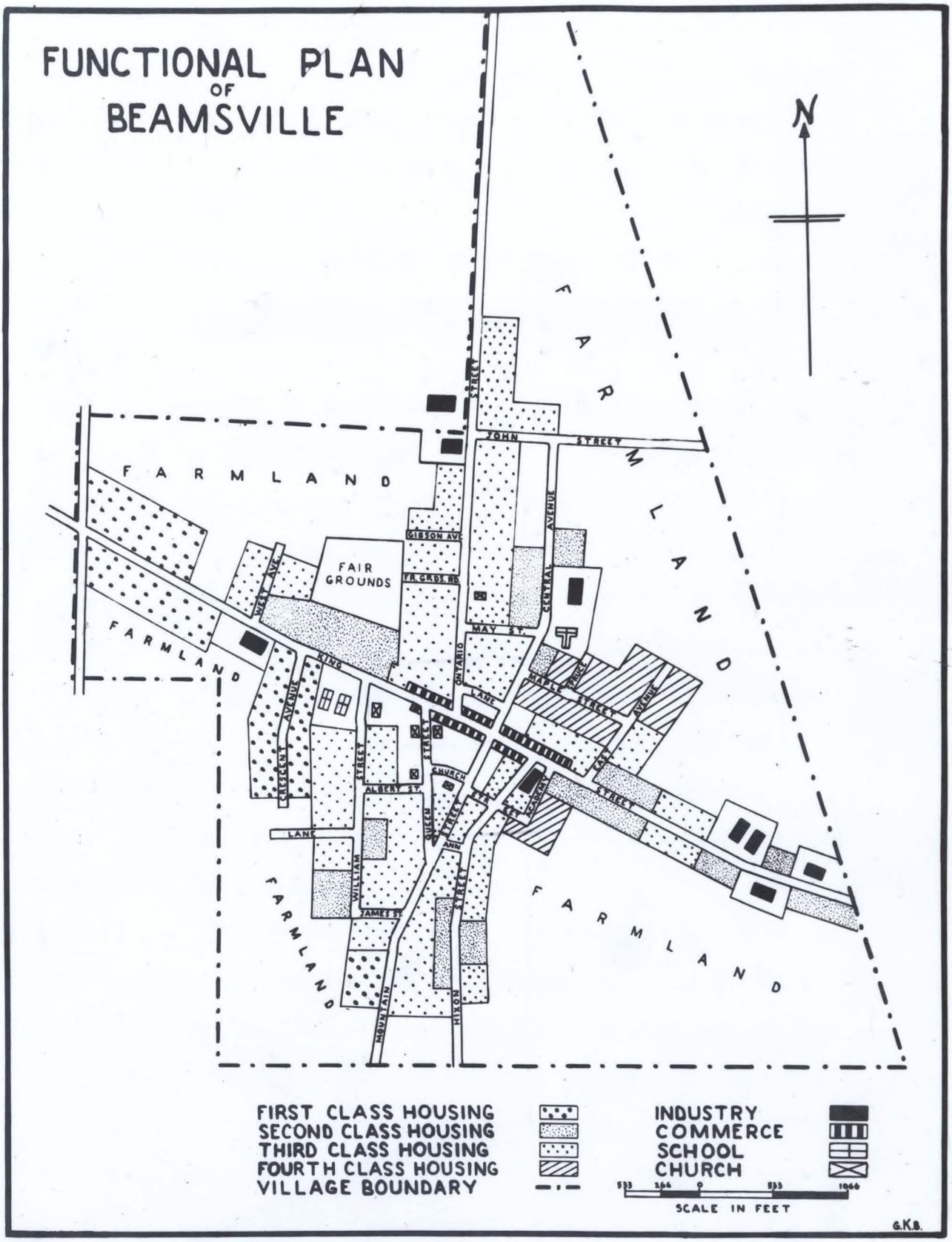

FUNCTIONAL PLAN
OF
BEAMSVILLE
N
FARMLAND
FARMLAND
FARMLAND
FARMLAND
FARMLAND
FAIR GROUNDS
FR. GRDS. RD.
GIBSON AVE.
WEST AVE.
JOHN STREET
CENTRAL AVENUE
MAY ST.
ONTARIO STREET
KING STREET
CRESCENT AVENUE
ALBERT ST.
CHURCH STREET
QUEEN STREET
WILLIAM STREET
JAMES ST.
MOUNTAIN STREET
HIXON STREET
LANE
LANE
LANE
FIRST CLASS HOUSING
SECOND CLASS HOUSING
THIRD CLASS HOUSING
FOURTH CLASS HOUSING
VILLAGE BOUNDARY
INDUSTRY
COMMERCE
SCHOOL
CHURCH
533 266 0 533 1066
SCALE IN FEET
G.K.B.

PLATE 7

As regards the number of people employed industry outranks commerce in the village. In 1951 there were about 150 people working in commercial establishments as compared to the 192 employed in industry. But in terms of the value of property the opposite is true. In the 1951 assessment commercial land and buildings were estimated to be worth $234,804 while industrial real estate was valued at only $50,425.

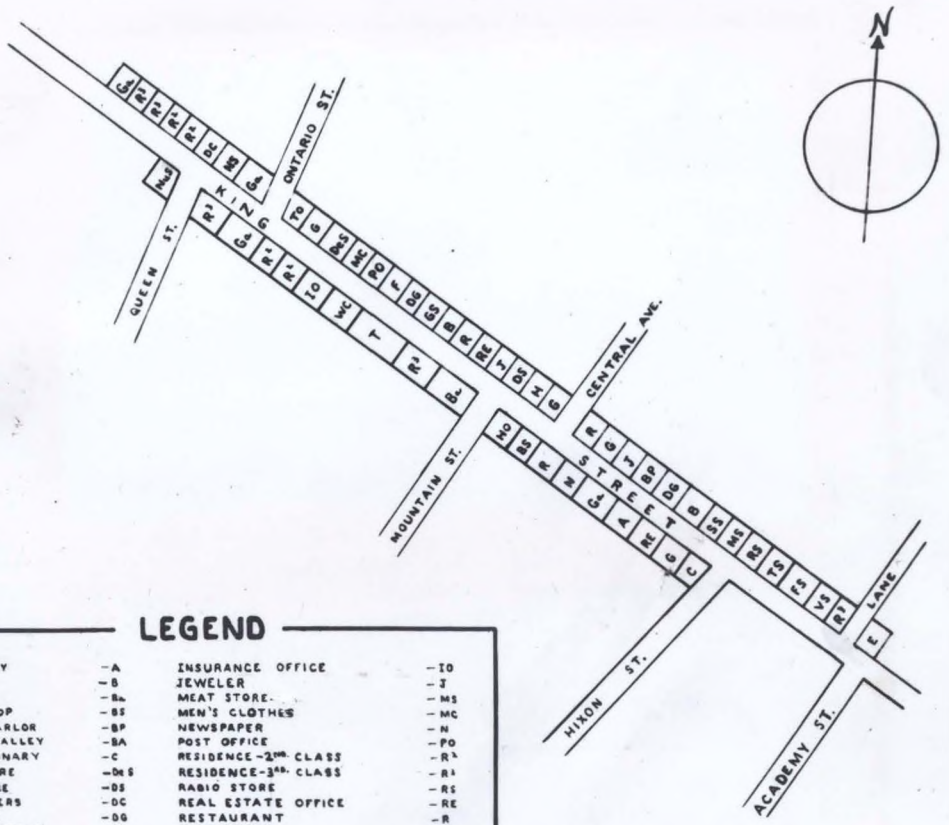
Turning to a critical study of commerce in Beamsville the two most important factors to consider are the extent of diversification of the services offered and the extent of centralization of commercial establishments.

One of the best indicators of whether a commercial centre is well developed is the existence of specialty shops. In the evolution of a town and its business district, the most basic needs of the community are the first to be supplied. As the community develops, special services like men's and women's clothing stores, a newspaper, beauty parlour and a theatre begin to appear.

As can be seen by plate 8 Beamsville has reached the stage of commercial diversification where it is very nearly self-sufficient. This is a healthy sign and it indicates that the citizens not only of Beamsville but of the surrounding agricultural region are relatively prosperous.

The business district, as well as being diversified, is completely centralized and for the most part continuous, i.e. it is not seriously interrupted by vacant lots,

DIAGRAM OF THE BEAMSVILLE BUSINESS DISTRICT



LEGEND

AUTO SUPPLY	-A	INSURANCE OFFICE	-IO
BAKERY	-B	JEWELER	-J
BANK	-Bk	MEAT STORE	-MS
BARBER SHOP	-BS	MEN'S CLOTHES	-MC
BEAUTY PARLOR	-BP	NEWSPAPER	-N
BOWLING ALLEY	-BA	POST OFFICE	-PO
CONFECTIONARY	-C	RESIDENCE-2ND. CLASS	-R²
DEP'T. STORE	-DeS	RESIDENCE-3RD. CLASS	-R³
DRUG STORE	-DS	RADIO STORE	-RS
DRY CLEANERS	-DC	REAL ESTATE OFFICE	-RE
DRY GOODS	-DG	RESTAURANT	-R
ELECTRIC STORE	-E	SHOE STORE	-SS
FEED STORE	-FS	TELEPHONE OFFICE	-To
FURNITURE STORE	-F	THEATRE	-T
GARAGE	-Ga	TOURIST HOME	-TH
GIFT SHOP	-GS	VACANT STORE	-VS
GROCERY	-G	WOMEN'S AND CHILDREN'S WEAR	-WC
HARDWARE	-H	NOVELTY STORE	-NS
HYDRO OFFICE	-HO	NURSERY STORE	-NuS

G.K.B.

PLATE 8

Fig. 12 King Street looking east. The commercial district of Beamsville.

houses or service stations.

Furthermore, places of business are concentrated entirely on the main street. This, of course, is the result of the relatively small population and the general compactness of the village. Even the peripheral areas are sufficiently close to the business district to eliminate the necessity for the development of a secondary commercial section.

As well as serving the townspeople the business district, of course, provides services for the surrounding agricultural region. The extent of the trade area was found to coincide roughly with the township boundary except in the southern part. Farmers from this district are attracted to Smithville, which lies in the southeastern section of the township of South Grimsby, rather than to Beamsville.

The northwestern boundary of Clinton is about midway between Grimsby and Beamsville and serves as a reasonably accurate trade boundary. In the east, Vineland is not large enough to compete seriously with Beamsville commercially. The trade boundary, therefore, extends about a mile east of the township line and the people living beyond it go to St. Catharines, about eight miles further to the east.

In respect to public works it was found that Beamsville has its own fire department and hydro electric distribution facilities. The latter were purchased about 40 years ago and paid for out of the profits that accrued in less than six years. A waterworks system was installed in 1895 and consequently Beamsville was one of the first villages

in the region to have its own running water. A reservoir, which is fed from wells, is located on the scarp-face just to the south and since it lies above the level of the community, water is supplied by force of gravity, thus eliminating the necessity of a water tank.

In addition, a sewage system and disposal plant were completed in 1952 at a cost of over $200,00. This innovation was greeted appreciatively by the townspeople and it is hoped that this service will help to attract more new homes in the future.

As may be seen by plate 7 the village has spread in a ribbon pattern along Ontario Street and the highway. The two exceptions to this are the urban developments west of Hixon Street and east of Central Avenue.

Contrary to what might be expected, the existence of the sharp slope from the Iroquois terrace to the till plain has not hampered development southward. Since the lake plain is characterized by rather poor drainage it seems that the better drainage on the dissected till plain is a sufficient inducement to compensate for the physical barrier which hampers travel somewhat.

By and large the class of houses in Beamsville is only fair. Third class houses are the most numerous and together with the two acreas of fourth class housing constitute the greatest proportion of the oldest houses in the village. Third class houses are generally small, kept in only a moderate state of repair and are preponderantly of frame construction. Fourth class houses are usually a little smaller

Fig. 13 A modern first class house on Crescent Avenue.

Fig. 14 A first class house on King Street of somewhat older construction.

Fig. 15 Second class housing development on Central Avenue.

Fig. 16 A third class house located on May Street.

Fig. 17 A fourth class house on East Avenue.

Fig. 18 The Beamsville High School

in size, are in a more extreme state of disrepair, and they are all constructed of wood.

Most of the first and second class houses are of modern construction although there is a small number of older homes which are quite large and in excellent condition.

There seems to be no definite concentration of the modern first and second class homes except on Crescent Avenue and at the base of Mountain Street. One finds new houses singly or in small groups in almost all parts of the village. This is probably because the farmland, which comprises a relatively large area within the village limits, has a much higher capital value than the lots which are still vacant on the main residential streets. This higher value is due to the fact that the farmland is supporting vineyards and orchards whereas the lots are simply lying idle.

As these lots are taken up by new residents however, prospective builders will be forced to purchase the higher priced agricultural land. Since it is more economical for new homes to be built in compact housing surveys in areas that do not have sewage disposal and running water facilities and electricity, more concentration of first and second class housing may be expected in the future.

Beamsville has both a high school and a public school. The former serves all of the townships of Clinton and Louth and has an enrollment of 350 students. The public school, which is housed in two separate buildings, has a total of 250 students.

The spiritual needs of the people of Beamsville and Clinton township are answered by a total of seven churches. Most of them were built before the turn of the century and they reflect the wide range of religions of the early settlers. They include: a Baptist, a Wesley United, a Knox United, a Presbyterian, two Disciples, and an Anglican church.

On the whole it does not appear that Beamsville will experience any substantial industrial development in the future. It has no harbour, it is not situated directly on the railroad and the Queen Elizabeth Way has diverted the major part of the traffic from Highway No. 8. Thus, competition from larger cities, with more natural advantages, like Toronto, Hamilton and St. Catharines, is too great.

Future development, therefore, will be limited to a slow increase in population as a result of a continued influx of people who are willing to commute to the larger cities; and with the population rising it is probable that there will be a further diversification of the commercial services in the village.

Vineland

This village is located on the eastern boundary of the township on Highway No. 8. Little information as to its early history is available but it is known that settlement first began around 1786.

In 1921 Vineland was incorporated as a village and it now has a population of approximately 500. Consistent

Fig. 19 The main street of Vineland looking east.

with the trend shown in Beamsville and Campden the village has grown considerably in the last five years as a result of people building houses there and commuting to St. Catharines about eight miles to the east.

At present the business district of Vineland includes a bank, drug store, restaurant, service stations, grocery store, barber shop and a post office. At Vineland Station, about a mile to the north, there is a large canning factory, which gives seasonal employment to a large number of people, and the Vineland Growers Co-operative.

If the economy of the nation remains stable it seems likely that there will be the same continued residential development in Vineland as in Beamsville in the future. It is improbable that there will be any further significant commercial or industrial development because of the competition with larger centres like St. Catharines and Beamsville.

Campden

This is a small community, with a population of approximately 192, situated on the Vinemount moraine in the central part of the township.

The commercial services include two grocery stores, a post office, a shoe repair shop, a service station, and a funeral home. In addition, there is an Evangelical church, a two-room public school and just beyond the village limits there is a grist mill.

Fig. 20 The main street of Campden looking east.

The population has remained relatively stable since in 1876 the Historical Atlas reported that there were 150 people living in the community. A considerable number of new homes have been built in recent years and it was found that many of their residents commute to St. Catharines to work.

The village first developed to provide limited services for the farmers on the dip slope and it has been performing the same function ever since. Due to the fact that Campden is situated on a secondary road and is not located near a railroad it is relatively isolated. As a result of this it is difficult to see how any substantial development of the community can occur in the future.

Tintern

This is a comparatively isolated and insignificant community lying on a secondary gravel road in the south-eastern part of the township.

Tintern is too small a settlement to be incorporated, containing only six or eight houses in addition to a general store, a post office and a United Church. At present, Tintern has a population of about 30 to 35 persons.

CHAPTER SIX

AGRICULTURAL LAND USE

General Climatic Factors Affecting Fruit Culture

About 90 per cent. of the area below the escarpment in Clinton township is in orchards and vineyards. The most important factor allowing for this specialization in land use is climate. Fruit trees, and especially peaches and cherries, cannot withstand prolonged winter temperatures below -17 F. In addition, early autumn frosts do serious damage to the ripening fruit and late spring frosts may eliminate the possibility of the formation of fruit by preventing bees from pollinating the blossoms. As we have seen in a previous chapter the moderating influence of Lake Ontario and the protection afforded by the escarpment reduce these climatic hazards to a minmum giving rise to the most suitable conditions for fruit culture in Ontario.

It has been found that grapes do better on the Dissected Till Plain than in any other section below the escarpment. Since the lake tends to moderate temperatures in summer as well as in winter, this land type often has summer temperatures several degrees higher than those areas nearer the shoreline. The grape requires hot summer days in order to mature and, therefore, does somewhat better in this location. This does not mean, however, that grapes are grown in no land type but the Dissected Till Plain. Indeed, upon perusal of the land use map it will be seen that there are large areas covered by vineyards nearer

the lake shore. It does mean nevertheless that higher yields are usually produced on the Dissected Till Plain than in other sections.

Plate 9 indicates that some grapes are also grown in the area along the edge of the escarpment on the Vinemount moraine. A small number of orchards also occur in this land type but in almost every case apples are the type of tree fruit cultivated. Although no specific climatic statistics are available for this section it is known to have a slightly cooler climate than the region below the escarpment. Since apples and grapes are somewhat more tolerant of extreme winter temperatures and early and late frosts than other types of fruit they can be grown in this land type but with a much greater element of risk than in the area below. Most farmers, therefore, are unwilling to plant more than a small part of their farms in these fruits reserving the remaining cultivable land for more dependable cereal and hay crops.

Thus, it is evident that climate is the primary factor in determining the location of fruit culture in Clinton township. Within the various land types further limits are set by edaphic and relief factors. These will be dealt with in the subsequent discussion.

Sand Plains

The sand plain in the southwestern part of the township offers the best correlation between soil type, relief and land use.

Fruit trees do best on fairly well drained and

aerated soils which have enough slope to carry off excess moisture. Since this land type possesses these characteristics it is almost entirely in orchards. As grapes are more tolerant of poorer drainage conditions a small number of vineyards are found on the few low lying sites which have imperfect drainage.

There are two small woodlots in this area and these are found on locations along stream courses which are so poorly drained that even the cultivation of grapes is precluded.

The central sand plain is characterized by imperfect drainage primarily because the surface is more level. In this section relationships between physical factors and land utilization are more difficult to appreciate because the human element enters into the situation more extensively. Tile drains are used to improve soil conditions in these imperfectly drained areas. Consequently, orchards may occur where they would not otherwise be expected if the farmer is willing to invest money to improve his land. Grapes, however, are somewhat more predominant because less capital investment in tile drainage systems is required in their cultivation.

It will be noted that a number of fields of hay and cereals occur in this sand plain. This is the result of an economic rather than a physical factor. Some fruit growers have an agreement with the feed store in Beamsville whereby they raise a given number of pigs or chickens to maturity. The feed store then takes these animals and gives the farmer a specified sum of money in payment for his labour and the

feed supplied for the animals.

Oats is the main crop grown for pig feed and wheat is cultivated as feed for the chickens. Practically all of the hay grown in this area is alfalfa. After being cut it is taken to the grist mill in Beamsville and chopped up, whereupon it is mixed with the wheat to form a supplementary food for the chickens.

One reason why farmers indulge in this activity is that it gives them a source of income independent of what they receive from their fruit, thus providing partial insurance against failure of the fruit crop. Another reason is that some farmers do not have the available capital to plant all of their farms in fruit and consequently they adopt this method of utilizing the land which is not in grapes and orchards.

A few woodlots are again evident in this land type. They either exist on inferior land which would be especially difficult and costly to condition for fruit culture or are kept on the relatively good land because of the commercial value of the timber.

On the southeastern sand plain drainage is also imperfect but apparently because of more extensive use of tile drains, orchards are slightly more numerous than vineyards.

Unlike the central sand plain there are no cereal or hay crops in this section and the woodlots are much fewer in number.

Fig. 21 A view of orchards and vineyards on the Till Plain as seen from the Iroquois shore-cliff. Highway No. 8 is visible in the foreground.

Fig. 22 A typical farmstead on the Till Plain.

Till Plain

Since this is an area of heavy soils with imperfect to poor drainage, grapes are the dominant crop. Orchards, however, also occur in this land type but only on the better drained sites and even then they usually must be accompanied by tile drains.

The influence of climate seems to be especially apparent in this area inasmuch as there are more vineyards in the southern section of the area than nearer the lake shore.

Woodlots are somewhat larger in this land type than in the Iroquois sand plains and are again usually found on the soils characterized by poor drainage. There are two or three small fields in scrub and it would seem that they are the result of relatively recent cutting of the trees from woodlots in order to prepare the land for cultivation.

There are a number of fields supporting cereal and hay crops and the same reasons for their existence apply here as in the central sand plain. These crops are usually relegated to the poorer soils both because they are more tolerant of adverse conditions and because the initial investment in planting them is less than it would be for fruit, since tile drains usually are not used.

Dissected Till Plain

The majority of the orchards in this land type occur south and west of Beamsville. Owing to stream ero-

Fig. 23 A typical farmstead on the Dissected Till Plain.

Fig. 24 An example of the gullying which has developed on the steeper slopes of the Iroquois shore-cliff.

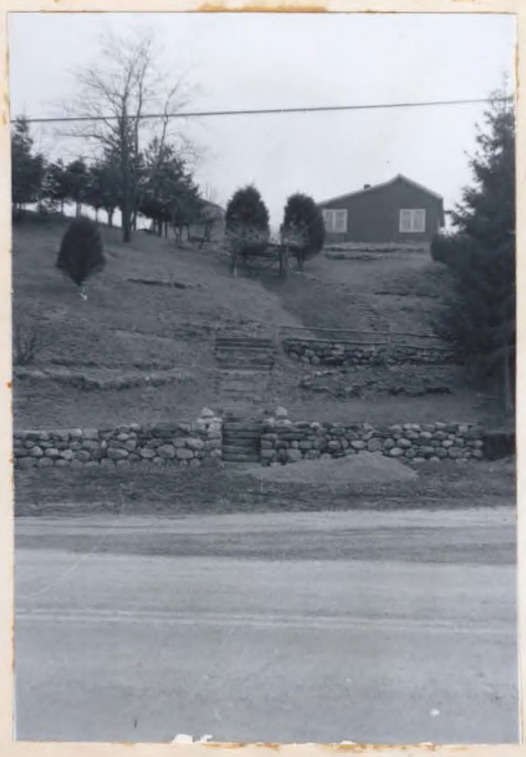


Fig. 25 A house situated on top of the Iroquois shore-cliff east of Beamsville. Highway No. 8 is visible in the foreground.

sion the terrain is more rolling in this area resulting in better drainage. Grapes, cereal and hay crops are found on the less well drained sites. It was found that much of the hay and cereal being grown in this land type is sold for cash instead of being used as feed for hogs and chickens.

Due to the better drainage conditions in this area most of the timber has been cut and any woodlots that still remain are found along or near stream courses.

The steep slope between the Iroquois terrace and the edge of the dissected till plain is not used as cropland except in one or two locations near Beamsville and Vineland where the gradient is somewhat reduced. In the rest of the township it is kept in permanent grass cover and in spite of this in many sections deep gullies have been formed.

Erosion presents a problem on the steeper slopes throughout this land type especially in the orchards and vineyards. The grapes are usually oriented at right angles to the slope to reduce the speed of running water and in recent years the trend has been to plant grass between the trellises and fruit trees to act as a binder.

Niagara Escarpment

The slopes of the scarp-face in Clinton township are too steep to allow the land to be cultivated or even used as pasture. Consequently, the scarp-face is everywhere covered with mixed deciduous and coniferous tree growth.

Vinemount Moraine

Although a small proportion of this land type is devoted to apple orchards and vineyards the major part of the cultivated land is oriented toward dairy farming.

The farmers of this area supply milk to the dairies in Beamsville and St. Catharines. Since the town of Grimsby has no dairy of its own the Beamsville dairy supplies the bulk of the demand in North and South Grimsby townships as well as in Clinton township.

It was found that in Clinton ninety per cent. of the fruit farmers prefer to buy their milk rather than keep a cow of their own to supply their domestic needs and it is reasonably safe to assume that about the same percentage applies throughout the fruit growing region. This means that the dairies of Beamsville and St. Catharines supply a large number of consumers. Consequently, they must go relatively great distances to obtain their raw milk since so much of the Niagara Peninsula does not produce milk. Thus, the Vinemount moraine and the clay plain to the south fall within the milk-shed of these two dairies and because the demand for milk remains quite stable, the farmers in these land types enjoy a reliable if not a large income.

The average farm on the Vinemount moraine is about 75 acres in size. This is about 25 acres smaller than most of the farms on the clay plain and is a reflection of the fact that some of the land on the Vinemount moraine is devoted to fruit culture. As has been stated previously the cultivation of fruit requires the appli-

Fig. 26 A typical farmstead on the Vinemount moraine.

Fig. 27 A view of the Vinemount Moraine showing the rolling nature of the terrain and the imperfect drainage conditions.

cation of more labour per acre of land than the cultivation of cereal and hay crops and consequently the farmer in this land type must work with a smaller farm unit.

The dominant crops grown by the dairy farmer are oats, wheat, hay and pasture. These are grown in rotation and a three year cycle is usually followed comprising cereal the first year, hay the next and pasture in the third year. A number of years ago a field was usually left fallow for one year out of four but with the widespread use of commercial fertilizers in recent years it has been found that the productivity of the soil can be maintained without resorting to this conservation technique.

The grain grown by the farmer is used, of course, for feeding his dairy cattle and the few hogs he may keep to supplement his income. If an unusually heavy crop is harvested the amount in excess of what is required for feed and the next year's seeding is sold.

There is considerably more oats than wheat grown on the Vinemount moraine and also on the clay plain. This is primarily because oats yields about ten bushels more than wheat per acre and makes almost as good a feed as regards protein and carbohydrate content. Wheat is used mainly as chicken feed but it is also added to the oats as feed for cattle, hogs and horses.

More alfalfa is grown in this land type and on the clay plain than any other type of hay crop. With adequate liming to help reduce the acidity of the soil excellent yields of alfalfa are obtained and since it is

just as good or better as a feed than other kinds of hay more and more farmers are tending to grow it almost exclusively. An additional advantage also is that it adds valuable nitrogen to the soil and may be grown on the same field continuously for four or five years without noticeably reducing soil fertility.

Since the land in this area is gently rolling the external drainage is good leaving very few sections too wet for cultivation. Thus, practically all of the land is being cultivated and as a result there are very few woodlots in existence. Farmers who do have a woodlot use it as a source of fuel and in some cases maple trees are tapped for making maple syrup. Where the stand of timber is not so dense as to prevent the growth of grass these woodlots are also used as pasture.

The average dairy herd on the Vinemount moraine numbers between 15 and 18 cows. Usually about one-half of these are producing milk at any one time and a farmer milking nine cows is able to sell approximately 285 pounds of milk per day. At prevailing prices this gives the farmer an annual income of about $3,500. In the case of a farmer also raising and selling hogs, chickens or fruit, of course, the total income is increased accordingly.

One or two farmers in this land type keep pure-bred Holstein cattle exclusively. In most cases, however, the herds are composed of non-pure-bred stock.

Clay Plain

One of the most important differences between land use in this land type and in the Vinemount moraine is the almost complete absence of vineyards. Most of those that do occur are along the northern boundary of the area but by and large the acreage is insignificant. Apple orchards persist but they are small and the fruit crop is used for the farmer's domestic needs.

The farms in this land type average approximately 100 acres in size and the emphasis is entirely on dairying. Since the farm units are larger than in the land type to the north and there are practically no vineyards to reduce cereal and hay crop acreages, the dairy herds are somewhat larger in size averaging about 20 - 25 cattle per herd. Again most of the cattle are of non-pure-bred stock in this land type.

Drainage is perhaps the greatest problem in this area as a result of the heavy textured soils and the level nature of the terrain. Tile drainage is used to some extent but even then it is often difficult to sow wheat in the autumn and oats and other cereals in the spring because the ground is too wet.

The field crops grown in this area are similar to those found on the Vinemount moraine except that here a slightly greater emphasis is placed on corn for ensilage. The acreage devoted to this crop, however, is relatively small in both land types.

Fig. 28 An example of the poor drainage conditions and the level nature of the terrain in the Clay Plain.

Fig. 29 Typical farm buildings on the Clay Plain. Oat stubble may be seen in the foreground.

Fig. 30 An outcrop of Lockport dolomite on the Clay Plain. These areas of extremely shallow overburden are used as permanent pasture.

There is proportionally less arable land in this area than in the Vinemount moraine. In a few places, especially in the central part of the land type, the Lockport dolomite outcrops or is so near the surface that the resultant poor drainage precludes cultivation. Since trees also do poorly in these sections they are all characterized by a cover of scrub or grass and are utilized as areas of permanent pasture. Some scrub pasture is also to be found along the most poorly drained parts of the stream courses in the south and southeastern parts of the clay plain.

Woodlots are proportionally greater in number on the clay plain than in any other part of the township. Since the drainage conditions here are generally poorer each farmer usually leaves the lowest lying part of his land in forest cover. As in other sections of the township the wood is used for fuel and occasionally sap is tapped from maple trees for making maple syrup.

A Consideration of General Problems Affecting the Farmers of Clinton Township

In speaking of the township as a whole, drainage and the acidity of the soil seem to be the two greatest problems presented by the physical environment. The western sand plain is the only land type with fine enough textured soils and sufficient slope to give moderate drainage conditions. Elsewhere tile drains have had to be used extensively to bring the productive capacity of the soils up to

a point where cultivation is reasonably profitable.

Since most crops are not tolerant of acid soils heavy applications of lime must be made constantly. Together with the cost of drain installation this means that the farmer must make a relatively large investment in his land. When the drainage and acid factors are corrected, however, the soils become relatively productive and good crop yields are usually obtained.

Erosion by running water is not a serious problem in Clinton township because of the generally level nature of the terrain. The southwestern sand plain and the dissected till plain have the steepest slopes in the township, except of course for the Niagara escarpment, and in these land types most farmers are using erosion control practices such as the planting of cover crops between trellises and fruit trees, contour ploughing and permanent pasture cover.

Erosion by wave action along the lake shore, however, has become a serious menace to farmers in that area. Lake Ontario is now at the highest level at which it has been in many years and shore erosion, therefore, has been intensified. Since the spring of 1951, in fact, so much erosion has taken place that part of the road which runs along the lake shore has been undercut and made impassable and at the present time cropland immediately adjacent to it is being threatened.

Groins have been constructed at some points along the shoreline in order to build up a larger beach but they are expensive and the average farmer cannot afford the cost.

Fig. 31 A view of the road along the lake shore taken in May, 1951. It has been partly washed away but is still passable.

Fig. 32 A picture of the same section of the lake shore as above taken in March, 1953. The road has now completely disappeared as a result of the erosive action of the lake.

Fig. 33 An example of slumping along the Lake Ontario shore-cliff.

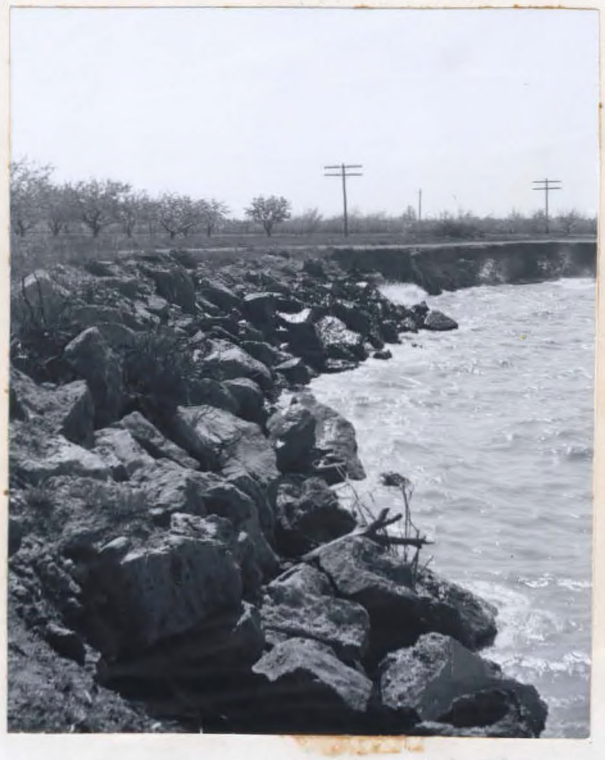


Fig. 34 Limestone blocks have been placed along the shore-cliff to retard erosion.

Fig. 35 A groin building up a beach along the lake shore. Very few of these exist in Clinton township.

Fig. 36 An example of fruit trees having been killed by the action of waves during storms. They have been recently cut down.

Large blocks of limestone cut from quarries on the dip slope are also being placed along the base of the shore cliff to retard erosion but most of the shoreline is still exposed to the destructive action of the waves.

As regards factors of the human environment, overproduction seems to be the most serious problem affecting the fruit farmer. Since 1939, the cost of sprays, baskets, and labour for picking the fruit has practically doubled whereas the selling price of fruit has remained relatively the same as a result of flooded market conditions. This means, of course, that the average fruit grower is making less profit on the same number of acres of land than he did in 1939.

The production of fruit beyond what is demanded by the large local market in Toronto and Hamilton and other urban centres in southern Ontario is the result of two basic phenomena. First, there is the fact that a great deal more land below the escarpment throughout the Niagara Peninsula has been devoted to fruit culture since 1939 (primarily as a result of the artificial stimulus provided by a wartime economy) thus increasing the total amount of fruit offered for sale. Secondly, the widespread use of sprays in the last few years has decreased the loss of fruit through diseases and insect pests again resulting in an increased production.

The situation has become so critical that some fruit growers are just able to meet their expenses and are realizing no profit while others even suffer a deficit

each year. In order to keep operating, many farmers are forced to take employment in Hamilton and St. Catharines for the winter months.

The dairy farmers on the dip slope, on the other hand, are making reasonably adequate incomes. There has been no problem of over-production as yet and the price and demand for milk remain relatively stable.

One might expect that under the present conditions some of the fruit growers below the escarpment would alter their emphasis from fruit culture to dairying or mixed farming. There are important economic factors, however, which make them reluctant to do this. As has been pointed out previously each fruit farmer has a large investment in each acre of land under orchards or vineyards. Included in this investment are trellises, grape vines, fruit trees, spraying equipment and in some cases irrigation sprinklers and tile drainage. If conversion to dairy farming were carried out a loss of many thousands of dollars in capital goods would be suffered. The only other alternative for the individual is to sell the land but since the capital investment forces the selling price to a level out of proportion to the earning capacity of the land, buyers are difficult to find.

A constructive move has been made in recent months which might alleviate the situation, if not correct it. Negotiations are under way between the Provincial Government and representatives of the fruit growers whereby it is hoped to establish a Fruit Growers Marketing Board.

This organization would be controlled by the government and would attempt to stabilize market prices by buying up surplus produce at prevailing prices. This would artificially keep up the market price of the fruit and would act, in effect, as a subsidy to the farmer since the Marketing Board would have to bear the loss on any fruit that it could not sell.

If this plan or some other one closely akin to it is not adopted in the near future it is evident that the production of fruit in Clinton township will have to decline and it seems that the only way this can take place will be by some farmers suffering the loss involved in converting their land to the production of other crops.

CHAPTER SEVEN

CONCLUSION

As regards the scarp-foot plain, it may be said that climate is the primary factor determining land utilization. Since fruit trees, and to a lesser extent, grapes are so intolerant of extreme temperatures and late spring and early autumn frosts, the scarp-foot plain is the only section of Clinton township where complete specialization in fruit culture can be accomplished with success. The presence of large urban markets within close proximity, of course, is a very important factor also, especially since there is considerable risk involved in shipping fresh fruit over long distances. With an ever increasing amount of fruit reaching the urban markets in canned form, however, this factor must be considered a secondary one.

Soils and drainage conditions are important inasmuch as they give rise to a degree of areal distribution of orchards and vineyards. Grapes are usually relegated to the heaviest textured and poorest drained soils leaving the lighter textured soils and better drained sites for the less tolerant fruit trees.

The most important factors determining the emphasis on dairying on the dip slope are, first, the existence of a large market for fluid milk in the urban centres of St. Catharines, Grimsby, and Beamsville, and among the fruit growers on the scarp-foot plain; and second, the fact that the market is close at hand. Since dairy farming can be carried on under much more rigorous climatic conditions

than fruit culture it has developed above the escarpment and increased in extent over the past years in proportion to the growth of the urban markets.

The soils do not present a serious problem to the dairy farmer. Cereal and hay crops are more tolerant of adverse soil and drainage conditions than fruit trees and grape vines. Thus, when properly limed and drained the soils produce at least average crop yields for the farmer on the dip slope.

It is difficult in the investigation of any area to assess the trend of future development on the basis of existing conditions. Although the physical environment remains relatively the same over a long period of time, the human counterpart is characteristically ephemeral as a result of increasing knowledge of the environment and constant technological improvement; and man's activity, therefore, is always changing. Thus, any consideration of development or retrogression occuring in the future must be made on a short term basis.

In respect to the fruit growers it may be said that the sudden prosperity caused by World War II stimulated efforts to increase yields by the more extensive use of sprays to combat disease and insect pests and the more extensive use of commercial fertilizers and tile drains. In addition, more land was devoted to fruit culture than ever before. The result is the present economic complication of overproduction.

It would seem that this economic problem will be of only a temporary nature, for if the trend for the growth of urban centres in southern Ontario continues, the excess in production within three to five years should be absorbed by the resultant larger markets.

As was pointed out previously, steps are being taken at present to at least alleviate if not correct the situation by the establishment of a Fruit Growers Marketing Board. If this organization proves to be feasible it will act as a worthwhile expedient until the natural balance between supply and demand is restored.

In contrast to the fruit growers, the dairy farmers are not confronted with any serious problem of overproduction. The large local markets are absorbing all the milk that is produced and with continued urban development any increased production of milk should be adequately counterbalanced by the larger market. At present, the demand for milk is stable and the market price is sufficient to ensure a reasonable income.

There may be some reduction in the rural population on the dip slope in the future as farm units become larger as a result of increased mechanization. At the time this study was made, however, no significant development in this connection had begun.

It was stated in a previous chapter that the population of Beamsville and Vineland is growing steadily because of the construction of homes by people who are willing to travel comparatively long distances to their places

of employment in Hamilton, and more particularly St. Catharines, in order to enjoy the benefits of living in a small community. This tendency is a relatively new phenomenon and is the direct outcome of the development of easy means of travel and a prosperous economy. It would seem that any future growth of Beamsville and Vineland will be the result of the situation which prevails at present since there are no strong locative factors to attract large scale industry.

Clinton township provides an excellent example of how the pattern of land utilization reflects the broad limiting influences of the physical environment. Moreover, it gives evidence of how man can act to partially control some of the factors of that environment and so engage in activity which he deems desirable. But paradoxically, as we have seen, in the process of doing this, man may create a progression of problems which, although wrought by his own hand, he finds extremely difficult to overcome.

BIBLIOGRAPHY

Caley, J.F., Palaeozoic Geology of the Toronto-Hamilton Area, Ontario; Department of Mines and Resources, Mines and Geology Branch; Memoir 224; Ottawa, 1940.

Canada, Bureau of Statistics; Census Statistics 1851-1951.

Chapman, L.J., and Putnam, D.F., The Physiography of Southern Ontario; Toronto, 1951.

Coleman, A.P., Lake Iroquois; Ontario Department of Mines, Forty-fifth Annual Report; Toronto, 1936.

Coombs, A.E., History of the Niagara Peninsula; Toronto, 1930.

Halliday, W.E.D., A Forest Classification For Canada; Department of Mines and Resources, Lands, Parks and Forests Branch; Bulletin 89; Ottawa, 1937.

Illustrated Historical Sketch of the Counties of Lincoln and Welland, Ontario; Toronto, 1876.

Putnam, D.F., and Chapman, L.J., The Climate of Southern Ontario; Scientific Agriculture, 18: 401-446, 1938.

Olding, Soil Survey of Lincoln County, (unpublished); Ontario Agricultural College, Soils Branch.

LAND USE

CLINTON TOWNSHIP

PLATE 9

G.K.B.