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OTTAWA IN 1878:
LAND-USE PATTERNS IN A CANADIAN CITY

by

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ABSTRACT

The purpose of this study is to reconstruct the land-use of the city of Ottawa in 1878, using a variety of documentary sources including the Fire Insurance Atlas, the Assessment Rolls and the City Directory. A series of questions are examined, using descriptive and statistical approaches. These are as follows; is it in fact possible to establish patterns for the whole city as it existed in 1878? Did a single C.B.D. exist in Ottawa at this time or was Ottawa best conceptualized as a series of nodes similar to what has been portrayed as the non-western city? Did the early C.B.D., if such existed, have a vertical dimension as urban geographers have identified in the contemporary city? What was the pattern of industrial, residential, public and ancillary land-uses? What patterns were exhibited by the buildings in terms of height and construction materials?

The results confirm that by 1878 a single C.B.D. had come into being, replacing the earlier foci of Upper and Lower Town. A vertical dimension to land-use in the city was found in that the taller buildings occurred toward the central area, and within this central business district some vertical stratification of land-uses was identified. Particular land-uses were found to be associated with the vertical dimension and with particular building materials. In addition, the work suggests that the overall pattern of land-uses in the city fits none of the

classical models of Burgess, Hoyt, and Harris and Ullman. Rather, Ottawa exhibited elements of all these, reflecting its past history, the importance of transportation and its new-found role as the capital of Canada. Yet while the patterns are not absolutely clear, Ottawa's land-uses would seem to be primarily sectoral in form at this time.

Accessibility and land values are generally seen as explaining the land-uses of the city, though in particular cases site considerations and historical precedent were found to be especially important.

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CHAPTER 1

THESIS OUTLINE AND ORGANISATION

1.1 Introduction to the Literature

Contemporary urban geographers study the land-use of cities in terms of (a) the spatial extent of particular land-uses and (b) the existence of a core or cores of intensive land-use activity, variously defined as the central area or Central Business District (C.B.D.). This second element, traditionally viewed as being two dimensional, has recently received greater attention in terms of a third dimension, that being the vertical extent. Springing from the same forces as produce the C.B.D., (the desire to gain accessibility and maximise profit), this third dimension is, in the absence of a literature to the contrary, generally considered to be a quality of the western, economically integrated city. Its existence has been documented by Murphy and Vance¹ for nine C.B.D.'s in the United States, and by Bowden² in the case of San Francisco. In the Canadian context this has also been done in the study of Neimanis³ working on contemporary Ottawa. Studies of this vertical element in the non-western world are rare but Campbell⁴, for example, hints at some degree of vertical differentiation in certain Latin American cities. Thus, it may be that the modern western city does not possess an exclusive right to this phenomenon.

The duality described above, that of the western and non-western

city, is a recurring theme in the literature. This dichotomous treatment of the modern western and non-western city may of course be real, but on the other hand it may reflect nothing more than the understandable inability of urban researchers to cover the whole global experience. At worst it reflects the predilection of researchers for their own culture. Whatever the reason, the division within the literature is obvious. Many people have, with justification, concentrated upon the modern western C.B.D., defining it as a single, centrally located area of intense economic activity.⁵ A noted exception is Harris⁶ who suggests that the North American city, as a subset of the western city, should be seen in its later stages as increasingly multi-nucleated. Similarly, an examination of the non-western or pre-industrial city reveals that it is most generally perceived as a series of discrete functional nodes. Different reasons are advanced in order to explain the internal form of these cities. Mukerjee⁷ stresses the strong influence of cultural values and Horvath⁸ points out that the different types of colonialism had very different effects upon the cities directly involved. Both Larimore⁹ and Mabogunje¹⁰ look at the African city, Larimore dealing more with the role of the elite while Mabogunje stresses the importance of trade and transportation in founding and forming a city. Thus, while some stress political and social forces and others stress economic and industrial factors, all are agreed upon the multi-nucleated form of "central" functions in the non-western city.

Another element, however, discernible in the literature is recognition of a relationship between stage of development and form although several authors are divided in the stress placed upon culture, as a

force militating against stage of development, or, conversely being fashioned by developmental stage. This is most clearly illustrated in Wheatley's criticism of Sjoberg's work.¹¹ Yet the association between form and development level may in fact accord with reality. Moreover, this is philosophically attractive in that it can serve to unify a diverse literature. As Mabogunje says,

Urbanization is a continuing process, related to the increasing functional specialization in human society. As such it is easy to conceive of communities at different stages of the process.¹²

Thus both types of city may actually lie along a continuum though located at different points. Such a view permits integration of both types and may lead to one theory of urban form and development. This work and subsequent research will aid in the acceptance or rejection of this viewpoint.

If this view of a continuum is accepted, one may ask where on this continuum did Ottawa lie at this point in its history? Is it more correct to view the city as having a single C.B.D. or were there in fact a series of central nodes? This is indeed one of the aims of this thesis, the purpose of which is outlined below.

1.2 Purpose

The aims of this thesis are similar to those of contemporary urban researchers but they are pursued for a past period when the city was perhaps less complex and the possibilities of achieving answers to the questions asked were probably greater. However, the relative absence of complexity is not the only reason for pursuing these themes in the past. There is also the added challenge of trying to reconstruct a city that has now largely vanished under modern developments. It is

also a truism that the patterns of today reflect in varying degrees the activities of the past: hence the importance of establishing the roots of the city's past.

The purpose of this thesis is fourfold: (i) to determine if one or more central areas existed at the chosen time and to delimit these areas. In light of this (ii) to describe and explain the patterns of particular land-use categories or themes, including the C.B.D. uses, in the city of Ottawa in 1878, a year chosen because of the quantity of documentation available for this early period, (iii) to see if, at this early time, a vertical dimension can be observed, and (iv) to explain the patterns of land-use, and the variations from them in terms of the historical context and the currently accepted theories of urban morphology.

These aims are pursued as a series of themes based on land-use categories, viz., C.B.D. uses, Residential use, Industrial use, Ancillary use, and Public use. These are associated with the variables of monetary values, building height, materials, and distance from the Peak Land Value Intersection (P.L.V.I.). The land-use categories are derived from the Fire Insurance Atlas¹³, and with reference to the literature, especially that of Murphy and Vance.¹⁴

The Analysis is pursued at the scale of the blocks, and the results may reflect the level of the research. The viewpoint taken is explicitly structural and social phenomena which might alter the conclusions are not explicitly recognised.

1.3 Organization

The study of these themes is organized as follows: the historical background is outlined, from the first settlement on the site of Ottawa city up to 1878, in Chapter Two. The source materials essential to subsequent chapters are described in Chapter Three. Chapter Four deals with the whole city in such a way as to set the five land-use themes outlined above into context and to outline the basic extent of the city. Subsequent chapters deal with the themes individually, treating each of them with regard to the five variables mentioned previously. Chapter Five deals with the C.B.D., concentrating upon its core, Chapter Six with residential land-use, and Chapter Seven with industrial, ancillary, and public land-use. The inter-relationships found in the preceding chapters and the areas delimited in those chapters are tested statistically in Chapter Eight. In Chapter Nine, the concluding chapter, the interrelationships between the patterns observed are discussed in the context of the whole city and its historical development.

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CHAPTER 2

THE HISTORICAL DEVELOPMENT OF OTTAWA TO 1878

This chapter summarizes the main events in the history of Ottawa and surrounding areas so that the city of 1878 may be seen in its historical context. It is based upon a synthesis of the published secondary sources and not upon primary research which may or may not alter some of the detail though not the major conclusions.

2.1 Early Exploration

The first known European penetration into the Ottawa valley took place in the seventeenth century, and in 1613 Champlain described the Chaudière and Rideau falls.¹ The Chaudière area was recognised as a portage place, an important consideration in the days when exploration for natural resources was the chief purpose of European contacts. From these early contacts, and for almost two hundred years following, the resource sought for was furs, but this changed to timber in the nineteenth century.

The Gatineau River was named as early as 1650.² Just before the end of the eighteenth century though, interest turned more to the Rideau River and in 1783 a Lieutenant G. French of the British Army came to the future site of Ottawa in order to explore the possibilities of a water route to Lake Ontario.³ Military considerations weighed heavily in the minds of the early colonial administration both in terms of the route to the interior and the need to establish an urban base. Thus the

Ottawa route was, in the event of hostilities with the United States, seen as less vulnerable than the St. Lawrence. A military report dated August 5, 1791 recommended, for strategic purposes, a town at the "... junction of the Reddo."⁴

2.2 The First Settlements

The initial settlement came on the north bank of the Ottawa River with the establishment of houses, farms, and a landing by Philemon Wright, his family, and workers. Philemon Wright made successive trips to the Ottawa valley in the late 1790's, finally becoming permanently established with twenty-five lumber workers at the present site of Hull in 1800. As a reporter of the "Hamilton Spectator" wrote,

Previous to Mr. Wright's coming, the sound of the white man's axe had nowhere been heard above the Long Saults Rapids; and thus was the beginning, apparently so insignificant, from which the whole of the vast Ottawa lumber trade has sprung.⁵

A village, with supporting farms, quickly grew up on the site of present-day Hull and the squared timber trade began to grow from about 1805. On the steep, wooded, south-bank of the river virtually nothing was happening in terms of settlement. A Major Elliot told the Governor General in 1824 that it would be possible to build a village on the site of present-day Lower Town, but he had found the land to be so swampy, and the vegetation so thick, that he was unable to carry out a proper survey.⁶ In 1826, before Bytown was established on the site of Ottawa, Nepean Township had only two stores, one stone building, three squared timber houses, and a few log cabins⁷, while the early settler, Braddish Billings, located near the present site of Billings Bridge, was virtually

alone in Gloucester Township.⁸ Thus, while a few people lived near the Chaudière portage, the

... whole site of the city, in its natural state, was a curious patchwork of limestone bluffs and outcroppings, pestilential swamps and beaver meadows.⁹

As the histories show, Ottawa's site was far from being a flat, uniform plain.

The future Capital was largely a cedar swamp with hemlock and pine-topped ridges of rock cropping out here and there. Dow's great swamp stretched almost from the Rideau to the Ottawa.¹⁰

Following the decision of the British military authorities to build the Rideau Canal the largely untouched nature of the site was changed rapidly, but one road had already been cleared by the military before the work of the canal commenced. The lower, western part of Wellington Street and the Richmond Road had been cleared by the men of the 99th Regiment of Foot, disbanded in 1818 and granted land to settle at Richmond (Figure 2.1). These men came up the Ottawa River to Bellow's Landing at the foot of the Chaudière Falls, on the south side. The site became a temporary campsite, and was renamed Richmond Landing, while the road was being cut from there to the new settlement twenty miles away on the Jock River.¹¹

Some of the land to be used for the canal and town was already privately owned by the early 1820's. A former employee of Philemon Wright, Nicholas Sparks bought the land bounded by Nicholas Street, modern Bronson Avenue, Wellington and Laurier Streets for only £95.¹² A Captain LeBreton had also bought a large block of land to the west of modern Bronson Avenue, overlooking the Chaudière Falls and Richmond

NAMES OF STREETS AND AREAS

FIG. 2.1

NOTE: Some sources give Victoria St. as Vittoria and Coopers St. as Cooper.

Landing. When the Landing was proposed as the entrance site for the canal, LeBreton asked a very high price for the land. He had paid £499 but asked £3000.¹³ Governor General Dalhousie refused to pay, contending that LeBreton had bought the land after hearing military conversations concerning the canal while at Richmond in 1820 and that he was blatantly speculating.¹⁴ As a result Dalhousie bought, for £750, a tract of land to the east and north of Spark's farm, fronting on the Ottawa River at Sleigh Bay, which became Entrance Bay with the construction of the canal, and extending to the Rideau.¹⁵

Colonel John By was put in charge of the whole Rideau canal project, and with his superior, Dalhousie, chose Entrance Bay for the start of the canal in the September of 1826. From this date plans were put into action, the results of which were to shape the city, but it could also be argued that the Dalhousie and LeBreton clash had also shaped the city's form indirectly since the first projected canal route, following the approximate line of modern Bronson Avenue, would have been two miles shorter than the route from Hog's Back to Entrance Bay.

Nicholas Sparks gave some land to Colonel By, who wanted a 200 foot strip on either end of the canal.¹⁶ Colonel By reserved Barracks Hill (the present Parliament Hill) and Majors Hill to Nepean Point, all of which was on Dalhousie's ordnance land, for projected fortifications (Figure 2.1).¹⁷ As Leggett says,

This was the real beginning of the town planning which the Superintending Engineer pursued so vigorously, and which has shaped the growth of central Ottawa over the years.¹⁸

Since the provisions, troops, and tools were brought up river for

the canal site but landed on the flat north side of the Ottawa River at the wharfs of the small town of Wrightsville, one of the first jobs was the construction of a bridge to span the Ottawa. Started in 1826 and named the "Union Bridge", it was opened in 1828.¹⁹ It spanned the Chaudière Falls from Wrightsville to Richmond Landing. From the start of canal construction there was an associated settlement because of the troops and the two thousand Irish labourers who came to the site. Many of these Irish workers lived in extremely poor conditions along the canal workings known as the "Deep Cut", and in "Corktown".²⁰ From 1826 onwards though, land was being subdivided into town lots by Sparks to the west of the canal and by Louis Besserer to the east.²¹ This was perhaps the beginning of the contrast between residential areas of the city, since "Corktown" was an unplanned, noisy, dirty, jumble of huts along the west bank of the canal and on what is now Cartier Square,²² while other areas were being planned, surveyed, and drained from the start. Dalhousie had told By to lay out and rent lots to settlers, and to open out streets and stipulate building regulations.²³ With By's help, Sparks and Besserer also laid out 66 feet by 198 feet lots, which canal artificers rented. By contrast, the early settlers bought lots on Wellington Street.

One event which had a great impact on the early growth and shape of Ottawa was the desire for military fortifications to guard the new canal. In 1827 the military authorities asked if they could buy 88 acres from Sparks, who promptly asked for $\frac{1}{2}$ 600 an acre. Colonel By said that the price was too high and so Sparks was dispossessed of 88 acres without remuneration.²⁴ Since no fortress was built, Sparks got the land

back, but only after it had been idle for about twenty-one years, thus effectively dividing the growing community into two parts.²⁵ Although the military reserve formed a barrier across the centre of the future city, many of the military plans were both beneficial and long-lasting. For example, Colonel By's sappers and miners cleared the west part of Wellington Street, Queen Street (from Bank Street to Elgin Street), Rideau and Sussex Streets, all being 99 feet wide from the start (Figure 2.1). Other streets were planned at 60 feet wide, with others at 40 feet wide.²⁶ A visitor to Bytown, as it was then being called, in the summer of 1828 said,

The streets are laid out with much regularity, and of liberal width that will hereafter contribute to the convenience, salubrity, and elegance of the place.²⁷

Lower Town streets, east of the canal, had the long-lasting reputation of being impassable in the spring and autumn even though as early as 1827 the Lower Town swamp was being drained. In 1831 part of the £114 requested from the Government by Colonel By was for the construction of drains.²⁸ Despite the Lower Town drainage problems, people were building in the area in 1827 before it was anywhere near fully drained,²⁹ because of its accessibility and the cheapness of the land.

Colonel By was responsible for building his house on Majors Hill, civilian and military barracks, a hospital, a commissariat, a work yard, and storehouses along the head locks.³⁰

2.3 Upper Town and Lower Town

From 1826 onwards the settlements grew rapidly. Brault says that

by 1829 there were between 140 and 150 houses in the town, most dwellings being on Wellington, Sussex, and Rideau Streets, and he adds that,

The commercial centre was on Rideau Street between Mosgrove Street and the canal. ³¹

Other historians indicate that the growth was even quicker. Leggett says that 250 houses were built in the first two years of the settlement, and he points out that these were in two distinct groups, called Upper Town and Lower Town,³² with Upper Town being on the high, dry, limestone ridge to the west of the military reserve which separated it from the canal, the commercial centre, and Lower Town. Davis reports,

In 1828 there were a hundred and fifty houses in Bytown and fifteen shops ... Before the canal was finished there were fifteen hundred civilian residents. ³³

She goes on to say that the flat, stone bluffs on which Sparks had laid out lots at the western end of Wellington Street were settled by those of marked social standing.³⁴ This area was predominantly mainland British (as opposed to Irish and French ethnic groups), and Protestant and it contained the residences of wealthy merchants. Even the poor workers of the French and Irish Catholic groups who lived in Lower Town were better off than the dwellers of squalid "Corktown."³⁵

Therefore, from the start there were the strong influences of military planning, of the physical drainage conditions, and of the cultural factors which led to the formation of two distinct nuclei. If "Corktown" is included, the settlement contained three differing residential areas.

The local markets reinforced this separation and served each group living in this disjointed Bytown. In 1829 By aided the construction of

the Upper Town market on Lyon Street, between Sparks Street and Wellington Street. A short while later the first of three Byward markets, on George Street near Sussex Street in Lower Town, was also established. The Bywash, a stream then running along King Street near the Lower Town market was the local water supply, while on the corner of Wellington and Kent Streets was the Upper Town well, also just one block from the market.³⁶ There were even two fire engines in Bytown, Upper Town getting its fire engine in 1836 and Lower Town getting its in 1837,³⁷ indicating again their early independence and separation.

2.4 Industry, Growth, and Unification in Mid-Century

Brault gives the 1841 population of Bytown as 3,122,³⁸ while by 1851 it had more than doubled and the settlement(s) had changed. There are a number of reasons for the spatial growth of the town and its population. One reason is the removal of the military barrier between Upper and Lower Town. Leggett says that Sparks got his land back in 1848, as mentioned previously, while Bond says,

The two separate entities, Upper and Lower Bytown, grew, separated by the military reserve crowned with its barracks, until 1845, when the interdiction on Spark's land was removed and the two towns, quite different in composition, began to grow toward each other.³⁹

Secondly, by the 1830's Bytown was the centre of the Ottawa Valley squared timber industry. Those who profited from this industry located on the heights of Upper Town between Wellington Street and the Ottawa River cliffs.⁴⁰ The first sawmills were also being constructed for the growing timber industry, which in the 1830's was still predominantly in the squared timber, rather than the sawn timber, trade.

In 1829 the first timber slide had been built by Ruggles Wright on the north side of the Chaudière Falls, thus greatly speeding up and affording safe passage of timber rafts on their way to Montreal and Quebec City.⁴¹ Bytown grew because of the provisions necessary for this industry and more timber-working plants were established along the rivers. In 1831 \$150 was spent on a bridge linking the workers' houses in Lower Town with the sawmills and gristmills built by Thomas McKay on Green Island and at the Rideau Falls. This route was also to become the first road from the settlement directly to Montreal.⁴²

Concerning the growing industry of the area directly affecting Bytown at this time it may be said that,

McKay made pioneer New Edinburgh (including Green Island) an industrial hive in the wilderness. Mills, plants, breweries, and stores made it a rival settlement of Bytown.⁴³

Thus the settlements had outgrown their dependence on the canal and military and were growing because of local resources and trade. Plants were being set up in the town too, the first mill being that of Jean-Baptiste St. Louis on the Bywash, near Cumberland and York Streets, established before 1830 (Figure 2.1). Thomas McKay had his construction business too, with skilled stone masons, while Enock Walkley had an early brickworks near the canal.⁴⁴

With the increasing lumbering trade, based on Bytown, the settlements which became Ottawa grew quickly with the population doubling in the decade 1841-1851 and again between 1851-1861. Table 2.1⁴⁵ shows the growth of population during the years under consideration.

POPULATION OF BYTOWN - OTTAWA

<u>Year</u>	<u>Population</u>
1837	1,300
1839	Above 2,000
1841	3,122
1851	7,760
1861	14,669
1871	21,541
1881	25,633

SOURCE: SELECTED YEARS TAKEN FROM L. BRAULT. OTTAWA OLD AND NEW, page 36

TABLE 2.1

It was in the 1850's that a great boom in the lumbering industry took place. At the beginning of this period, in 1848, there were 1,019 houses, 2 sawmills, 3 gristmills, 1 distillery, 3 breweries, and 2 foundries in Bytown, while in 1861 there were 2,104 dwellings, 12 sawmills, 1 woollen mill, 3 breweries, 1 tannery, 1 foundry, and many small workshops.⁴⁶ Although the lumber industry was growing rapidly by the 1850's further impetus came from the Reciprocity Treaty with the United States in 1854, which gave free access for Canadian lumber to the American market.⁴⁷ Since there was increasing demand for lumber in the U.S.A. there was a rapid increase in supply from the Ottawa valley, being exported via the Rideau Canal and Oswego. Spelt records that this pattern had been developing for some time to the benefit of Bytown, since,

Vast quantities of lumber were being prepared in 1836 on the Ottawa River for shipment via the Rideau Canal to Oswego and New York. Also small quantities of grain were forwarded in that direction.⁴⁸

He goes on to stress the importance of the sawmill and the introduction to the Ottawa valley of American innovations and capital in the 1850's.⁴⁹ Certainly in the 1850's the Chaudière and Rideau Falls could boast some of the largest sawmills in all of North America. E.B. Eddy came to the Chaudière from Vermont in the 1850's, while another individual, Bronson, established his firm at the falls in 1852. Perley and Pattee also arrived from the United States and these companies grew very rapidly so that, for example, E.B. Eddy was employing about 1800 people by 1871.⁵⁰

Discussing the great impact of the lumbering boom of the mid-century on Bytown-Ottawa, Leggett writes,

As sawmilling grew, every available piece of land around was used for the stock piling of sawn lumber, not only at the Chaudière Falls but also at the Rideau Falls, since here also industrial plants were developed to use the power available.⁵¹

2.5 A Change of Status: Boom Town to Capital City

With the rapid growth in size and importance of Bytown, it was felt that Bytown did not have sufficient status, either officially or in the name itself. Thus, on February 8, 1853 there was the first attempt to change the name of Bytown to Ottawa, and this change actually took place on January 1, 1855;⁵² Ottawa, a derivation from the Outaouais Indians, being regarded as a more suitable name for a potential capital city. Bytown was only incorporated as a town on January 1, 1850;⁵³ a previous attempt of 1847 had not been successful, the bill being disallowed Queen Victoria partly due to the lawless behaviour of the populace. Bytown was trying to rid itself of the image of the rough frontier town and gain a place in the hierarchy of Canadian cities. By 1854 it was large enough to separate from Carleton County, and from January 1, 1855

the town became the city of Ottawa.⁵⁴

A permanent capital needed to be found for the province of Canada, the alternating system of government between Toronto and Quebec city proving to be unsatisfactory. Ottawa had a claim because of its strategic location and position between the sections of the province. The Union Bridge (Suspension Bridge) at the Chaudière had an apt name, and the city had a French-Catholic and British-Protestant admixture. The backwoods location did nothing to strengthen Ottawa's claim in the eyes of other Canadians, but its cultural mixture did permit its being an acceptable alternative for French Canadians.⁵⁵

By the time Queen Victoria announced that Ottawa was her choice as Capital of Canada, on December 31, 1857, the city had gained limited access to the main Grand Trunk Railway system and to American Railways via the Bytown and Prescott Railway. Since this railway was supported by Thomas McKay with the aim of serving his lumber works in New Edinburgh and at the Rideau Falls, the railway tracks entered Bytown over his land and terminated two blocks from his lumber yard on Sussex Street. The service on this line opened on December 25, 1854⁵⁶ but it was not a great success at first. Following Confederation though, the line was reorganised and put on a sounder commercial footing, recommencing on December 21, 1867 as the St. Lawrence and Ottawa Railway Company. In 1871 this company built a branch from the main tracks near Billings Bridge to the lumber yards of the Chaudière area. Soon passengers also were being transported to and from this new, Broad Street terminal near

to the Falls (Figure 2.1). The 1870's also saw the arrival of the Canada Central Railway, again at the Broad Street terminal, and the Canada Atlantic Railway at the southern limits of the city on Elgin Street.⁵⁷ These transport routes within the city are shown on Figure 2.2.

At the same time as the railways were starting to come to Ottawa there was also a mushrooming of stage coach lines to Ottawa. The first stage in the Ottawa Valley had run from Long Sault to Hull as early as 1818.⁵⁸ Routes were established from Ottawa to Perth and to Richmond in 1855,⁵⁹ as the city expanded its hinterland into areas being cleared for agriculture. Despite these improved links with the surrounding area much importance was still placed on water transport, via the Ottawa River and the Rideau Canal. There had been a gradual decline of freight transport on the canal to about 1875, after which increasing quantities of coal were transported for the railways, but a considerable level of passengers and timber transport was maintained. During the 1870's M.K. Dickinson of Manotick made considerable profits from his Rideau Canal Barge Company.⁶⁰ Because of the poor condition of the roads, water transport was often preferred by passengers, including the Governor General who went from Rideau Hall, in New Edinburgh, to Parliament by boat.⁶¹

It is difficult today to realize that when the original Parliament Buildings were started in 1860, virtually all travel was still by water.⁶²

Ottawa had changed much through the 20 years of the mid-century but further rapid changes came following Confederation.

MAIN TRANSPORT ROUTES

- Roads
- Main Roads
- Horse Tramway Route
- Railway Tracks
- Ferry Route (1836-44)

Fig.2.2

2.6 Post-Confederation "Take-Off"

Canadian urban development probably had its "take-off" towards high levels of urbanization in the 10-15 years following Confederation in 1867. ⁶³

As has been seen, Ottawa had a history of rapid growth and change, but it is really in the ten to fifteen years before 1878 that the lumber town became a government city with more of the modern amenities and services. As Gentilcore says,

Next in prominence to Kingston (in 1850) also on a major river, but growing rapidly was Bytown (Ottawa). Its expansion derived from the lumber trade and the canalization of the Rideau for which it served as construction headquarters. However, the real impetus to its continued growth was to come later, with its selection as the capital. ⁶⁴

As Table 2.1 shows, the population of the city in 1871 was three times the 1851 figure, and the 1860's and 1870's saw many large and important buildings being constructed, along with new houses, especially for the newly arrived government staff. Many of the changes to the city took place because of the complaints of the Civil Servants who had moved to Ottawa from the older, more sophisticated city of Quebec. ⁶⁵ It took six years to complete the Parliament buildings on the former Barracks Hill, vacated by the military in 1853, ⁶⁶ but the provision of services and adequate housing was a problem lasting into the 1870's. Upper class residential areas still included the high limestone bluffs, near the Anglican cathedral, where some of the lumber "Kings" lived, but there were also new fashionable areas. Rideau Hall, built by McKay in 1838, in New Edinburgh, was rented to the Government in 1865 and finally bought along with 88 acres, as the Governor General's residence in 1868. ⁶⁷

Some of the rich merchants and government officials moved to New Edinburgh, out of the city limits, to live in this prestigious location.

Nearer the city centre was the fashionable "Sandy Hill" of Louis Besserer's estate. Here many ordinary civil servants settled after 1865, close to the Parliament and city centre. Rideau Street separated these better houses from those of Lower Town. Daly Street in 1867, in the heart of "Sandy Hill" (Figure 2.1) was probably the most fashionable residential street in town.⁶⁸ Sir John A. Macdonald briefly lived in this area and Daly Street also boasted the famous Albion Hotel. The area east of the canal also contained the new Nicholas Street Jail, built in 1862, and the Collège de Bytown, built on Besserer's land in 1856 and given its university charter in 1866.⁶⁹

The area west of the canal was making even more rapid progress, especially in terms of commercial growth. Brault says, of the 1870's,

The main commercial arteries are Sparks, Bank, and Rideau Streets. They used to be Sussex, Rideau, and Wellington Streets where old stone buildings can still be seen.⁷⁰

Representatives of the "Bank of Upper Canada" and the "Commercial Bank" had come to Ottawa in 1836, but it was in the 1860's that banking premises were beginning to cluster near to the centre of Upper Town, the "Bank of Ottawa" being formed in 1874 and the "Bank of Montreal" bought property at the corner of Wellington and O'Connor streets in 1867.⁷¹ At this junction also stood the Royal Victoria Hotel, a rival of the Albion Hotel east of the canal, where the Prince of Wales stayed during a visit in 1860. The prime hotel from the first days as Capital was said to be the Russell House on the corner of Sparks and Elgin

Street.⁷²

Upper Town also got a new Post Office, in order to deal with the Government's mail, and this was built in 1876 on a plaza at the junction of Elgin and Wellington Streets, facing down Rideau Street across the canal bridges.⁷³ The other prestigious buildings worthy of mention for Upper Town were the Collegiate Institute,⁷⁴ built in 1872 on Cartier Square, and the new City Hall, between Queen and Albert Streets on Elgin Street (Figure 2.1), built in 1877 to the rear of Spark's 1848 market, which in 1849 became the first "City Hall".⁷⁵

Thus, the area once dividing the two settlements was becoming the new commercial core of the city, with the older, Lower Town centre in relative decline.

Sparks Street in 1867 shared the honours with Sussex Street as the city's main commercial thoroughfare. This soon changed however, and the balance tipped in favour of this Upper Town street.⁷⁶

2.7 The Influence of the First Public Transport

As has been seen, the rise in status of Ottawa to a Capital city brought a great rise in population, in the number of buildings, and in services such as the first public transport, and the first public water works which was opened in 1875.⁷⁷ The event which helped and affected the growth of the city was the introduction of the horse railway for public transportation. The "Ottawa City Passenger Railway Co." was incorporated on August 15, 1866 and services commenced in late 1869. Its route linked the Chaudière Falls with New Edinburgh, thus connecting the three railway depots and the old and new business foci. The route lay along Sussex Street to Rideau, over Sappers Bridge, along Sparks Street to Bank, thence to Wellington and along Queen Street to Duke Street and

the Suspension Bridge to Hull (Figure 2.2). The extension to Chaudière Island had taken place by 1878, thus indicating perhaps the four most important miles of route-way within the Capital. The project was started by McKay, with the idea of transporting timber in the evenings, but its prime function was always the transportation of passengers, carrying 273,000 in the first year.⁷⁸

The wide streets were suitable for a street railway, which was a popular affair, if dependent upon the seasons and the sobriety of the drivers during the winter time. In summer the company ran horse-drawn vehicles on rail tracks, while in winter sleighs were used. During the thaw five horse buses operated through the mud. The summer service ran every twelve minutes, bringing the workers back home, mostly to Lower Town, much quicker.

Immediately the life and habits of people in⁷⁹
both New Edinburgh and Ottawa were changed.

2.8 Conclusion

From virtually nothing in 1826, the city had grown in only fifty-two years to be a capital with a population of about 25,000. The year 1878 is a point of some stability in the years of rapid growth in that there was a brief economic depression from 1876 to 1879, so that the population of the city actually fell from 25,471 to 23,789.⁸⁰ Ottawa in 1878 still had some of the characteristics of the two early settlements, and the imprint of By's planning was still obvious, but now too the city had the beginnings of a central core. The distribution of land uses and attempted delimitation of zones will be discussed below, in light of the many events which shaped the city up to 1878.

Even though the horse railway had been introduced, the great expansion of Ottawa into the surrounding countryside only came with the electric street cars of the 1890's.⁸¹ Ottawa had still not grown too big for convenient analysis, being relatively compact, with the transition on the fringe from urban to rural being fairly distinct. It was largely a walking city with pre-modern buildings.⁸² The growth process up to the point of analysis may be summarised as follows:

The establishment of saw-mills was a great trade stimulant in Ottawa. Many auxiliary industries developed. When the city was chosen as the Capital, the arrival of civil servants and their families inevitably caused a large increase in business.⁸³

From this historical background it may be seen that Ottawa had an important administrative function, in the central part of the city, along with many of the functions associated with a modern city. The literature reviewed in this chapter points to there being a concentration of stores, and all commercial activity in the central part of the city, with the Upper Town centre having a more important role than the Lower Town commercial area. These two areas had grown together, with rapid development having taken place on the former reserve which had divided the city up to the late 1840's.

Distinct residential districts also existed, the two upper class areas having been identified as the cliff tops of Upper Town, and Sandy Hill. The literature also points out the importance of the large area of lower class housing in Lower Town.

As in many a modern city, distinct industrial areas existed in Ottawa in 1878. These industries, and the whole city, had been linked

to the other main cities of Canada, rather than remaining an isolated frontier town. Railway, stage coach and water routes all provided Ottawa with links to other industrial and commercial centres. The city could also rival the older cities in that, by 1878, it could provide services and goods to many elements of society, from civil servants to lumbermen.

The full impact of this last aspect, the government bureaucracy, has not yet been fully assessed. It is not explicitly located in the secondary literature upon which this chapter is based. Its proper assessment awaits primary research although its impact was probably considerable. One aspect of this (among many) was the undoubted reinforcement of the Upper Town core whose Anglophone population increased at this time. This, together with new functions associated with government, led to a relative increase in the importance of the upper core and a decline in the lower core in relation to the city as a whole. Though the Lower Town core remained important to the French and Irish population in that area, serving their particular needs, by the 1870's the upper core was already showing signs of dominance. It is one of the purposes of this thesis to establish how marked this effect was in 1878.

Thus, in the more detailed study of the land-uses in the following chapters, it may be expected that Ottawa would have many facets associated with the modern city, while still retaining some of the imprint of its planning and earlier form. Before dealing with the city in detail, the primary source materials necessary for the study are dealt with in Chapter Three.

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CHAPTER 3

DOCUMENTARY SOURCE MATERIALS

3.1 Introduction

The primary source materials, which provide the bulk of the data for this thesis, are rich in the type and variety of information which they contain. Clustering as they do around 1878, the sources allow a wide range of data to be collected and each source contributes to the desired total of information required for each city block. Working at the level of the city block, 462 of which may be designated within the city limits of 1878, the following types of information may be collected or calculated. It is possible to ascertain the size of each block, the construction materials and building height, and also many of the land uses, not only on the ground floor but also on the upper floors. To this data monetary values could also be added, in the form of assessed values, for the land making up each block, and for the buildings and the total Real Property. Thus the data from the combined sources allows a picture to be formed of the city which contains the desired elements including land-use, horizontal and vertical patterning of the major types of land-use along with the construction materials and monetary values. Individually and collectively the sources provide a wealth of information which, by careful synthesis, can provide a valuable picture of the city as it once existed. The sources are treated individually, below, outlining

their value to this particular study and also noting the drawbacks or problems associated with them.

3.2 The Primary Sources and their Availability

In historical studies there are always problems of missing, incomplete, or very fragmentary data. Documentary sources are easily destroyed, by exposure to the weather, through neglect, accidents including fires, and even by deliberate policy. Fire has been a considerable hazard in the whole of the Ottawa Valley and within the City of Ottawa itself. In 1931, for example, the City Hall which had been erected between 1875 and 1877¹ on Elgin Street was destroyed by fire. This Italianate building² housed the Assessment records of the City up to 1930 and all but six volumes, which were not in the building at the time, were destroyed by the fire. Many building permits and property records were also destroyed in the fire which consumed the old wooden Byward Market Building.³

It is very fortunate that so many sources for the late 1870's do in fact still exist, and it is equally fortunate that the City of Ottawa itself was not totally destroyed in the "Great Fire of 1870"⁴, which destroyed much of Carleton County. A large portion of the City of Ottawa, along with much of Hull and the intervening Chaudière Industrial and Lumbering area, was burnt to the ground in the Ottawa-Hull fire of 1900.⁵ Since many of the buildings were of wooden construction, it was quite possible for whole blocks of the city to vanish into ashes, such as happened to the block bounded by Cumberland, Walter, Daly, and Stewart Streets in 1873 for example⁶ (Figure 2.1).

3.3 The Fire Insurance Atlas

The most valuable of the sources for an urban-historical land use study in the late 1870's is the Fire Insurance Atlas⁷ published for the City of Ottawa in 1878. This atlas, or series of 49 large plans, may be assessed to be of great accuracy because of the scale and detail of the plans, because of the accuracy demanded where money and insurance are involved, and because the assessors were required to visit the structures and check the details before their inclusion on the plans. Most of the plans contained in this atlas were drawn to a scale of 40 feet to one inch, with the plans of the Chaudière lumber yards being drawn to a scale of 100 feet to one inch.

The plans provide accurate dimensions of the streets, blocks, and the individual buildings, with each building address, its height in floors, and information concerning at least the ground floor land use of most of the structures. A colour code indicates the basic building materials, i.e. brick, stone and concrete, timber, stucco surfaced, brick veneer, and combinations of these. Much other detail is also included, such as roof type and material, positioning of windows, fire-walls, street water pipes, and some non-structural land uses, i.e. in the industrial and lumbering areas.

Problems do arise with the use of the Fire Insurance Atlas though, since the buildings on some blocks have been given assigned numbers as well as their street address. This is a minor problem and with care the address of a structure can be taken for comparison with other sources. Comparison with other sources is necessary since the plans often give no information regarding the uses of the upper floors of structures.

This problem can only be solved with reference to the Assessment Rolls and City Directory, mentioned below. Only in the central part of the city is any indication given of any upper floor uses. Many corner stores and smaller one-and-a-half and two-storey stores are indicated only as a "store", often irrespective of type and without any indication of the use of the upper floor. Thus, for the purpose of this study it was necessary to assume that the upper floor, or floors, were residential in use. It was not always possible to crosscheck with other data sources and so this assumption had to be made, though it may be possible that in a few instances the upper floor was used only for storage. This assumption is supported by secondary sources, the following instance being taken as an example. The west side of Sussex Street (now Sussex Drive) contained a long row of three-storey buildings in 1878 and the Fire Insurance Atlas shows most of these as having a retail ground floor land use. Only rarely is any indication of the uses of the upper floors given. It has been assumed again that these were residential, unless other sources indicated otherwise. Courtney Bond confirms this assumption by saying that there were many small hotels and rooming houses along this part of Sussex Street and that there were many boarding houses above the stores which were "... much frequented by the raftsmen and shantymen".⁸

It is not always possible to crosscheck between sources in order to find the upper floor uses but it may be argued that the ground floor uses are of most concern and most importance, and that in the 1870's there was still little separation between place of work and place of residence for the majority of people.⁹ It is not possible at all to check the exact use of the many small sheds shown on the plans and so

these have been recorded as a group by themselves.

The final problem associated with the Fire Insurance Atlas is the lack of property boundaries and the omission of most, though not all, lot lines.¹⁰ The blocks assigned numbers 149 and 153 (Figure 3.1) at the north end of Kent Street, for example, have all the lot lines shown on the plan whereas other blocks, especially those in the more heavily built up areas of the city show no evidence of lot lines. This did not prove to be a serious omission, the work being done at the level of the city block rather than with the individual lots.

3.4 The City Directory

In order to check on the uses of various individual buildings it is possible to look at the other main sources. The address of a building, taken off the Fire Insurance Atlas, may be located in the City Directory listing.¹¹ Volumes are available from 1861 onwards, including 1878, and the Directories give the street name, civic address, and the person or persons living in that building. Unfortunately there are quite a number of discrepancies between the Atlas and the Directory. This may be due to the method of compiling the Directory, whereby citizens were asked to complete a form and give the required information. Not all families wanted it to be known who lived in which house, and there were also problems of illiteracy and failure of people to answer willingly, correctly, or fully.

Some considerable differences do occur between these two sources; for example, No. 522 Sussex Street (Drive) is shown on the Atlas to be a brick building with three floors, the first floor being a store. On

FIG. 3.1

the Directory listing, this same lot is classed as being vacant. It may be that the particular building was constructed after the Directory survey had been taken but before the survey carried out by Charles Goad's men. This is a possibility, and it may certainly be so in a few other cases, but there is doubt in this case since the row in question on Sussex Street had been quite long established.¹² The City Directory did enable the uses of upper floors to be found in about 230 cases, but this still left about 100 problems. However, this is not a large number in light of the total population of the city, being between 21,541 in 1871 and 25,633 in 1881,¹³ and considering the total of 8,500 data cards compiled in the process of the study. Many of the 100 remaining cases were assumed to be of residential use, though a few were assigned the code for unknown use on the upper floors.

3.5 The Assessment Rolls

Probably of more value than the Directory, and of greater accuracy too, are the Assessment Rolls¹⁴ for each ward of the city. Unfortunately the Assessment Rolls for 1878 were amongst those destroyed by fire, but the Assessments do exist for 1876-77 and for 1879. During the research period only the 1876-77 volume was available for study, the 1879 volume undergoing preservation and rebinding by the staff of the Ottawa Public Library. It may also be argued that some information for the other sources of 1878 may well have been collected in 1877 and so the 1876-77 Assessment Rolls are closer than the 1879 volume to the desired date of 1878. This problem, though, underlines the difficulties encountered when dealing with historical data.

For each ward of the city the Assessment Rolls list the name of the occupant or other taxable party for each property unit and indicate whether the person is a tenant or a freeholder. The lot number and the position of the property on that lot are given but these are listed by the street and not by city blocks as desired. The assessed values listed are as follows: Value of the Land, Value of the Buildings, Total Value of the Real Property, and Personal Property and Income. For the purposes of this study only the first three of these values were needed. In order to bring these values to the block level it was necessary to locate each lot for which the values are given within the appropriate city block. Thus a base map was necessary which showed the lots and lot numbers of the city blocks that existed in 1878.

3.6 Contemporary Base Map

After considerable search in the Public Archives no Assessment Roll base map could be found, if one actually existed, and so Belden's¹⁵ map of the City of Ottawa for 1879 had to be used as the best available, having lot numbers and contemporary street names. This map shows the streets, and the survey lines for proposed streets. It also shows the lot numbers where these had been assigned by 1879. Once again there proved to be problems with this source, since it was not always possible to read the lot numbers, nor one or two of the smaller street names. Often, though, it proved possible to infer the illegible lot numbers by following the numerical sequence. In some cases both ends of a numerical sequence were quite legible and so missing numbers in the middle could be filled in. The Fire Insurance Atlas was used to cross-check details of street plans since some of the survey lines were not

actually followed. For example, Concession Road (modern Bronson Avenue) stopped short of the 35 ft. cliff near the Ottawa River, whereas the survey line for this road extended on the map right to the water's edge. Thus, with minor corrections it was possible to produce base maps, with lot numbers and street names (Figure 3.1) for use with the Assessment Rolls.

Since it was necessary to work at the block level, the assessed values for the streets surrounding each block had to be computed. It was therefore necessary to know exactly which lot numbers fitted into each city block. Most lot numbers were filled in easily but there were a few minor problems where the lot numbering scheme employed was not consistent, or even logical to this author's eyes. On certain streets the lot numbering sequence started from No. 1 at each end, working upwards towards the middle of the street. The south side of Wellington Street is an example of this type of confused numbering, with the numbers diminishing westwards from No. 25, starting at the junction with Elgin Street and also diminishing eastwards from No. 23 at the junction of Wellington, Sparks, and Concession Streets. Thus, the south side of Wellington Street has two lots No. 1, with each sequence being separated by lot Z and lot A on the block between Kent and Bank Streets. Similar problems do occur for Sparks Street and Queen Street. Extra initial confusion is created because of the use of letters to designate each lot in a few of the earlier surveyed streets. In several places even a mixture of letters and numbers were used to designate lots, and a difficult area for the assigning of lot numbers lies between Park Street, in Ottawa Ward, and Ottawa Street (now St. Patrick Street).

3.7 Reconciling Differences between the Sources

Another minor problem arose because of the changing of street names and the use of a different name for the same street in the different sources. The Fire Insurance Atlas was taken to be the most accurate and up-to-date source.¹⁶ For example, McLachlan Street (which is assumed to be the Bay Street of the Fire Insurance Atlas) did appear in the Assessment Roll for Victoria Ward, but no such name appeared on any other source. This was so assigned since the lot numbers for the west side of Bay Street and the lot numbers given for the McLachlan Street in the Victoria Ward Assessment Roll agree exactly. Also, the particular location, in the lumbering district near the LeBreton Flats once contained a firm established by a McLachlan family.¹⁷ The Assessment Rolls could be matched with the city blocks remembering, though, that in and around 1878 for example, Biddy Street became Lisgar, Besserer Street became St. Paul, Baldwin became Daly, and Ottawa Street in St. George's Ward became Besserer Street. The Fire Insurance Atlas shows Clarence Street so named for the whole of its length, but according to the Assessment Rolls this same street commences as Clarence Street West, then becomes Parry Street, and after Anglesea Square it becomes Franklin Street. These discrepancies between sources had to be solved before the Assessment Roll data could be used.

3.8 The City Limits

Four sources, the Fire Insurance Atlas for 1878, the Ottawa City Directory for 1878, the Assessment Rolls for 1876-77, and Belden's survey map of 1879, proved to be the most useful, especially as they

all cluster around the year 1878. They all share the common problem of having an ill-defined southern limit for the city of Ottawa. The Fire Insurance Atlas does not cover the area south of Theodore and Lisgar Streets, since there are very few structures beyond this line. The Assessment Rolls cover a larger area but since the southern parts of Wellington and St. George's wards were only in the process of being surveyed and settled in the late 1870's, these areas are consequently dealt with in a fragmentary manner. Likewise, the City Directory has no clearly defined southern limits but it does cover all but the thinly settled area. Belden's map shows the city limits on the land but it does not indicate the borders in terms of the water courses. Checking with other secondary sources in the National Archives was therefore necessary in order to establish the city limits along the centre of the Rideau River, but excluding from the city islands such as Green Island. The limits were also found to follow the centre of the Ottawa River's widest channel to the centre of the Chaudière Falls.

3.9 Additional Sources

The Bird's Eye View of the city,¹⁸ although two years from the desired date, is a profitable source in a number of ways. Although such maps were produced in order to show the attractions of a city and hence not too much reliance should be placed upon them, they do show the extent of streets and the location of buildings. It does cover areas not covered or fully shown by the other sources. Thus it proved to be very valuable for checking areas of the Ottawa River waterfront in the lumbering district and around Nepean point, this latter area especially

being only partially covered by the Fire Insurance Atlas. This Map/view also allows for the reconstruction of the occupied blocks south of the limits of the Fire Insurance Atlas. This proved most helpful for the area between the line of Theodore and Lisgar Streets, and the city limits.

The Bird's Eye View is not complete either, in that it excludes all of the interesting and complex industrial area around the Rideau Falls, and the site of the first Ottawa station of the "St. Lawrence and Ottawa Rail Road". On the western side of the city the area to the west of Concession Street (now Bronson Avenue) is also omitted. This is a useful source, despite these omissions and the reservation about the faithfulness of the reproduction in that perhaps the city appears to be more attractive than it really was.

Other possible sources include the Building Permit records which may have been useful, but, as mentioned above, these records of buildings prior to 1940 were destroyed in various fires, the majority being in the Byward Market Fire.

The Census data for 1871 and 1881 was not used since these years were considered to be too far away from the desired year of 1878, the 1881 census not being available in any case due to the 100 year secrecy restriction by the Government of Canada. It may also be argued that any additional information concerning land-use would only be minimal.

Contemporary photographs of Ottawa in 1878 are available from the Public Archives, but these were only used for background information. They confirm the building uses, heights, quality of streets and other interesting features of Ottawa. Two drawings proved very helpful -

one of Upper and Lower town in 1855 showing two distinct nuclei, and another of Sappers and Dufferin Bridges (between Sparks, Wellington, and Rideau Streets) in 1877. These are reproduced by Brault¹⁹ and do indeed bring illumination to the maps and histories of the city.

3.10 Conclusions

These sources, together with histories and photographs, provide a picture of the city and its land use in 1878, which must be at least 90 percent if not 95 percent accurate. It is indeed fortunate that so much data and so many sources are available for this latter part of the 1870's. When dealing with historical data going back 100 years, especially in a fire prone city, it would be too much to expect that a picture of much greater accuracy could be achieved. Rather, it is pleasing that the sources around 1878 allow so much data to be compiled and at a high level of accuracy.

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CHAPTER 4

CITY-WIDE DISTRIBUTION PATTERNS

4.1 Introduction

In Chapter Two it was shown that there were areas in Ottawa in which particular land-uses predominated in the period before 1878. Such a case occurred in Lower Town which had housing associated with the poor. One of the express purposes of this thesis is to delimit the areas of particular land-uses, a task undertaken in subsequent chapters. However, land-use is obviously related to land value and may be associated with other variables such as building materials and building height. The purpose of this chapter is to discuss the physical extent and general characteristics of Ottawa and to present the pattern of variables rather than to describe and explain the actual pattern of land-uses. The variables "land value", "building height", and "building materials" are explicitly treated in the sections which follow. The data collection and manipulation necessary to reconstruct their patterns occur immediately below.

4.2 Data Collection

Using the Fire Insurance Atlas (F.I.A.), mentioned in Chapter Three, it was possible to take scale measurements of every building in the city since all the main built-up areas were covered by these plans.¹ The

measurements were converted to the actual sizes in feet and were recorded by block on computer coding sheets, each block having an assigned block number and an eight figure grid-reference. Details of building height and construction materials were also obtained from this source. Many land-use functions could be determined from the F.I.A. for each floor; sometimes for upper floors reference had to be made to the City Directory.² Less frequently the third important source, the Assessment Rolls,³ were used to determine or confirm a function. Cross-classified with the Assessment Rolls the land, building, and total real property values were obtained for each block, not without difficulty since these values were recorded not by block but by sheet and lot. This problem was compounded because of changes in street names over time and because there were occasional disagreements between the sources concerning a street name.⁴ The dimensions of the blocks were also recorded so that all the values and land-use functions could be expressed as percentages of the total square footage of the block. The mass of detail obtained in this way made basic pattern recognition most difficult and it was necessary to aggregate and classify before producing a series of maps using the SYMAP routine.

4.3 The Production of Distribution Maps

The data were aggregated to the level of the city block.⁵ Table 4.1 shows the categories of aggregated data which were recorded for 462 city blocks. Table 4.2 lists the actual land-use categories used. Although sixty-one maps were prepared (Table 4.3) providing the basis for visual analysis, only those relating to the whole city will be discussed in

AGGREGATED DATA

- 1) The square footage of each building material category as a % of the total building area on the block.
 - 2) The square footage of each building material category as a % of the total block area.
 - 3) The square footage of each floor 1 land-use category as a % of the total block area.
 - 4) The square footage of each floor 2 land-use category as a % of the total block area.
 - 5) The square footage of each floor 3 land-use category as a % of the total block area.
 - 6) The square footage of each land-use category for floors above floor 3 as a % of the total block area.
 - 7) The square footage of each land-use category not associated with buildings as a % of the total block area, i.e., Parkland, Lumber stacks, and Vacant land or buildings.
 - 8) The square footage of 1,2,3,>3 storey buildings on each block as a % of the total block area.
 - 9) The square footage of 1,2,3,>3 storey buildings on each block as a % of the building area.
 - 10) The square footage of buildings on each block, by floors, and the total square footage of each block.
 - 11) The % of each block occupied by buildings, by footage.
 - 12) The totals of assessed land, building, and real property value for each block.
 - 13) Assessed land and real property value per square foot for each block.
 - 14) Assessed building value per square foot for the buildings on each block.
- Subsequently added;
- 15) The distance from the centre of each block to the PLVI (Peak Land Value Intersection).

Table 4.1

LAND-USE CATEGORIES

- 1) Retail...all stores, market buildings and places offering goods and services, e.g., hotel livery stables.
- 2) Services...includes all hotels, saloons, cafes, restaurants, and places designated as boarding houses.
- 3) Commercial...all banks and identifiable financial institutions.
- 4) Offices...all offices including newspapers and telegraphic offices. Excludes commercial institutions and the offices of public administration.
- 5) Public Buildings...the offices of government and public administration, schools, public halls, and all ecclesiastical property.
- 6) Industrial...all manufacturing and processing plants, including lumber mills, grist mills, foundries, factories, and blacksmiths.
- 7) Stables...all private stables and driving sheds but excluding livery stables.
- 8) Sheds...all non-residential structures classed by the FIA as sheds.
- 9) Wholesale...all storehouses and warehouses where differentiated from sheds on the FIA.
- 10) Residential...all houses, apartments, and floors of long term residential use. Also, all upper floors of buildings with no other use indicated and which could reasonably be assumed to be residential.
- 11) Office+Service...a category to include property used by doctors, dentists, veterinary surgeons, lawyers, and undertakers.
- 12) Manufacturing+Selling...where production and selling took place on the same site. Includes the property of bakers, jewellers, shoemakers, and cabinetmakers.
- 13) Lumber stacks...all industrial lumber stacks and commercial stacks of cordwood. Also private wood piles with an area of over 100 square foot.
- 14) Vacant...all specifically vacant lots. Also buildings classed as burnt or rotten and presumably empty.
- 15) Parkland...public gardens and parks.

Table 4.2

LIST OF MAPS PRODUCED USING "SYMAP" PROGRAM

- 1) Area of stone buildings as % of block building area.
- 2) Area of brick buildings as % of block building area.
- 3) Area of timber buildings as % of block building area.
- 4) Area of veneered buildings as % of blocks building area.
- 5) Area of stn+brk buildings as % of block building area.
- 6) Area of stone buildings as % of block area.
- 7) Area of brick buildings as % of block area.
- 8) Area of timber buildings as % of block area.
- 9) Area of veneered buildings as % of block area.
- 10) Area of stn+brk buildings as % of block area.
- 11) Floor 1 Stores as % of total floor 1 sq.feet.
- 12) Floor 1 Hotels as % of total floor 1 sq.feet.
- 13) Floor 1 Financial as % of total floor 1 sq.feet.
- 14) Floor 1 Offices as % of total floor 1 sq.feet.
- 15) Floor 1 Public as % of total floor 1 sq.feet.
- 16) Floor 1 Residential as % of total floor 1 sq.feet.
- 17) Floor 1 Industry & Manufacturing+Selling as % of total floor 1 sq.feet.
- 18) Floor 1 CBD uses as % of total floor 1 sq.feet.
- 19) Floor 1 Ancillary (Sheds+Stables+Warehouses) as % of total floor 1 sq.feet.
- 20) Non-building land (Vacant+Lumber+Parks) as % of total floor 1 sq.feet.
- 21) Floor 2 Stores as % of total floor 2 sq.feet.
- 22) Floor 2 Hotels as % of total floor 2 sq.feet.
- 23) Floor 2 Financial as % of total floor 2 sq.feet.
- 24) Floor 2 Offices as % of total floor 2 sq.feet.
- 25) Floor 2 Public as % of total floor 2 sq.feet.
- 26) Floor 2 Residential as % of total floor 2 sq.feet.
- 27) Floor 2 Industrial as % of total floor 2 sq.feet.
- 28) Floor 2 CBD uses as % of total floor 2 sq.feet.
- 29) Floor 2 Ancillary as % of total floor 2 sq.feet.
- 30) Floor 3 Stores as % of total floor 3 sq.feet.
- 31) Floor 3 Hotels as % of total floor 3 sq.feet.
- 32) Floor 3 Financial as % of total floor 3 sq.feet.
- 33) Floor 3 Offices as % of total floor 3 sq.feet.
- 34) Floor 3 Residential as % of total floor 3 sq.feet.
- 35) Floor 3 Public as % of total floor 3 sq.feet.
- 36) Floor 3 Industry as % of total floor 3 sq.feet.
- 37) Floor 3 CBD uses as % of total floor 3 sq.feet.
- 38) Floor 3 Ancillary as % of total floor 3 sq.feet.
- 39) Above fl.3 Public as % of total >fl.3 sq.feet.
- 40) Above fl.3 Wholesale as % of total >fl.3 sq.feet.
- 41) Above fl.3 Residential as % of total >fl.3 sq.feet.
- 42) Above fl.3 CBD uses as % of total >fl.3 sq.feet.
- 43) Lumber stacks as % of block area.
- 44) Vacant land as % of block area.
- 45) Parkland as % of block area.
- 46) 1 storey buildings as % of block area.
- 47) 2 storey buildings as % of block area.
- 48) 3 storey buildings as % of block area.
- 49) >3 storey buildings as % of block area.
- 50) The % of block occupied by buildings.
- 51) Land value per sq.feet of block.
- 52) Real value per sq.feet of block.
- 53) Building value per sq.feet of buildings on block.
- 54) 1 storey buildings as % of building area on block.
- 55) 2 storey buildings as % of building area on block.
- 56) 3 storey buildings as % of building area on block.
- 57) >3 storey buildings as % of building area on block.
- 58) Areas with $\geq 50\%$ timber material + $\geq 50\%$ in residential use.
- 59) Areas of Lumber stacks and Industry.
- 60) Areas of brick,stone,or brk+stn material and with buildings of >3 floors.
- 61) Areas with $\geq 10\%$ brick,stone,or brk+stn and with $\geq 10\%$ CBD uses.

Table 4.3

this chapter. Because of the problem of boundary definition the computer printed maps were clarified by hand so that patterns could be recognised more easily.

4.4 The Physical Extent of the City

Figure 4.1 shows the extent of the built-up city in 1878, this differing from the legal city or officially defined municipal area. The map was compiled mostly from the F.I.A., every half lot occupied by structures being plotted. For the areas outside the limits of the F.I.A. but still within the city limits, two other sources were consulted. For the area south of Lisgar and Theodore Streets (Figure 2.1) the Bird's Eye View produced by Hermann Brosius⁶ proved to be most useful. The other area not covered by the F.I.A. and also excluded from Brosius's map was the area south of Edward Street and west of Concession Street (Bronson Avenue). In order to complete this area the Assessment Rolls were used, buildings being plotted on each lot which was recorded as having an assessed building value. No data could be found for 20 lots in this area.

Figure 4.1 clearly shows the extent of the undeveloped portion of the city and also how, within the built-up city, the intensity of occupancy of lots increased towards the city centre. Many blocks in Lower Town were intensely occupied, while in southwestern Upper Town there was a marked decrease in the intensity of lot occupancy away from Wellington and Bank Streets.

This figure is complemented by Figure 4.2 which shows the percentages of each block's area occupied by buildings. This confirms the den-

LOT OCCUPANCE

FIG. 4.1

PERCENTAGE OF BLOCK WITH BUILDINGS

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	14.00	28.00	42.00	56.00
MAX.	14.00	28.00	42.00	56.00	70.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ.	251	108	60	33	10

FIG. 4.2

sity of occupation around the Peak Land Value Intersection (P.L.V.I.), located at the junction of Sparks and Elgin Streets (Figure 2.1), and reveals two other high density areas, i.e., Lower Town between the Byward market and the Rideau River, and the LeBreton Flats. Figure 4.2 will be discussed further in Chapter Five, where it is used in the discussion of the C.B.D.

By contrast, Figure 4.3 shows the distribution of non-building land within the city limits. It is really a composite map since it includes all vacant land plus parkland and lumber-stacks. Separate maps of parkland and vacant land appear as Appendix A.

4.5 Assessed Values in the City

Figure 4.4 shows the distribution of assessed land values per square foot for the 462 blocks of the legal city. There are three readily distinguishable areas, the first being of very low values (less than 1¢ per square foot) which corresponds closely with the areas of little developed blocks of Figure 4.1 (139 blocks). There is also a very large area (302 blocks) of low land values (1¢ to 41¢ per square foot) stretching from the LeBreton Flats through the southern part of Upper Town, through Lower Town in an arc to the Rideau Falls (Figures 2.1 and 4.4). This extensive uniformity is surprising, since included within it lay the high-class residential areas of Sandy Hill and the Upper Town cliff tops. The third area to stand out is the central area (21 blocks), of higher land values, extending westward along Wellington Street as far as Sally Street (Lyon), and eastward along Rideau Street as far as Dalhousie Street. This central concentration of high land

LAND NOT OCCUPIED BY BUILDINGS

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
--	---	---	---	---	---

SYMBOLS	.....	.....	.....	.....	.....
					

FREQ.	324	9	6	2	121
-------	-----	---	---	---	-----

FIG. 4.3

LAND VALUE PER SQUARE FOOT OF BLOCK

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	BELOW	.01	.41	.81	1.20	1.60	ABOVE
MAX.		.01	.41	1.20	1.60	2.00	2.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	L	3	4	5	H
SYMBOLS	.....	////	#####	#####	#####
FREQ.	139	302	11	6	4

FIG. 4.4

values will be further discussed in delimiting the C.B.D.

Parliament Hill is excluded from this map and from the map of building values (Figure 4.5) since this property, with the Parliamentary workshops on block 148, is only listed on the Assessment Rolls as having a total real property value.⁷ This is also the case for a few of the other public buildings, while a few of the ecclesiastical properties, being exempted from taxation, have no recorded values.

Assessed land values only give a partial picture of the property values within the city. Not only did the land value vary, but so too did the assessed value of the buildings erected upon the land. Figure 4.5 shows the distribution of building values as separate from land values. These values had a much more complex distribution although, since no values could be found for any structures along the southern end of Bank Street or on the Canal Bank, there was a clearly marked southern limit to the building values. It may be seen again that many of the higher building values were concentrated in the city centre, close to the P.L.V.I. The high value areas scattered far distant from the P.L.V.I. will be discussed under the theme of Public Buildings. It should be noted that areas of high building value extended northward along Sussex Street almost to the factories at the Rideau Falls. A similar extension can be seen through Sandy Hill, along Daly Street. Generally, the values in Upper Town were higher than those of Lower Town, indicating the long-term influence of Upper Town as a desirable residential area for the richer citizens. The lower class residential area in Lower Town can be identified as having a large area of 1¢ to 41¢ per foot building values (Figure 4.5).

BUILDING VALUE PER SQUARE FOOT OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	BELOW	.01	.41	.81	1.20	1.60	ABOVE
MAX.	.01	.41	.81	1.20	1.60	2.00	2.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	L	1	2	3	4	5	H
SYMBOLS	.....	.....	////	++++	vvvv	oooo	uuuu
FREQ.	227	70	97	37	14	6	11

FIG. 4.5

The spatial distribution of total real property values per square foot in the city is shown on Figure 4.6. Except where specific exemptions were permitted for tax purposes, the figure for real property value is the sum of land and building value for each block. The pattern is much as before, with 129 blocks of very low values in the south, a broad middle value arc of 306 blocks from the LeBreton Flats, through southwestern Upper Town, broadening through Lower Town to the Rideau Falls. The high values on 26 blocks at the city centre stand out, with the Parliament area on block 147 being included this time. The highest value area lay between Bank Street and the Byward market, being seen especially on Wellington, Rideau, Sparks, and Sussex Streets (Figures 2.1 and 4.6). The central low values may be explained by the presence of parkland and the canal basin.

These maps of land, building, and real property value are used in Chapters Five, Six and Seven to explain the location of certain of the land uses, especially the C.B.D. and the residential areas.

4.6 Building Height and Materials

In a city in which there is marked competition for land, the response, as the twentieth century city would seem to testify, is to maximise the profits obtainable at a particular location by building vertically. In part for technological reasons, as well as for prestige accruing to a particular business operation, this has resulted in a change in building materials. In modern Ottawa this had led to a shift to the high-rise office block of steel and glass, sometimes of dubious aesthetic value. Where the profit motive is not as marked, as for

REAL PROPERTY VALUE PER SQUARE FOOT OF BLOCK

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	BELOW	.01	.41	.81	1.20	1.60	ABOVE
MAX.		.01	.41	.81	1.20	1.60	2.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	L	1	2	3	4	5	H
SYMBOLS	.....	.....	////	++++	vvvv	oooo	oooo
FREQ.	129	257	49	12	5	2	8

FIG. 4.6

example in residential property, one might expect that these higher structures will not occur as frequently as in areas of intense land-use competition epitomised by the Central Business District. Here too one may expect that the building materials may be different since the technological requirements are not so great, nor is there a widespread ability to cater to building fashions by replacement of homes.

If we accept that Ottawa in 1878 was becoming a commercial and industrial city, we might also expect that manifestations of these economic processes would be most evident in the C.B.D. It is not the aim of this thesis to document these changes, though that is a worthwhile topic in itself. Rather, the task here is to demonstrate what were the characteristics of the buildings of Ottawa in 1878. Our expectation at this stage is that a reconstruction of building heights and materials of Ottawa in that year would show a marked concentration of the highest buildings (three-storey and above three-storey) in stone and brick in the central area, and that this would decrease towards the residential and industrial areas where the same *raison d'etre* would not exist. In these latter areas, one and two-storied timber, stucco, and brick veneered buildings would be more common.

4.7 Building Height

One of the aims of this thesis is to see if any vertical zonation could be seen as early as 1878 and to establish if there was a vertical element to the C.B.D. It has been seen where the buildings were located within the city, but buildings in 1878 were not uniform in height, i.e. at a time well before modern high-rise construction techniques and zoning regulations.

Two sets of maps showing building height were produced. The first set of four maps, Figure 4.7 to Figure 4.10, shows the square footage of one-storey, two-storey, three-storey, and above three-storey buildings as a percentage of the block area. A second set of maps, Figure 4.11 to Figure 4.14, shows the square footage of each height category as a percentage of the total square footage of the block occupied by buildings. This can be an important distinction since, for example, a block could have 20 percent of the area covered by three-storey buildings but 100 percent of the building on that block may be three storeys high. Such is the case for the market building on Anglesea Square (block 30). Thus both sets of maps are important, since if only the percentage of the block area was taken, it may be possible to dismiss an important structure, such as a school or hospital, since it covered only a small percentage of the total block area. Figures 4.7 and 4.11 show the percentages of one-storey buildings within the city limits. Figure 4.7 shows the square footage of one-storied buildings as a percentage of the block area, and a concentration of such buildings can be seen in the central part of Lower Town, especially northeast of the Byward market. Other clusters of one-storied buildings may be seen around the periphery of the built-up area, while the few near to the city centre can be explained by the presence of coal yards and storage sheds. From both figures it can be seen that one-storied buildings were common throughout the city, with slight concentrations around the periphery of the built-up area.

While two-storey buildings, like one-storey buildings, were ubiquitous, the highest concentrations were in Lower Town and on the

BUILDINGS WITH 1 FLOOR AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	4.60	9.20	13.80	18.40
MAX.	4.60	9.20	13.80	18.40	23.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

SYMBOLS	1	2	3	4	5
	.....	.....	.....	XXXXXXXXXX	.....
	.....	.....	.....	XXXXXXXXXX	.....
FREQ.	265	115	59	21	2

FIG. 4.7

BUILDINGS WITH 2 FLOORS AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	10.80	21.60	32.40	43.20
MAX.	10.80	21.60	32.40	43.20	54.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ.	340	96	25	0	1

FIG. 4.8

BUILDINGS WITH 3 FLOORS AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	8.40	16.80	25.20	33.60
MAX.	8.40	16.80	25.20	33.60	42.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS

FREQ. 401 43 12 3 3

FIG. 4.9

BUILDINGS WITH MORE THAN 3 FLOORS AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	5.40	10.80	16.20	21.60
MAX.	5.40	10.80	16.20	21.60	27.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

SYMBOLS	.....	.....	.....	.....	.....
FREQ	439	15	5	1	2

FIG. 4.10

Lebreton Flats (Figure 4.8). The map shows quite a widespread distribution of the 11 percent to 22 percent category of two-storied buildings per block. The high percentages of two-storied buildings may be seen (Figure 4.12) to have been on the fringes of the built-up city and near to the industrial areas (i.e., the industrial lumber stacks on Figure 4.1). Generally, the lower percentages can be seen nearer to the city centre.

A contrasting pattern is exhibited by Figures 4.9 and 4.13, which indicate the location of three-storey buildings. It is very clear that the blocks with a high percentage of their space occupied by three-storey buildings were located in the centre of the city, the highest percentages being around the P.L.V.I. This map (Figure 4.9) is almost the reverse of the previous distributions, with an almost complete absence of tall buildings away from the city centre. One or two did exist in the factory areas and along the major routeways.

Figure 4.13 picks out industrial tall buildings on the blocks. Here the three-storied buildings appear to represent quite high proportions of the buildings on the block even though they do not represent high percentages of the block area. This may be expected with churches or schools, being surrounded by their grounds and being scattered across the city. An example of this is the identification of the three-storied college on block 270, and of high-class houses, including the present-day "Earnscliffe", on block 72 (Figure 3.1). In the area of Sandy Hill more three-storied buildings existed than in the poorer housing area of Lower Town, north of Rideau Street. The concentrations of taller buildings (on 18 blocks of Figure 4.9) may obviously be related to the land

BUILDINGS WITH 1 FLOOR AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ.	243	159	50	5	5

FIG. 4.11

BUILDINGS WITH 2 FLOORS AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	.....	.....	.....
FREQ.	226	62	135	32	7

FIG. 4.12

BUILDINGS WITH 3 FLOORS AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	18.20	36.40	54.60	72.80
MAX.	18.20	36.40	54.60	72.80	91.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX
FREQ.	341	83	28	9	1

FIG. 4.13

BUILDINGS WITH MORE THAN 3 FLOORS AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	XXXXXXXX	.....
FREQ.	444	10	5	1	2

values (Figure 4.4) and probably to the building materials.

In Ottawa in 1878 there were few buildings of greater than three storeys in height (Figures 4.10 and 4.14). They included schools, public buildings, and more obviously and characteristically Parliament itself.

Thus the city contained a pattern of one and two-storied buildings that differed from that of buildings of three storeys and above. The structures of lower height were found throughout the city, but concentrations did exist in central Lower Town and on the LeBreton Flats, while less were located along the main transport route and in the city centre around the P.L.V.I. From the results it also appears that tall buildings were predominantly associated with the city centre, although a scatter existed away from the central core.

4.8 The Distribution of Building Materials

Five categories of building material were coded from the F.I.A.; brick, stone, timber, timber frame plus brick veneer or stucco, and brick plus stone or concrete. The latter category is regarded as an innovation at this date.

As with the building heights, each building material category was mapped as a percentage of the block area and then as a percentage of the area of the buildings on each block. As indicated earlier, building heights and materials are closely associated and it is to be expected that elements in the distribution of both heights and materials would bear marked resemblance one to another (Figures 4.7 to 4.14 with Figures 4.15 to 4.20).

BRICK MATERIAL AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	7.00	14.00	21.00	28.00
MAX.	7.00	14.00	21.00	28.00	35.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ.	419	34	5	2	2

FIG. 4.15

STONE MATERIAL AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	6.00	12.00	18.00	24.00
MAX.	6.00	12.00	18.00	24.00	30.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ	402	36	15	6	3

FIG. 4.16

TIMBER MATERIAL AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	10.00	20.00	30.00	40.00
MAX.	10.00	20.00	30.00	40.00	50.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	////	XXXXXX	XXXXXXXXXX
FREQ.	284	94	48	26	10

FIG. 4.17

BRICK MATERIAL AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	.....	.....	.....
					

FREQ.	405	44	11	1	1
-------	-----	----	----	---	---

FIG. 4.18

STONE MATERIAL AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
--	-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ.	394	45	14	6	3

FIG. 4.19

TIMBER MATERIAL AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	.....	.....	.....
FREQ.	208	42	53	76	83

FIG. 4.20

Figure 4.15 shows a clear concentration of brick as a building material in the central part of the city with the highest percentages near to the P.L.V.I., at the junction of Wellington and Rideau Streets with the canal. Extensions of the area of brick buildings can be seen along the cliff tops and Wellington Street, south from the P.L.V.I. along Elgin Street, around the Byward market and along Daly Street in Sandy Hill. This pattern is confirmed by Figure 4.18, which further emphasised the use of brick in the high-class Sandy Hill area, and also picks out the brick structures of Anglesea Square market (block 30) and the Protestant Hospital (block 107).

Figure 4.16 shows a similar though more extensive pattern for stone structures, there being a concentration again around the P.L.V.I., with extensions along the main transportation routes. It may be argued that stone would be more widespread than brick, there being skilled stone masons in the settlement from its founding in 1826 and an available supply of stone, whereas brick had to be manufactured. Wightman argues that brick was only beginning to be of importance in Ottawa from the 1860's, his map of building materials for Canada West in 1861 showing Ottawa with 85 percent timber construction, the rest being in stone.⁸ Thus it may have been that, despite Walkley's brick works, brick was still relatively unimportant as a building material in Ottawa's first days as a city.

These maps of brick and stone are associated closely with those of taller buildings; the isolated areas of stone construction material on Figure 4.19 can be identified as Public Buildings, such as the school and college on blocks 270 and 271, and the ecclesiastical property on

block 60.

The areas with concentrations of one and two-storied buildings are closely associated with those of timber construction material shown on Figures 4.17 and 4.20. These two maps present almost a "mirror image" of the distribution of brick and stone, the concentrations of timber also being in the areas of lower land values. The greatest numbers of timber structures were in Lower Town, the south-western part of Upper Town and the LeBreton Flats. The lowest percentages of timber structures can be seen along Wellington, Rideau, Sussex, Daly and Elgin Streets.

The maps produced to show the distributions of mixed building materials and of timber frame plus veneer have been omitted. The maps for mixed materials both showed less than 10 blocks in the city with such buildings, these few clustering around the P.L.V.I. Veneered buildings only appeared in small percentages, there being an absence of this type from the core of the city. Two very minor concentrations existed in Sandy Hill and to the southwest of Anglesea Square, possibly representing residents who could afford to spend a little more on their houses than those with plain timber structures.

4.9 Conclusions

There were definite patterns of building height, construction materials and associated values in the city of 1878. Higher values, higher buildings, and stronger materials appeared in the centre of the city around the P.L.V.I. and extended along a few main transportation routes and into the two known higher-class housing areas. Lower values,

associated with timber structures and with buildings of lower height, made up high proportions of the blocks in Lower Town and on the LeBreton Flats, and generally through the broad arc lying between the city centre and the southern fringe of the city and extended from the Chaudière Falls to the Rideau Falls. The association of land value, building materials, and building heights with land use is the topic of the next chapters.

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CHAPTER 5

THE CENTRAL BUSINESS DISTRICT

5.1 Introduction

Many studies concerning cities have concentrated on the area of the city variously known as the Central Core or the Central Business District. Perhaps this is because of the importance in modern society of the commercial centre, with its high values of land and buildings, its intensive use of the land, and the continued business and retail importance. Especially since the work of E.W. Burgess¹ after the First World War, many people have studied the form and functions of cities, agreeing on the presence of the C.B.D. but varying over its delimitation. Often the theories of urban form concentrate on the distribution of land-use areas about the C.B.D. Burgess argued for a city of five concentric zones moving outwards from the C.B.D., while H. Hoyt² argued for sectors of different land-use around the C.B.D. with the important influence of transport routes. More recently Harris and Ullman have argued for multiple nuclei within the modern city. They still retain the C.B.D. as of prime importance among the nuclei.³ Many other writers have reviewed these three theories of the form of the western city, some adding criticisms, modifications, and conditions but through them all comes the importance of the C.B.D.⁴

Delimitation of the C.B.D., the aim of the present chapter,

remains a problem even for the present modern city, since different criteria have been used and since some argue for an inner core within the C.B.D., surrounded by a transitional area known as the frame. It may be argued that the level of the city block, as the unit of analysis, is too large a unit for accurate delimitation, and that half or one-sixth of a block should be used.

Murphy and Vance argue that it may be better to look at the part of each block fronting onto a street, but they admit that it is very difficult to divide a block, especially when it is of irregular shape or where lot lines cannot be located. Because of the difficulty of dividing city blocks into street frontages, or similar small units, the city block is the usual unit for study even though one side may be residential while the other could be predominantly of C.B.D. use for example.⁵

The fact remains that fixing a border for the C.B.D., past or present, is difficult.⁶ It may be better to see any line delimiting the C.B.D. as being a suggested edge within a transition zone between one general area of land-use and another. Because of the existence of these transition zones it is better to concentrate on locating the areas of predominantly C.B.D. or residential or industrial use. Areas between these may well be zones of transition, though in some cases barriers may exist beyond which an area would not extend, certain land-uses being mutually exclusive.

This chapter, therefore, concentrates on the core of the C.B.D., the transition zones around it being located in the concluding chapter with reference to the areas of non-C.B.D. uses surrounding the central

core. The core was studied in terms of its land and property values, land-uses, and the associated building heights and materials.

5.2 The Former C.B.D.

Although much work has been done concerning the C.B.D. in the past forty years, very little has been done to delimit or even identify the C.B.D. of western cities in the past, even in the nineteenth century.⁷ As has been seen in Chapter Two, Ottawa did not start with one C.B.D. but, rather, it had various nuclei. By the 1870's the Upper Town and Lower Town cores had grown together to meet across the Dufferin and Sappers Bridges over the canal. In Chapter Four it was seen that the P.L.V.I. was found to be at the junction of Sparks and Elgin Streets in 1878. Figure 4.2 indicated that the central part of the city had the highest percentage of buildings per block. Also, this map showed that there was not an equal or concentric distribution of building percentages around the P.L.V.I. Using the background information of Chapter Two and Chapter Four, the C.B.D. was delimited using the variables of value, structure (including height and material), and land-use.

5.3 Methods and Steps

Three maps show the general area of the C.B.D. in which delimitation must be attempted after reference to maps dealing with values, heights, materials, and especially the combinations of these. Figure 5.1 shows the percentage of floor one area occupied by stores. Anglesea Square market on block 30 (Figure 3.1) stands out since the market building was the only structure on that block and thus the map shows block 30 as having 100 percent of its floor space as a store. Since this

PERCENTAGE OF FLOOR 1 OCCUPIED BY STORES

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS					
					

FREQ.	429	26	6	0	1
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FIG. 5.1

deals with only one large building, and since the block is a considerable distance from the central part of the city, it can be excluded from further discussion of the C.B.D.

Along Wellington Street two areas where stores made up 40 percent to 60 percent of the floor area stand out, one being very close to the P.L.V.I., while another such area was located at the junction of Rideau and Sussex Streets. The area where stores made up 20 percent to 40 percent of the floor one area extended from the Byward market west to the LeBreton Flats, showing a marked linear trend corresponding with much of the route followed by the horse tramway.

Stores alone do not comprise the C.B.D. now or in 1878, and so Figure 5.2 shows the distribution of the combined C.B.D. uses on floor one. Here the combined areas of stores, hotels/cafes, financial institutions, offices, and the premises of doctors, auditors, auctioneers, jewellers, and others associated with the C.B.D. were taken as a percentage of the floor one area. A definite concentration existed around the P.L.V.I., extending to the area around the junction of Rideau and Sussex Streets, and westwards along Sparks and Wellington Streets. Thus, a central core appears to have existed between Bank Street on the west along Sparks and Wellington-Rideau Streets and as far as two blocks east of Sussex Street (Figure 2.1). Both to the east and west of this central area were areas of slightly lower percentages, surrounding the old Byward market and core of Lower Town, and the pre-1845 Upper Town nucleus.

As with Anglesea Square in the east of the city, the blocks with 20 percent to 40 percent of the floor one area in C.B.D. uses in the

COMBINED C.B.D. LAND-USES ON FLOOR 1

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	////////	XXXXXXXX	XXXXXXXX
	.....	.....	////////	XXXXXXXX	XXXXXXXX

FREQ.	422	20	11	7	2
-------	-----	----	----	---	---

FIG. 5.2

west of the city will not be considered under the C.B.D. theme since they were not contiguous with the central area, but were a considerable distance from it and formed part of the LeBreton Flats nucleus.

Figure 5.3 delimits the areas within the city having at least 10 percent of any floor occupied by a C.B.D. land-use plus at least 10 percent of the building area constructed of stone, brick, or a mixture of these. An "L" shaped area is suggested by this map, the elongation along Wellington and Sussex Streets being evident. Again the relationship to the tramway route is obvious (Figure 2.2).

5.4 Suggested Delimitation Using Values

It has been seen in Chapter Four that there was a concentration of high land and real property values in the central part of the city around the P.L.V.I. However, putting borders around an area often involves the choice of limits and so choices, sometimes somewhat arbitrary, must be made to decide which areas should be included within the limits and which should not. Since the prices and values of 1878 differ considerably from those of today and from those used by Murphy and Vance, a choice had to be made from the value distribution maps, Figures 4.4 to 4.6, as to which areas to include as high value areas. Figure 5.4 shows the high value areas in the city centre based on the following criteria:

- (a) the central city blocks having a land value of above 41¢ per square foot. Only 21 blocks had a value of above 41¢ per square foot while the remaining 441 city blocks had lower assessed land value.
- (b) the contiguous central city blocks having a total real property

AREAS WITH ABOVE 10% BRICK, STONE AND C.B.D. LAND-USES

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	1.00	1.50
MAX.	1.50	2.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

50.00	50.00
-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2
SYMBOLS	414	48
FREQ.	414	48

FIG. 5.3

CONTIGUOUS CENTRAL HIGH VALUE BLOCKS

Fig.5.4

value of above 81¢ per square foot. Only 27 blocks in the whole city had values of 81¢ and above while 49 had values of 41¢ to 81¢ and 368 had a value of less than 41¢ per square foot. Within this area of 27 blocks, 15 exceeded \$1.20 per square foot. On Figure 5.4 blocks were excluded in the delimitation of the C.B.D. if they were not contiguous with the central area. Similarly, Parliament was excluded since it was not considered a commercial use.

From Figure 5.4 it will be seen that only eight blocks in Upper Town and six blocks in Lower Town had a total real property value of over \$1.20 per square foot of the block, forming a central highest value core with an "L" shape reflecting the importance of transportation. Similarly, around the fourteen highest total value blocks the remaining blocks with high real property value show the influence of transportation routes since they are grouped along Wellington, Elgin, Sussex, and Rideau Streets.

Figure 5.5 shows how the twenty-one blocks with the highest land values were chosen. Of these, nineteen were included within the area shown on Figure 5.4 to have a total real property value of above 81¢ per square foot. The remaining two blocks were contiguous with them. It will also be seen that the high value area shown on Figure 5.4 conforms well with the map of floor one C.B.D. uses, Figure 5.2. Again the area around the canal basin stands out, its industrial land-use acting as a barrier to commercial development, the other barriers being the government property of Parliament Hill and Majors Hill.

The close agreement between the high value area of the city and the area of C.B.D. uses allows the C.B.D. core area to be suggested,

Fig. 5.5

but since agreement is not complete, reference should also be made to the other factors associated with the high value/C.B.D. area.

5.5 Suggested Delimitation using Building Height

The importance of the vertical dimension in the modern C.B.D. was stressed by Neimanis⁸ but the beginning of a vertical element may be seen in the central area of the city as early as 1878. Often it is thought that there was little or no vertical differentiation in the pre-twentieth century city and Neimanis says that the great vertical growth of central Ottawa only started with the stronger construction materials of the 1880's.⁹

Building heights were reviewed in Chapter Four but Figure 5.7 shows the distribution of tall buildings in the central part of the city. Outlying blocks were again excluded along with the Parliament. Thus the map agrees with the area suggested by the previous maps, Figures 5.2, 5.3, and 5.4. The frequency of occurrence of blocks with three-storey and greater than three-storey buildings was plotted on Figure 5.6. The plotting of three-storey buildings presented a problem since a total of 61 blocks stood out as against the remaining 401 blocks. However, 18 blocks appear to be distinct within the set of 61. Of these 12 were contiguous and were plotted on Figure 5.7.

Figure 5.6 shows that only 23 city blocks had above 5.4 percent of the area occupied by buildings of more than three storeys in 1878. With the Parliament being excluded, only 10 blocks, contiguous with the central area were plotted, 6 of them having over 10.8 percent of the block area occupied by buildings of greater than three storeys.

Fig. 5.6

CONTIGUOUS BLOCKS WITH 3 AND >3 STOREY BUILDINGS AROUND PLVI

Fig. 5.7

Comparison of Figures 5.4 and 5.7 emphasises the association between the tallest buildings of the city and the central high value area. The blocks of tall buildings outside the central area were scattered.

5.6 Suggested Delimitation Using Building Material

There were not enough blocks within the city with a high enough percentage of mixed brick plus stone/concrete construction to help with the delimitation of the C.B.D. Thus Figure 5.9 concentrates on the distribution of high percentages of stone and brick building materials. The usual exclusions were made and blocks were plotted if they were contiguous. It may be argued from Figure 5.8 that all the contiguous blocks from the 43 with the highest percentages of brick and from the 60 with the highest percentages of stone should have been plotted. However, this would have led to a virtual reproduction of Figures 4.15 and 4.16, especially since both brick and stone were concentrated in the city centre and Upper Town. Thus the contiguous blocks with over 14 percent of brick and over 12 percent of stone were plotted, rather than 7 percent and 6 percent respectively, so that a central core could be really evident (Figure 5.8). On Figure 5.9 a central area had six blocks with a combination of greater than 14 percent brick and greater than 12 percent stone. This central concentration occurred on both sides of the canal bridges, around the P.L.V.I., with extensions along Sussex Street, and especially along Wellington Street. It can also be seen that these building materials were associated with the higher land and property values, as was the case for height. Although the outer

Fig. 5.8

HIGH PERCENTAGES OF BRICK AND STONE IN CENTRAL AREA

Over 14% of block with brick

Over 12% of block with stone

Blocks with high % of brick and stone

Fig. 5.9

edge of it varies, there is once again, as in the case of the land value maps, a basic "L" shaped configuration to the C.B.D. core.

5.7 The Use of Individual C.B.D. Land-Use Categories

Figure 5.10 is a composite of three other maps, with non-central values excluded on the basis as previously described. First, the floor one C.B.D. land-use map, Figure 5.3 was used, showing the central parts of the city with at least 10 percent of the block occupied by C.B.D. uses and occupied by buildings, at least 10 percent of which were constructed of brick or stone. This provided a broad outline, the choice of 10 percent producing an area rather larger than resulted from the previous maps. Secondly, the high value areas off Figure 5.4 were added, showing the central high value core not extending as far along the transportation routes as the area bounded by the 10 percent lines. Finally, the addition of the area of tall buildings, off Figure 5.7, shows a central core of 15 blocks having high values, tall buildings and C.B.D. land-uses.

In order to relate the larger area taken off Figure 5.3 with the smaller core of 15 blocks, the individual C.B.S. land-uses must be looked at, to see how far they extended individually. The central land-uses are looked at by floors, primarily dealing with floor one, that being the floor in direct contact with the street and the people, and thus having the greatest commercial status. Neimanis makes the point that the ground floors of multi-storied buildings are occupied by activities benefiting from a central location.¹⁰

Figure 5.1 shows the distribution of stores on floor one with the

COMPOSITE OF CBD-USES, HIGH VALUES AND TALL BUILDINGS

extensions along Wellington Street and into the old Lower Town centre. The area of highest percentage is quite small and this may suggest an area of intensive use within a larger zone of transition. Figure 5.11 tends to suggest this too, since the area of office space was much more compact and located within the area of highest values. The outlying areas of offices represent the offices of the industrial establishments rather than commercial and central business offices.

Figure 5.12 also confirms a central core within the general area of the C.B.D., with most financial and banking activities having been focussed on the block bounded by Wellington, Metcalfe, Sparks and O'Connor Streets. Consistent with this core and transition approach to the C.B.D. is the distribution of hotels, cafes and restaurants as shown by Figure 5.13. These surrounded the financial and office area, lying to the west of the core but well within the general C.B.D. area, and also concentrated in and around the Lower Town section of the C.B.D. This Lower Town area can be explained by the long-term presence of hotels and of raftsmen's boarding houses, and by the former dominance of Sussex Street.

The composite map of all the C.B.D. land-uses on floor one has been mentioned previously, but it should be mentioned again since it summarizes the picture of the C.B.D. at ground level (Figures 5.2 or 5.10). The core or concentration around the P.L.V.I. is evident, fitting well with the 9 Upper Town and 6 Lower Town blocks mentioned in connection with the high value areas. Around this central area there appears to have been a transition zone, or frame, extending along Rideau Street and north-eastwards into central Lower Town. It also extended

westwards along Sparks and Wellington Streets but perhaps only for one or two blocks in a southwards direction.

Although perhaps of lesser importance, the land-uses on the upper floors must be considered too, as part of the vertical dimension of the C.B.D. It may be argued that only the larger, more important stores, would expand from the first to the second floor. Thus the small stores would be excluded, leaving the larger ones, representative of the C.B.D., showing up on floor two. Appendix C.1 shows only the small extent to which this had happened by 1878 though large stores do not appear to have been common at that time. Four of the blocks that did have over 40 percent of the second floor space in retail use were within the area of the C.B.D., the fifth being Anglesea Square, the lone building on block 30. Offices were more likely to be found above stores and on upper floors. Appendix C.2 shows this to be the case, with a concentration in the Upper Town core of the C.B.D. The outlying industrial offices can be seen at the Chaudiere Falls but most of those associated with the Rideau Falls were outside of the city limits.

Appendix C.3 shows the expected central location of banks and financial offices quite close to the P.L.V.I., and again focussing on the block bounded by Wellington, Metcalfe, Sparks and O'Connor Streets. The distribution of second floor hotels (Appendix C.4) covered a smaller area than on floor one, since cafes and restaurants do not often extend to the upper floors, while hotels most frequently do. The major hotels appear to have been concentrated on the main routes close to the P.L.V.I. on both sides of the canal.

The composite map of all goods and services on floor two, Figure

5.14, clearly shows the smaller central core of the C.B.D. and the dominance of Upper Town. The P.L.V.I. certainly appears to have been a focal point of C.B.D. land use. The two outlying nuclei were almost equidistant from the P.L.V.I. just north of the east-west Rideau-Wellington Street axis of the city.

Since the maps of floor three offices and stores show very little other than one or two isolated cases, these have been included in Appendices D.1 to D.4. Appendix D.2 confirms the distribution of banks seen previously, while Appendix D.3 shows that on floor three there were fewer uses competing with the hotels and boarding rooms, and so high percentages of floor three space were occupied by this land-use. In Chapter Two the important hotels were located and this map confirms the importance of the northernmost blocks of Elgin Street and shows the competition around the market just to the east of Sussex Street.

Figures 5.15 and 5.16, being composite maps for the goods and services on floor three and above floor three respectively, confirm the dominant position of Wellington and Sparks Streets to the east of Bank Street, the clustering of C.B.D. land-uses around the P.L.V.I., and the continued importance of Sussex Street and the old Lower Town core. The "L" shape for the C.B.D. can still be seen from these maps, the linearity being explained most readily by the route of the horse tramway.

These maps help with the description of the central area of the city as it existed and with the understanding of the distributions within it. No one map, nor set of them, produces one firm border for the C.B.D., though an inner area of about 14 blocks is strongly suggested along with a larger transition zone. Hence, any lines of demarcation

must be somewhat arbitrary and based on the amalgamation of salient features.

5.8 Suggested C.B.D. and Frame

Figure 5.17 represents the suggested C.B.D. area, including the inner core and the zone of definite C.B.D. influence. The outer limits were taken, in modified form, from Figure 5.10 since they enclose an area with materials and land-uses representative of the C.B.D. Block 39 on Sussex Street was excluded since it did not appear to be of any importance on any of the other maps. This criterion was also used to exclude block 40 and block 229. The area enclosed by the solid line on Figure 5.17 represents the outer areas of C.B.D. influence when looking at factors associated with the C.B.D., but modifications may be advisable after delimitation of other areas of land-use, especially residential use. The area between the core and the suggested edge of C.B.D. influence may be seen as a zone of transition with weakening C.B.D. influence towards the edges.

The eight Upper Town and seven Lower Town blocks chosen to represent the C.B.D. of 1878 portray the "L" shape seen previously. The C.B.D. thus chosen was based on the 14 contiguous highest value blocks, from Figure 5.4, with elements taken from others. Since using only values over \$1.20 as a criterion would have excluded block one, reference was made to all the other distribution maps, which show block one as having many other C.B.D. features. Thus block one, representing the west side of Sussex Street nearest to the P.L.V.I. was included. Block 227, the site of the previous Upper Town market and nucleus was

SUGGESTED CBD CORE AND FRAME

CBD Core blocks

Limit of CBD Frame

PLVI

Fig. 5.17

not classed as part of the C.B.D. core, because of the distance from the P.L.V.I., its continued importance being more attributable to the tram route rather than general pedestrian accessibility. Also, the intervening block, 242, did not possess so many features associated with a C.B.D. block. All the blocks within the suggested C.B.D. area west of Bank Street may have represented part of an elongated transition away from the core. Doubt may be expressed concerning the westernmost blocks within this area, because of their distance from the P.L.V.I. and proximity to the known residential areas to the south and north. Although included here, these blocks may have represented a transition area between the LeBreton and central city nuclei. They may also represent a survival of the former Upper Town nucleus, and they lay along the major transportation route.

Similarly, on the eastern side of the core, the blocks classed as being part of the transition zone represented part of the former Lower Town nucleus and also a transition between the core and the heart of residential Lower Town. The two markets in Byward were on the very edge of the area classified as C.B.D. core, but were included as being parts of the blocks classified as the transition zone. The markets were included with these blocks, 10 and 14 (Figures 3.1 and 5.17), when aggregating data to the block level, but much of the eastern sides of these blocks were residential in nature.

Blocks 275 and 276 (Figure 3.1) had high values, tall buildings, high percentages of brick and stone, but they have still been excluded from the C.B.D. core. These blocks were more administrative than commercial, containing the Fire Station and Police Station along with

public buildings.

It may be argued that within the 15 blocks classed as the C.B.D. core there may have been a peak or prime area of four or five blocks, but further division and delimitation is really unnecessary since the concentration of individual C.B.D. land-uses is already evident.

It may perhaps be argued too that the C.B.D. was bi-nodal, but the maps of land value, building value and real property value (Figures 4.4, 4.5 and 4.6) all show a concentration in Upper Town, with a considerably lower value node existing at the junction of Rideau and Sussex Streets. (The four blocks at the junction of Rideau and Sussex Streets gave a combined land value per square foot total of 375¢ while the value at the P.L.V.I. was 483¢).

Rather than being bi-nodal, as in previous years, it may be better to see the "L" shaped C.B.D. as having a marked linearity due to transportation routes, the two former nuclei having grown together. Upper Town and Lower Town parts of the core could not have joined up to a greater extent because of the barrier effect of the government land to the north of Wellington-Rideau Streets and the industrial area long established around the canal basin. Thus Ottawa appears to have had one C.B.D., with an Upper Town predominance, its shape being strongly influenced by barriers to development and by the chief transportation routes.

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CHAPTER 6

RESIDENTIAL LAND-USE

6.1 Introduction

Residential areas consume more land in American cities than any other type.¹

Although this statement refers to the modern North American city it remains a fact that large areas of land were needed in Ottawa in the year 1878 to house about 25,000 people. In chapter two it was seen that three distinct residential areas existed in the canal-building period, i.e. Upper Town, Lower Town, and Corktown. These early nuclei differed considerably in having different ethnic, religious, and social groups. In the years following Confederation it was seen that the upper classes lived near the cliff tops of Upper Town, in Sandy Hill, and near to Rideau Hall in New Edinburgh. Towards the opposite end of the social scale, the poorer groups had located in the poorly drained areas of Lower Town.

This chapter looks at residential areas in more detail, in light of the historical context and also in light of the suggested location of the C.B.D. Initially, no attempt will be made to differentiate between the upper and lower class residential areas but this will be looked at in the latter sections of the chapter. This land-use is differentiated by floors and then by social areas.

6.2 The Pattern of Residential Land-Use by Floors

It may be expected that large areas of the city would have residential uses on floors two and three since in the nineteenth century the separation of place of work and of residence was not so great as it is today. If, in addition, large areas of floor one were in residential use, despite competing land-uses, one may safely assume these to be dominantly residential areas. Figure 6.1 shows the great extent of the residential areas of the city, with two large areas having between 60 percent and 80 percent of the floor one space in residential use. One of these areas extended from the landward side of the LeBreton Flats through the southern half of Upper Town to near the line of Elgin Street. It will be noted, from Figure 4.1 and Figure 5.17 that this residential area lay to the south of the Chaudière lumber area and to the south of the Wellington Street routeway and C.B.D. area.

To the east of the canal an even larger area with 60 percent to 80 percent of the floor one space in residential use extended from south of Sandy Hill and to the east side of the canal. This arc lay between the Sussex Street and Byward section of the C.B.D. in the west and the Rideau river in the east. The low percentages of floor one residential use in the C.B.D. area will be noted, and also the sharp southern edge of the residential area, especially west of the canal. Only two exceptions to this pattern existed, one being the cliff top residential area around Rear and Victoria Streets, north of the Wellington Street routeway; the other being Cartier Square which effectively divided the Upper and Lower Town residential areas.

If reference is made to Figure 4.17 it will be evident that in

many parts of the city the areas of wooden buildings correspond closely with the areas of residential land-use.

It may be expected that fewer land-uses would compete with residential use on floors two and above, except in the C.B.D. and manufacturing areas. Thus Figure 6.2 shows considerably higher percentages of residential land-use on floor two, extending over an even greater area of the city. The areas occupied by 60 percent to 80 percent residential use on floor one are seen to have had 80 percent to 100 percent of their space in residential use on floor two. Again the enlarged Upper Town and Lower Town areas were separated by the canal and Cartier Square. It should be noted, though, that while buildings are known to have existed along the western bank of the canal and west of Concession Street (Bronson Avenue) (Figure 4.1) it was not possible to determine their height, building materials or their uses.

On Figure 6.1 the main routeways of Wellington-Rideau and Sussex Streets stood out as having little residential use near to them, but on Figure 6.2 it is evident that on floor two much more residential use existed close to these routeways. Even in the C.B.D. area 40 percent to 60 percent of the floor two space was occupied by residential land within the industrial areas and the lower percentages in the C.B.D. area are to be expected but otherwise it can be seen that there was considerable consistency in floor two residential use throughout the city. Figure 4.12 showed a very similar distribution pattern for two-storey buildings.

With the exception of tall buildings in public use it might be expected that, like two-storey buildings, three-storey buildings would have large amounts of space devoted to residential usages. This was

FLOOR 2 RESIDENTIAL LAND-USE AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS

FREQ.	227	20	45	70	100
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FIG. 6.2

certainly the case as Figure 6.3 confirms. Where buildings of three floors existed, often as much as 80 percent to 100 percent of that space was in residential use. The pattern is similar to that seen for floor two except that the pattern is not quite so consistent across the city and higher percentages of floor three space in the C.B.D. were in residential use.

In a number of ways Figure 6.4 is almost a mirror image of the preceding maps, in that the few contiguous blocks with residential use above floor three were concentrated in the area of the C.B.D., and especially the Sussex Street side of the C.B.D. A few isolated blocks had residential use at above floor three in Lower Town and along Rideau Street, and also along the cliff tops overlooking the lumber yards. These last few blocks will be discussed further in relation to the houses of the lumber "Kings".

As has been suggested previously, different social and ethnic groups were represented in this overall pattern of residential land use. Only by reference to the land and building values, and to the heights and materials, can the maps aid in the separation of the housing areas according to social groups.

6.3 The High Class Residential Areas

Goheen points out that in Toronto in the last quarter of the nineteenth century one of the high-class prestige residential areas was located near to the commercial and industrial core.² This was also true for the high-class residential area of Ottawa located along the cliff tops of Upper Town and overlooking the LeBreton Flats and Ottawa

FLOOR 3 RESIDENTIAL LAND-USE AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	.....	.....	.....
FREQ.	263	18	16	24	141

FIG. 6.3

ABOVE FLOOR 3 RESIDENTIAL LAND-USE AS PERCENTAGE ABOVE FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	////	XXXXXX	.....
	.....	.....	////	XXXXXX	.....

FREQ.	443	2	4	1	12
-------	-----	---	---	---	----

FIG. 6.4

river, (as seen from the historical introduction in chapter two). These upper class houses were to the west of the city centre of 1878, but only a little to the north and west of the Upper Town centre of the 1840's. Goheen also states that the houses of the rich, the clubs, churches, and commercial houses took the prime and central sites of the early city, the poor people living where possible and on whatever land was left.³ Thus the high, well drained cliff top sites with a good view and close to the Upper Town market were early prime residential sites and continued to be so even into the 1870's. At various times up to and into the 1870's the lumber "Kings" such as Skead, Booth, Eddy, Bronson, Pearly, and Pattee all lived in this high prestige area overlooking their lumber yards.⁴ It is also interesting to note that the areas of high percentages of residential use on blocks 150 to 153, 203 to 204, and 208 to 210 (along the cliff tops), as seen from Figures 6.1 to 6.4 correspond closely with the areas of brick and stone building material as seen in Chapter Four.

The area of Sandy Hill, following especially Daly Street (Figure 2.1), was also convenient in relation to the C.B.D. and Parliament for the Civil Servants who settled there from the 1860's onwards. As the name suggests, the area had site and drainage advantages as well as accessibility by foot to the city centre. It is difficult to differentiate this area from the whole arc of high residential percentages east of the canal, but the area does stand out on Figure 4.18 and 4.19 as having higher percentages of brick and stone building materials than surrounding areas. Also, the Sandy Hill area is differentiated from the area north of Rideau Street, on Figure 4.20, since it had much

lower percentages of timber structures.

The other main high-class residential areas of the city were located outside of the city limits. Goheen notes that at first only the rich could afford to travel from the edges into the city centre.⁵ New Edinburgh, and especially the area around Rideau Hall, attracted the residences of the more prosperous elements in society and so too did the village of Janeville (Vanier), south of New Edinburgh and on the east bank of the Rideau River. Certainly by 1879 Janeville was a very flourishing settlement with the houses of well-to-do Ottawa public servants and merchants.⁶ Especially following Confederation, good stone built houses were constructed along Sussex Street into New Edinburgh along the outcrops above the Ottawa river.⁷ This extension of high-class housing along Sussex Street, like that along Wellington Street, not only followed the high, well drained cliff tops but also the horse tramway route.

6.4 The Housing Areas of the Poor

The rich could seek and afford the better and most picturesque locations while the residential areas of the poor were often on the least secluded, worst drained, and the most industrially polluted land, a point emphasised by Yeates and Garner.⁸ Goheen in his work on Toronto records similar findings, noting that the unskilled workers could not compete with the other groups for the desirable and accessible residential locations.⁹

Thus the broad area of Lower Town southwest of the Rideau River and north of Rideau Street could appear to fit many of these conditions

and to have housed many of Ottawa's poor. As seen in Chapter Two, this was the area of French and Irish Catholic settlement. This fact suggests that these areas were indeed poor residential areas: Goheen finding in Toronto that,

Roman Catholics in 1870 are characterized by the factor analysis as possessing a very low economic ranking and as occupying the worst housing within the city. ¹⁰

Katz also made similar observations for Hamilton.¹¹ Also, since timber may be regarded as the cheapest available building material, it can be suggested that the areas with high percentages of timber plus high percentages of residential land-use indicate the areas of the houses of the poorer classes. Figure 6.5 shows the areas of the city having at least 50 percent of the building space constructed of timber plus at least 50 percent of the space occupied by residential use. Again, the area which really stands out in terms of size and consistency, is the previously described Lower Town area.

This same figure also shows the residential area of LeBreton Flats/southwestern Upper Town. Since this area does not feature in the literature in connection with the French and Irish ethnic/religious groups or with particularly poor conditions, it may be better not to class it as having been populated by the poorest and least skilled elements of the population.

6.5 The Middle Class Housing Areas

It may be argued that the residential areas not occupied by the rich or by the poor must therefore be the areas of the middle class housing or of mixed housing. To a certain extent this is true while

keeping in mind the following considerations. As Goheen points out,

Skilled labour tended to be localized in those districts in which industrial establishments were found.

and also,

This finding reflects the advantages of contiguity which obtained in a city without effective public transportation.¹²

If reference is made to Figure 3.1 it will be seen that the horse tramway route was often away from the timber plus residential areas seen on Figure 6.5. Thus, many of the skilled workers, who were presumably at least lower middle class in status, lived quite close to the factories so that they could quickly walk to and from work.

Much of the area on Figure 6.5 in the southwestern part of Upper Town may have been an area of little differentiation in residential status while the area south of Sandy Hill may be seen as an area of transition between high-class and undeveloped areas of the city. It will also be seen that the high-class areas of the Upper Town cliff tops, Sandy Hill, and the northern section of Sussex Street were still very close to poor and middle class residential areas. Certainly Warner records that this was also the case for Boston (Mass.) in the 1850's, so that the factories, wharves, and offices were only a few blocks from those of the middle class houses.¹³ He also points out that the separation of residential areas according to class status really took place after a pattern of street railways was established. The middle and upper classes only moved out of the compact city once there were rapid electric streetcar routes, introduced in the 1880's and 1890's. Also the large scale development of suburban land did not

take place until it could be provided with power and sanitation services as well as accessibility.¹⁴ In the light of Goheen and Warner's observations, the classification of this area as one of middle and mixed housing would seem reasonable.

6.6 Conclusions

Within the city of 1878, therefore, there were areas with definite social and ethnic characteristics, often being based upon site characteristics; but these areas were often close to contrasting residential and non-residential areas. At this date much of the residential area, i.e. much of that occupied by the lower and middle classes, was away from the one public transport route and so the inhabitants had to live close to the chief sources of employment, these being the C.B.D. and the Rideau and Chaudière areas.

Goheen, in his Toronto study, noted the extension of high status areas along the street railway routes, the poorest still being on the least accessible and least healthy land¹⁵, and also that the C.B.D. had not been abandoned as a place of residence by 1880.¹⁶ This would appear true not only of Toronto but of Ottawa in 1878.

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15. Goheen, P., op. cit., page 143.
16. Goheen, P., ibid., page 168.

CHAPTER 7

INDUSTRIAL, ANCILLARY, AND PUBLIC LAND-USES

7.1 Introduction

These three themes have been grouped into one chapter, since they need less discussion than did the C.B.D. and residential themes. Industrial land-use, public buildings, and ancillary services are treated separately in the chapter, though all should be seen in terms of their relationship to the C.B.D. and the residential areas of the city.

Yeates and Garner point out the very important though localised effect of industrial areas;

Although manufacturing land occupies a small proportion of total urban land, it contains a very important aspect of the urban economy, for on this land are located production facilities that provide employment for a large proportion of a city's labour force.¹

Since Ottawa in 1878 was only just emerging from being a pedestrian city, the location of industry had a close relationship with the location of residential areas. This chapter does not seek to differentiate between types of industrial activity, but rather to identify areas with high concentrations of industrial activity and employment. Careless points out that the early lumber trade, outlined in Chapter Two, had led to the diversification of manufacturing and an increase in service industries in Ottawa through the nineteenth century, a multiplier effect being seen in the growing city.²

Associated with the other land-use themes, and especially with the residential and industrial areas, is the group of land-uses classed as ancillary services. This term includes all sheds, warehouses and stables, these being regarded as subservient to the other land-uses.

From observation in the modern city, it may be seen that public buildings, taken to include all churches, schools, halls and municipal buildings such as police stations, fire stations and administrative offices, are scattered throughout the built-up area. This pattern may also be expected for 1878 since churches, schools and fire stations, for example, do not and did not then benefit from concentration. Rather, each area or neighbourhood of the city would require its own church, or churches, and school. It must also be remembered that in 1878 there was only one public transportation route and in many neighbourhoods most of the population would have had to walk to their places of worship, entertainment, and education. Also, such buildings would not have to compete with commercial institutions for their location.

7.2 Industrial Areas within the City

The important sites of the Chaudière and Rideau Falls have been mentioned in preceding chapters and the location of main industrial areas has been suggested by several distribution maps. These maps include Figure 4.1, which shows lot occupance and the location of lumber stacks, and Figure 4.2 which shows all of the non-building land. Figure 7.1, however, deals exclusively with industrial and manufacturing activity within the city limits. All factories, including sawmills, grist mills and woollen mills were included, as well as the land-use category dealing

FLOOR 1 INDUSTRY AND MANUFACTURING AS PERCENTAGE OF FLOOR 1 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	16.60	33.20	49.80	66.40
MAX.	16.60	33.20	49.80	66.40	83.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	439	11	3	5	4

FIG. 7.1

with premises of combined manufacturing and selling, e.g., jewellers, cabinet makers, bakers and coach makers. The areas occupied by lumber stacks were omitted from this figure and so it only shows areas of processing and manufacturing taken as a percentage of the floor one area on each block.

The water power sites around the Chaudiere Falls are very evident on Figure 7.1. Only one block (85) shows the Rideau Falls industrial area. The highest percentages of floor one manufacturing space are at the water power sites, with the one exception of block 20 which contained the city's only gasworks. It must be remembered that much of the industry centred on the Rideau Falls was located outside the Ottawa city limits, on Green Island and in New Edinburgh. It should also be noted that only the Ottawa side of the Chaudière industrial area is shown on this figure, the large area on the Hull side of the Union Bridge being excluded from this study. Much industry was located near to the water power supply; the raw material for many of the processes, timber, also being transported by water. The Chaudière islands and the LeBreton Flats were large flat sites of low value, suitable for the establishing of factories (Figures 4.4 and 4.6).

The location of industry around the canal basin can be explained by the canal traffic and timber exports to the United States, via Kingston and Oswego, as mentioned in Chapter Two. The remaining industrial areas within the city may have represented a previous stage in the form of Ottawa. Ward points out that areas of almost exclusively industrial concentration are features of the modern city.

Until the mid-nineteenth century, apart from small exclusive residential quarters of the rich, the functional specialization of urban land uses was only weakly developed. Most industrial and commercial activities generally were conducted on the premises of the producer or merchant, and local purchases or services were obtained on a custom basis directly from the producer.³

This may explain some of the industry close to the central part of the city but, since the water power sites had such an important and long-established influence, it may be better to see these near-central locations as being the small producers, such as bakers, cabinet makers and jewellers. Ward goes on to say that by the 1870's the foundries and processing plants of cities were relocating on the outer edges of the built-up area, in order to obtain more and cheaper land.⁴ Thus the near-central industry not explained by such trades as bakers, jewellers, and cabinet makers may have been the remainder of the previously central small plants which had not yet relocated to the desirable industrial locations of 1878.

A further factor is the influence of transport costs, since local commodity movements within cities were very expensive until the introduction of the motor vehicle.⁵ Thus, any plant producing a good for nearby C.B.D. blocks would not relocate and incur higher transport costs. Conversely, the small processing plants associated with the lumber plants would locate nearby to keep their transport costs to a minimum, especially where the raw material was heavy, bulky, or both.

If Figure 7.1 is compared with Figure 7.2, it will be clear that the industry of floor one is very closely linked with the areas occupied by lumber stacks. It will also be seen from Figure 4.4 that the lumber is

LUMBER STACKS AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	12.20	24.40	36.60	48.80
MAX.	12.20	24.40	36.60	48.40	61.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

SYMBOLS	1	2	3	4	5
FREQ.	440	8	5	3	6

FIG. 7.2

mostly stacked on land having a very low land value. Again the lumber stacks located near the canal basin can be explained by the lumber exports to the United States via the canal, and also by the presence of a small shipbuilding company on the north side of the basin between block 88 and block 110 (Figure 3.1)

7.3 The Vertical Element to Manufacturing

Although in Chapter Five it was seen that few stores and retail establishments had expanded to floors two and three, industrial buildings appear to have had considerable vertical extent, Figure 7.3, having a very similar distribution pattern to Figure 7.1. It is interesting to note that four of the industrial blocks near to the Chaudière Falls had 80 percent to 100 percent of their floor two space occupied by industrial activity, indicating the predominance of this land-use in the area. The vertical extent of the factories of the Chaudière area is shown on Figure 7.4, the pattern being basically the same as that for floors one and two. The factories of the Rideau Falls do not appear on this floor three map, even though there were many such buildings on McKay's land just outside the city, both his woollen and saw mills being famous.⁶ Many of Lower Town's residents were employed by McKay.

A further map has been included as Appendix E.1, since it deals only with the blocks occupied by lumber and industry together. Thus it shows the areas which had any percentage of any floor space in industrial use, plus any percentage of the block occupied by industrial lumber. The use of this map is limited since blocks having either lumber or industry, but not both together, are omitted.

FLOOR 2 INDUSTRY AND MANUFACTURING AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	441	12	1	3	5

FIG. 7.3

FLOOR 3 INDUSTRY AND MANUFACTURING AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL					
MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00
PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL					
	20.00	20.00	20.00	20.00	20.00
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL					
	1	2	3	4	5
SYMBOLS	.....	.....	////////	XXXXXXXXXX	XXXXXXXXXX
FREQ.	446	5	2	3	6

FIG. 7.4

7.4 Industry - Conclusions

It will be noted that there was no industry within the C.B.D. core and only small amounts around the outer edge of the C.B.D. The water power sites certainly dominated the industrial picture in 1878, exerting a strong influence on the residential areas. The location of these major industrial cities at the Rideau and Chaudière Falls may explain the linear expansion of the city core towards each one, and the pull of these areas of employment may also explain the location of important residential areas between the industry and the core.

Small industries did exist, but they are not easily located, and those blocks with some industry located near to the C.B.D. were probably areas of secondary industry, employing small numbers of workers.

7.5 Ancillary Services

On the F.I.A. many small structures were shown, being classed only as sheds. Most residential properties and stores had these sheds nearby and they also appeared in the industrial areas. Since no further information could be found for those structures, it is assumed that in all areas, with the possible exception of the industrial areas, these sheds were used for the storage of cases, chests and rarely used household items. It may also be suggested that some were outside toilets, while others may have been used for the storage of fodder and harnesses for horses.

Many stables were also shown on the F.I.A., these being the approximate equivalent in 1878 of the family garage today. The stables varied in size from small structures holding one or two animals, to

large buildings holding wagons and carriages on the first floor and fodder and equipment on the second floor. In the pre-automobile age the importance of the horse as a means of transport can be appreciated.

Few buildings on the F.I.A. were specifically classed as storehouses or warehouses, although some buildings and upper floors were so designated in the industrial areas and around the edges of the C.B.D. It may be suggested that many of the sheds near to stores performed the function of small storerooms. Many of the buildings containing stores appear to have combined the store, storerooms and residential floors in the one structure. Thus it proved to be very difficult to locate all of the storeroome and storehouses, making it impossible to differentiate between wholesale warehouses and retail storerooms.

Since all of these functions provided support for the domestic and commercial activity of the city, they have been grouped together under the title of Ancillary Services.

7.6 Distribution Maps of Ancillary Services

It may be assumed that sheds and stables in 1878 were not tall structures, but mostly of one or two storeys. It is not surprising that the almost uniform distribution of such buildings (Figure 7.5) closely matches the patterns of one and two storied buildings on Figure 4.9 and Figure 4.10. Only three areas stand out from the uniform distribution of ancillary services on floor one. The largest exception is the area of high percentages in the Chaudière/LeBreton industrial area. Many stables, storage sheds and warehouses would be needed in an industrial area. The other two areas of high percentages were also

FLOOR 1 ANCILLARY STRUCTURES AS PERCENTAGE OF FLOOR 1 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS					
FREQ.	233	184	33	6	6

FIG. 7.5

associated in 1878 with industry, one area being around the canal basin and the other being at the railway depot close to the Rideau Falls.

The assumption that many sheds and stables were only one-storied buildings is supported by Figure 7.6, which shows the distribution of all ancillary services on floor two. The distribution is not so widespread as on floor one, though many blocks in Lower Town still had 20 to 40 percent of their building area occupied by ancillary services. Two areas of high percentages stand out, these again being the LeBreton Flats area and the canal basin area. It may also be noted that most of the C.B.D. area had less than 20 percent of its floor two space occupied by ancillary services, whereas on floor one the percentage of the floor area was between 20 and 40 percent.

While it is known that many of the buildings of three storeys on Figure 7.7 were indeed industrial and wholesale warehouses, several were not reported as such in the data. Nonetheless, it would seem reasonable that this was in fact their function, since few sheds extended beyond two storeys. The highest percentages of ancillary services occur around the canal basin, these buildings being close to the C.B.D. as well as being located close to the wharves. The Chaudière industrial area also had a small concentration of warehouse space on floor three. Other than these two concentrations, the remaining four blocks having over 20 percent of the floor three area occupied by ancillary services probably represent scattered companies. For example, block 38 was occupied by the offices and storerooms of a shipping company.⁷

A figure was also produced to show the distribution of ancillary services, as a percentage of the floor space, for the floors above floor

FLOOR 2 ANCILLARY STRUCTURES AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS					
					

FREQ.	376	72	9	1	4
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FIG. 7.6

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS					
					

FREQ.	450	5	3	0	4
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FIG. 7.7

three. However, this map only showed three isolated blocks, one being near the Chaudière Falls. This map has not been included since it showed that virtually no ancillary services appeared above floor three in 1878. In the days before elevators, this is not really surprising, the access to the upper floors being only by stairs or, for bulky items, by derrick.

7.7 Ancillary Services - Conclusions

It may be seen that the majority of ancillary services were on floors one and two, the stables and sheds having the greatest concentration on floor one. Apart from the industrial concentrations of all the ancillary services, these were widespread on floor one within the built-up city. Although not worthy of further analysis, these functions obviously had considerable importance in the city of 1878. Since stables and sheds were associated with residential areas and also with industry, and even some of the C.B.D. land-uses, it did not prove to be possible or desirable to attempt a delimitation of these functions. The relationship between industrial areas and the identifiable warehouses has been seen, but it would not be valid to think of separate wholesale areas within the city in 1878.

7.8 Public Buildings

Prior to the late 1840's the city was geographically divided by the military reserve, as well as having ethnic, religious and socially distinct areas. From the early years, a scattered pattern of public buildings was established. Nicholas Sparks donated a parcel of land overlooking the LeBreton Flats for the large Anglican church⁸ (replaced in

1872 as the Protestant cathedral). On the edge of Lower Town, also overlooking the Ottawa river, Notre Dame Basilica was started in 1841⁹, near a former wooden Catholic church. The Anglican church served the predominantly English middle and upper-class settlers of Upper Town, while the Basilica served the predominantly French and Irish Catholic groups of Lower Town. Due to fights between these two latter groups, the Irish and French Catholics soon had separate churches, thus contributing to a scattered pattern along with the Scots who introduced their Presbyterian beliefs to the city. Therefore, by 1832 there were three official religious burial grounds - one Anglican, one Catholic, and one Presbyterian.¹⁰ By 1876 the number of denominations had risen, due to the increasing population, so that there were 23 churches in Ottawa.¹¹ A convent existed on block 60, while on block 49 near to the Basilica was the convent of the Grey Nuns¹², a church orphanage and the Hopital General. At the far end of Rideau Street, on block 107, stood the Protestant Hospital¹³ (Figure 3.1)

Also scattered across the city were at least eight educational establishments, including the College de Bytown on blocks 136 and 137, the Normal School and Collegiate Institute on Cartier Square, and the Ottawa Ladies' College in Upper Town on block 210¹⁴ (Figure 3.1).

Some public buildings did benefit from a central location and general accessibility, these being the City Hall, built in 1877 on Elgin Street between Queen and Albert Streets¹⁵, and the Post Office building built to serve the C.B.D. and Parliament, along with the citizens, in 1876. The previous Post Office, enlarged in 1865, had proved to be inadequate to cope with the increasing size and functions

of Ottawa, and so the new Post Office of 1876, at the junctions of Wellington, Elgin and Sparks Streets, was at the most accessible location.¹⁶

Thus it may be expected that in 1878 the pattern of public buildings would show few, if any, concentrations, but rather a scattered distribution.

7.9 Distribution Maps

The Figures 7.8 to 7.11 all show the expected scattered distribution, on all floor levels from one to above floor three. It is hardly surprising that no public buildings were located in the undeveloped part of the city or on the very fringes of the built-up area. Even the City Jail, on block 121, was quite near to the heart of the city, the settlement having expanded well beyond it since its eventual completion in 1862.¹⁷ Public buildings had not been erected in any numbers in the lumbering/industrial areas; none appear on the maps in the Rideau Falls area and at ground level only two blocks, with a church and the city water works¹⁸, being shown for the edge of the LeBreton Flats area (blocks 166 and 163 respectively). Since fewer people actually lived in the areas of factories and lumber stacks, it is not really surprising to see that so few public buildings were located near to them. With these exceptions, it can be seen that public buildings existed in all other areas of the city, from City Hall and Post Office close to the P.L.V.I., to the Hospitals nearer the periphery.

It should also be noted that many of the public buildings occupied high percentages of the floor space of the tallest buildings in the city and had high property values. These tall buildings were also associated

FLOOR 1 PUBLIC BUILDINGS AS PERCENTAGE OF FLOOR 1 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	|||||	////	XXXXXX	#####
	.....	|||||	////	XXXXXX	#####

FREQ.	433	12	7	3	7
-------	-----	----	---	---	---

FIG. 7.8

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	.....	.....	.....
					
					

FREQ.	427	14	10	3	8
-------	-----	----	----	---	---

FIG. 7.9

FLOOR 3 PUBLIC BUILDINGS AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS	.....	.....	////////	XXXXXXXX	XXXXXXXX
FREQ.	418	18	4	8	14

FIG. 7.10

ABOVE FLOOR 3 PUBLIC BUILDINGS AS PERCENTAGE ABOVE FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
-------	-------	-------	-------	-------

FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
---	---	---	---	---

SYMBOLS	.....	.....	.....	.....	.....
					

FREQ.	433	4	0	1	24
-------	-----	---	---	---	----

FIG. 7.11

with more solid construction materials.

7.10 Public Buildings - Conclusions

The overall distribution of land-use areas in the city will be discussed in Chapter Nine, but the idea of a multi-nucleated city should not be forthcoming from looking at Figures 7.8 to 7.11, since the scattered distribution has been explained - a scatter of churches, schools and hospitals being expected for any city. Like ancillary services, the public buildings provided services to the public, but the similarity ends in that public buildings were large, built in a style and material which added prestige to the institution. These buildings have a permanence due to their continued use, solid construction and since many were focal points for neighbourhood life.

7.11 Summary Conclusions

In 1878 Ottawa showed some of the features of a modern industrial city, with two distinct concentrations of industrial activity on the fringes of the city. Remnants of the central location of industry remained around the canal basin, and small plants existed around the edges of the C.B.D. area. The whole pattern of industrial location in the Ottawa area also included Hull and New Edinburgh, but these areas have not been studied, being outside the city limits of Ottawa.

The ubiquitous nature of stables and sheds in the 1870's has been demonstrated, with slight concentrations being evident in the industrial areas and in the residential areas adjacent to the industry. Slightly lower percentages were seen in the central core of the city, but sheds, storehouses and stables appeared to be common throughout the city, being

associated especially with one and two-storey buildings and timber construction.

Public buildings were found in every neighbourhood, providing administrative, social, religious and educational services, and in contrast to ancillary services, being particularly associated with taller buildings, constructed to last over a long period and to have considerable prestige, being built of brick or, most commonly, stone.

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CHAPTER 8

STATISTICAL ANALYSIS

8.1 Introduction

In the preceding chapters the maps produced were discussed, and visual analysis indicated areas of the city where particular land-uses predominated and where there were marked associations between brick and stone building materials and tall structures. Many of the dependent variables were seen to be related to both distance and land value. This indeed is what one might expect. The *raison d'etre* of, for example, locating a store in the C.B.D. is, after all, the greater accessibility of this area to the buying public. As a result, the shopkeeper is prepared to accept a higher land value for this location in order to maximize his profit; in effect, cash location has a bid price. Land value and distance are in general intimately associated, though of course in particular instances a good site may be remote from the C.B.D., and even within the C.B.D. a site close to the P.L.V.I. may have site characteristics which negate its advantageous location. Such exceptional occurrences were rare in Ottawa of 1878.

The purpose of this chapter is to describe these relationships statistically. It is expected at the outset that the signs of the coefficients will be negative with respect to distance and positive with respect to land value. However, in particular instances where particular land-uses are primarily located on the periphery, as in the case of industry, this expectation must be modified.

8.2 Data Preparation

Each of the 462 city blocks was given an eight figure grid-reference for the centre of the block, and the distance was also measured from the centre of each block to the P.L.V.I. The statistical analysis covered all 462 city blocks and also smaller areas within the city. The 281 built-up blocks were analysed, since it was felt that the 181 under-developed blocks within the city limits may have a distorting effect. The 281 built-up blocks were further divided into 22 C.B.D. area blocks and 259 non-C.B.D. blocks. The 22 C.B.D. blocks were chosen following the visual analysis and were studied separately to see if they represented a discrete part of the city with results differing from the analysis of the remaining 259 built-up blocks. The 22 C.B.D. blocks include the 15 core blocks identified in Chapter Five, plus blocks from the extensions along the transport routes. The blocks chosen to represent the C.B.D. were numbers 1, 9, 10, 13, 89, 90 to 92, 155, 226, 227, 242 to 244, 257 to 260, 262 to 264, and 276 (Figure 3.1). For further analysis the remaining 440 city blocks were compared with the 22 C.B.D. blocks and with the blocks of the built-up city.

8.3 Correlation Coefficients

Tables of Pearson product moment correlation coefficients were produced from the SPSS multiple regression program. Correlation coefficients by themselves only show how each variable is associated with another. One variable does not explain another, dependent and independent variables being used in regression analysis. Five tables of correlation coefficients were produced, tables 8.1 to 8.5, relating to all 462 city

MATRIX OF INTER-CORRELATION

N=462

	BRICK	STONE	TIMBER	STORES	PUBLIC	INDUSTRY	RESIDENT	HT.1	HT.2	HT.3	HT.>3	LANDVAL	PROPVAL	DISTANCE
BRICK	1.00													
STONE	.43	1.00												
TIMBER	.27	.18	1.00											
STORES	.53	.48	.29	1.00										
PUBLIC	(.08)	.40	(-.01)	(-.03)	1.00									
INDUSTRY	(.02)	.12	.15	(.02)	(-.05)	1.00								
RESIDENT	.16	(.03)	.61	(-.01)	(-.03)	(-.05)	1.00							
HT.1	.34	.28	.90	.33	(.07)	.12	.65	1.00						
HT.2	.37	.30	.88	.35	(-.01)	.25	.57	.79	1.00					
HT.3	.75	.63	.47	.62	.12	.11	.22	.54	.48	1.00				
HT.>3	.43	.72	(.06)	.40	.45	(-.02)	(-.07)	.13	.09	.42	1.00			
LANDVAL	.70	.65	.37	.69	(.01)	.10	.11	.45	.42	.81	.54	1.00		
PROPVAL	.71	.74	.37	.66	.11	.12	.14	.46	.45	.82	.69	.95	1.00	
DISTANCE	-.48	-.38	-.22	-.31	-.18	(.04)	-.12	-.34	-.27	-.48	-.36	-.49	-.49	1.00

() = not significant at .05 level.

Table 8.1

MATRIX OF INTER-CORRELATION

N=281

	BRICK	STONE	TIMBER	STORES	PUBLIC	INDUSTRY	RESIDENT	HT.1	HT.2	HT.3	HT.>3	LANDVAL	PROPVAL	DISTANCE
BRICK	1.00													
STONE	.35	1.00												
TIMBER	(.06)	(-.07)	1.00											
STORES	.48	.42	.15	1.00										
PUBLIC	(.01)	.35	-.20	(-.09)	1.00									
INDUSTRY	(-.06)	(.05)	(.02)	(-.04)	(-.10)	1.00								
RESIDENT	-.15	-.35	.27	-.32	-.29	-.30	1.00							
HT.1	.15	(.04)	.82	.19	-.12	(-.04)	.28	1.00						
HT.2	.20	(.10)	.80	.23	-.21	.15	.19	.62	1.00					
HT.3	.71	.56	.26	.57	(.03)	(.01)	-.20	.35	.27	1.00				
HT.>3	.38	.71	(-.10)	.36	.43	(-.07)	-.34	(-.03)	(-.06)	.37	1.00			
LANDVAL	.66	.60	.17	.66	(-.09)	(.02)	-.25	.29	.26	.78	.52	1.00		
PROPVAL	.67	.70	.15	.62	(.02)	(.04)	-.27	.25	.26	.78	.68	.94	1.00	
DISTANCE	-.51	-.37	(-.06)	-.30	-.16	.13	.15	-.26	-.26	-.50	-.39	-.51	-.51	1.00

() = not significant at .05 level.

Table 8.2

MATRIX OF INTER-CORRELATION

N=22

	BRICK	STONE	TIMBER	STORES	PUBLIC	INDUSTRY	RESIDENT	HT.1	HT.2	HT.3	HT.>3	LANDVAL	PROPVAL	DISTANCE
BRICK	1.00													
STONE	(.04)	1.00												
TIMBER	(-.04)	-.56	1.00											
STORES	(.38)	(.19)	(.01)	1.00										
PUBLIC	(-.17)	(.02)	(-.39)	-.43	1.00									
INDUSTRY	(.04)	(-.33)	(.20)	(.05)	(-.21)	1.00								
RESIDENT	(-.35)	(-.35)	(.29)	(-.42)	(-.26)	(-.17)	1.00							
HT.1	(-.16)	(-.29)	.52	(.40)	(-.36)	(.14)	(.21)	1.00						
HT.2	(.16)	(-.33)	.50	(-.07)	-.42	(.07)	.46	(.01)	1.00					
HT.3	.56	(.20)	(-.04)	.71	(-.18)	(-.07)	(-.38)	(.29)	(-.21)	1.00				
HT.>3	(.27)	.69	(-.38)	(.31)	(-.12)	(-.21)	-.50	(-.18)	(-.40)	(.21)	1.00			
LANDVAL	.45	(.41)	(-.07)	.56	-.42	(.09)	-.44	(.27)	(-.20)	.67	.45	1.00		
PROPVAL	.44	.63	(-.31)	.50	(-.15)	(-.12)	-.55	(.03)	(-.30)	.64	.67	.88	1.00	
DISTANCE	(-.41)	(-.16)	(.14)	(-.04)	(-.18)	(.04)	.46	(-.05)	(.21)	(-.34)	(-.46)	-.55	-.68	1.00

() = not significant at .05 level.

Table 8.3

MATRIX OF INTER-CORRELATION

N=259

	BRICK	STONE	TIMBER	STORES	PUBLIC	INDUSTRY	RESIDENT	HT.1	HT.2	HT.3	HT.>3	LANDVAL	PROPVAL	DISTANCE
BRICK	1.00													
STONE	(.10)	1.00												
TIMBER	(.09)	(-.06)	1.00											
STORES	.18	(.07)	.19	1.00										
PUBLIC	(.03)	.53	-.19	(-.09)	1.00									
INDUSTRY	(-.05)	.12	(.02)	(-.01)	(-.10)	1.00								
RESIDENT	(.09)	-.27	.30	-.14	-.32	-.34	1.00							
HT.1	.17	(-.01)	.84	.12	(-.11)	(-.04)	.36	1.00						
HT.2	.19	(.08)	.82	.24	-.20	.16	.25	.65	1.00					
HT.3	.60	.36	.37	.18	(.08)	(.07)	(.04)	.37	.32	1.00				
HT.>3	(.09)	.56	(-.11)	(-.03)	.69	(-.06)	-.27	(-.11)	(-.11)	(.02)	1.00			
LANDVAL	.52	.24	.40	.30	-.12	.15	(.09)	.42	.47	.60	(.01)	1.00		
PROPVAL	.52	.47	.34	.21	.13	.18	(.01)	.35	.44	.61	.40	.77	1.00	
DISTANCE	(-.44)	-.21	(-.06)	(-.06)	-.20	.12	(.02)	-.23	(-.11)	-.37	-.23	-.37	-.37	1.00

() = not significant at .05 level.

Table 8.4

MATRIX OF INTER-CORRELATION

N=440

	BRICK	STONE	TIMBER	STORES	PUBLIC	INDUSTRY	RESIDENT	HT.1	HT.2	HT.3	HT.>3	LANDVAL	PROPVAL	DISTANCE
BRICK	1.00													
STONE	.22	1.00												
TIMBER	.31	.19	1.00											
STORES	.25	.15	.30	1.00										
PUBLIC	.12	.56	(-.01)	(-.03)	1.00									
INDUSTRY	(.03)	.19	.16	(.05)	(-.05)	1.00								
RESIDENT	.34	.12	.64	(.09)	(-.03)	(-.05)	1.00							
HT.1	.38	.25	.91	.25	(.08)	.13	.70	1.00						
HT.2	.38	.29	.89	.34	(-.01)	.26	.61	.81	1.00					
HT.3	.67	.48	.57	.28	.19	.17	.42	.59	.54	1.00				
HT.>3	.15	.58	(.04)	(.01)	.70	(-.02)	(-.01)	(.06)	(.03)	.11	1.00			
LANDVAL	.58	.37	.58	.36	(.02)	.23	.45	.61	.62	.68	.10	1.00		
PROPVAL	.60	.56	.58	.30	.23	.27	.44	.60	.64	.71	.42	.84	1.00	
DISTANCE	-.40	-.24	-.18	-.10	-.20	(.04)	-.17	-.29	-.22	-.37	-.22	-.39	-.38	1.00

() = not significant at .05 level.

Table 8.5

blocks, the 281 built-up blocks, the 22 C.B.D. blocks, the remaining 259 built-up blocks and the remaining 440 city blocks respectively.

Those correlation coefficients significant at the 95 percent confidence level are identified on the tables, those with a correlation coefficient greater than ± 0.5 being regarded as showing a strong association.

A very strong association between two variables is indicated by a correlation coefficient closer to unity. With the exception of distance, each variable is expressed as the value per square foot of the block occupied by that variable.

Table 8.1, dealing with the whole city, shows that brick building material is quite strongly associated with buildings of three storeys, stores, land value and property value. Stone building material is closely associated with tall buildings of three and above three storeys, land value and property value. The other building material variable, timber, is closely associated with residential land-use and very strongly associated with buildings of one and two storeys. This does indeed confirm the associations seen in Chapters Four, Five and Six. The table also shows a strong association between buildings of three and above three storeys and land and property values, confirming the findings of Chapter Five that the taller buildings, associated with C.B.D. uses and stronger building materials, were on the highest value land in the city (Parliament being excluded from consideration).

Table 8.2 is a table of inter-correlation for the 281 blocks of the built-up city. It shows a similar association between brick, stone, tall buildings, and land and property value. Timber is again closely associated with buildings of one and two storeys ($r = 0.82$ and $r = 0.80$ respectively). It is interesting to note that brick building material,

land value and property value all have a negative association with distance from the P.L.V.I., these variables decreasing in quantity as distance increases. There is also quite a strong negative correlation coefficient for the variables of distance from the P.L.V.I. and buildings of three storeys. The strongest association, as on Table 8.1, is between land and property value, the correlation coefficient on Table 8.1 being 0.95 and 0.94 on Table 8.2.

The close association between land value and property value is also seen on Table 8.3, the correlation coefficient being 0.88. It may be expected that in this C.B.D. area the land-uses would be closely associated with the variables of height, structure and value seen previously. Indeed, stores are closely associated with buildings of three storeys, land value and property value. Tall buildings seen to have strong positive association with land value, property value, brick and stone building materials, confirmed the hypothesised relationships of Chapter Five.

Within the C.B.D. it may be expected that there would be less residential land-use than in surrounding areas. Table 8.3 shows within this area, as in the city as a whole, residential land-use is negatively correlated with property value and with the tallest buildings within the C.B.D. area. A positive relationship does exist between residential land-use and buildings of two storeys ($r = 0.46$) but this is not a very strong relationship, possibly because of the relatively smaller numbers of two-storey buildings in this area. Although not shown on this table, it is interesting to note that stores and one-storey buildings had a correlation coefficient of only .01. While it is not possible to directly compare

correlations, Tables 8.2 and 8.3 would seem to suggest that the relationships between distance and land and property values were stronger in the area designated C.B.D. than in the city as a whole.¹

Although the qualification holds true for Tables 8.3 and 8.4, i.e. that correlation coefficients are not directly comparable, the results appear to confirm the substantive point made in earlier chapters that the two areas are different and perhaps suggests the strength of relationship between stores, height, property value, and land value is not as great in the larger area, since they were probably less than in the C.B.D. area. As might be expected in this non-C.B.D. area, the relations between timber and one and two-storey buildings is greater. Even within this section where there were fewer tall buildings than in the C.B.D. proper, tall buildings occur in close association with brick and stone and with public land-use, an association identified in Chapter Seven.

In Chapter Four it was seen that buildings of one and two storeys had very similar distribution patterns and the strong correlation between buildings of these heights is seen on this table ($r = 0.65$). Also in agreement with Chapter Four is the strong association between one and two-storey buildings and timber construction material.

Table 8.5 may be used to compare the 440 city blocks with the 22 blocks of the C.B.D. area. Once again within this area timber is very strongly associated with residential land-use, one-storey buildings, and two-storey buildings.

As expected, the taller buildings are associated quite strongly with high land values, high property value, large amounts of stone and

brick material, and public buildings. Also, residential use is most strongly associated with one and two-storied buildings. It will be seen that the associations between one, two, and three-storied buildings and land and property values gets progressively stronger with increased height. The lower associations between these variables and the very tallest buildings (above three storeys) may be due to the scattered pattern of such buildings and their frequent exemption from tax assessment.

From the correlation coefficients it will be seen that there is considerable agreement between this part of the statistical analysis and the visual analysis of the preceding chapters. Even where there is a lack of association between variables, indicated by very low correlation coefficients, this agrees with the previous findings; for example, the low correlation coefficients for stone with residential land-use, or for buildings of one storey with industry (Table 8.5).

8.4 Regression Analysis

Regression analysis is an accepted technique which attempts to establish the linear relationship between one dependent and one or more independent variables. This differs from correlation in that correlation coefficients only show the association between two variables while a regression equation says that one variable can be "explained" to a certain extent, by one or more other variables. The dependent variables were the values of each variable such as brick or stone, as a percentage of the block area. The variables defined as the land and property value were assessed land value (LVAL) per square foot of the

block and the assessed real property value (PROPVAL) per square foot of the block.

Two sets of simple regressions were run, seeking to explain the distribution of the land and property value in terms of distance from the P.L.V.I. All the remaining regressions were step-wise multiple regressions whereby an "explanation" of the dependent variable was sought in terms of distance from the P.L.V.I. and then also in terms of the land value per square foot of the block. In a compact, largely pedestrian city, it was felt that distance to the centre, assumed to be very close to the P.L.V.I.,² would be a major factor in explaining the distribution of land-uses and of the other factors of value, structure and height. The second independent variable used in attempting to explain the distribution patterns was the assessed land value, the visual analysis indicating that certain land-uses were associated with the pattern of land values. Murphy and Vance also suggest land value as a variable with explanatory power.³ Thus the multiple regressions seek to explain the distribution of three-storey buildings, stores, and residential land-use for example, in terms of their distance from the P.L.V.I. and their assessed land value.

8.5 Results of Regression Analysis

The two simple and eleven multiple regressions were run for the 462 city blocks, the 281 built-up blocks, the 22 C.B.D. area blocks, the 259 non-C.B.D. built-up blocks, and the 440 non-C.B.D. city blocks. Tables 8.6 to 8.10 show the regressions equations and whether or not the equation was significant at the .05 level, determined using a table

RESULTS OF REGRESSION ANALYSIS

N=462

PERCENTAGE VARIATION EXPLAINED	DEGREES OF FREEDOM	REGRESSION EQUATION
24*	1 460	LAND VALUE = 34.46 + (-.02 DIST)
24*	1 460	REAL PROPERTY = 74.11 + (-.04 DIST)
23*	1 460	BRICK = 6.33 + (-.004 DIST)
51*	2 459	BRICK = 1.91 + (-.001 DIST + .13 LVAL)
14*	1 460	STONE = 6.11 + (-.004 DIST)
43*	2 459	STONE = 1.39 + (-.0009 DIST + .14 LVAL)
4*	1 460	TIMBER = 15.08 + (-.005 DIST)
13*	2 459	TIMBER = 8.02 + (-.001 DIST + .20 LVAL)
9*	1 460	STORES = 10.49 + (-.006 DIST)
47*	2 459	STORES = -1.75 + (+.0008 DIST + .36 LVAL)
3*	1 460	PUBLIC = 11.70 + (-.006 DIST)
4*	2 459	PUBLIC = 15.34 + (-.009 DIST + -.11 LVAL)
-	1 460	INDUSTRY = 1.56 + (+.001 DIST)
2*	2 459	INDUSTRY = -1.36 + (+.003 DIST + .08 LVAL)
1*	1 460	RESIDENTIAL = 34.74 + (-.007 DIST)
2*	2 459	RESIDENTIAL = 30.26 + (-.005 DIST + .13 LVAL)
11*	1 460	HEIGHT 1 = 8.51 + (-.004 DIST)
22*	2 459	HEIGHT 1 = 5.06 + (-.002 DIST + .10 LVAL)
7*	1 460	HEIGHT 2 = 11.76 + (-.005 DIST)
18*	2 459	HEIGHT 2 = 6.09 + (-.001 DIST + .16 LVAL)
23*	1 460	HEIGHT 3 = 10.12 + (-.006 DIST)
67*	2 459	HEIGHT 3 = 2.37 + (-.001 DIST + .22 LVAL)
13*	1 460	HEIGHT > 3 = 3.23 + (-.002 DIST)
31*	2 459	HEIGHT > 3 = 0.78 + (-.0007 DIST + .07 LVAL)

* = significant at .05 level

Table 8.6

RESULTS OF REGRESSION ANALYSIS

N=281

PERCENTAGE VARIATION EXPLAINED	DEGREES OF FREEDOM	REGRESSION EQUATION
26*	1 278	LAND VALUE = 42.86 + (-.02 DIST)
26*	1 278	REAL PROPERTY = 91.144 + (-.05 DIST)
26*	1 278	BRICK = 8.23 + (-.005 DIST)
48*	2 277	BRICK = 3.22 + (-.002 DIST + .12 LVAL)
14*	1 278	STONE = 7.52 + (-.004 DIST)
37*	2 277	STONE = 2.00 + (-.001 DIST + .13 LVAL)
-	1 278	TIMBER = 16.50 + (-.001 DIST)
3*	2 277	TIMBER = 12.44 + (+.008 DIST + .09 LVAL)
9*	1 278	STORES = 13.38 + (-.007 DIST)
44*	2 277	STORES = -2.17 + (+.001 DIST + .36 LVAL)
2*	1 278	PUBLIC = 12.81 + (-.006 DIST)
6*	2 277	PUBLIC = 20.82 + (-.01 DIST + -.19 LVAL)
2*	1 278	INDUSTRY = 0.63 + (+.004 DIST)
3*	2 277	INDUSTRY = -2.27 + (+.005 DIST + .07 LVAL)
2*	1 278	RESIDENTIAL = 34.85 + (+.008 DIST)
7*	2 277	RESIDENTIAL = 46.59 + (+.002 DIST + -.27 LVAL)
7*	1 278	HEIGHT 1 = 9.77 + (-.002 DIST)
10*	2 277	HEIGHT 1 = 7.93 + (-.001 DIST + .04 LVAL)
2*	1 278	HEIGHT 2 = 13.24 + (-.002 DIST)
7*	2 277	HEIGHT 2 = 9.52 + (-.0004 DIST + .08 LVAL)
25*	1 278	HEIGHT 3 = 12.64 + (-.007 DIST)
63*	2 277	HEIGHT 3 = 3.77 + (-.002 DIST + .21 LVAL)
15*	1 278	HEIGHT > 3 = 4.26 + (-.003 DIST)
29*	2 277	HEIGHT > 3 = 1.34 + (-.001 DIST + .07 LVAL)

* = significant at .05 level

Table 8.7

RESULTS OF REGRESSION ANALYSIS

N=22

PERCENTAGE VARIATION EXPLAINED	DEGREES OF FREEDOM	REGRESSION EQUATION
17	1 20	BRICK = 16.86 + (-.01 DIST)
24	2 19	BRICK = 8.09 + (-.007 DIST + .08 LVAL)
2	1 20	STONE = 15.04 + (-.004 DIST)
17	2 19	STONE = 5.01 + (-.003 DIST + .09 LVAL)
2	1 20	TIMBER = 14.26 + (+.004 DIST)
-	2 19	TIMBER = F level insufficient for futher comp.
-	1 20	STORES = 31.05 + (-.002 DIST)
42*	2 19	STORES = -1.26 + (+.02 DIST + .30 LVAL)
21*	1 20	RESIDENTIAL = 6.59 + (+.02 DIST)
26*	2 19	RESIDENTIAL = 15.92 + (+.01 DIST + -.09 LVAL)
-	1 20	HEIGHT 1 = 9.29 + (-.0006 DIST)
9	2 19	HEIGHT 1 = 5.53 + (+.002 DIST + .04 LVAL)
5	1 20	HEIGHT 2 = 11.77 + (-.005 DIST)
6	2 19	HEIGHT 2 = 14.02 + (+.004 DIST + -.02 LVAL)
12	1 20	HEIGHT 3 = 23.82 + (-.01 DIST)
46*	2 19	HEIGHT 3 = 5.37 + (+.002 DIST + 0.17 LVAL)
21*	1 20	HEIGHT > 3 = 11.99 + (-.01 DIST)
27*	2 19	HEIGHT > 3 = 6.21 + (-.008 DIST + .05 LVAL)

* = significant at .05 level

Table 8.8

RESULTS OF REGRESSION ANALYSIS

N=259

PERCENTAGE VARIATION EXPLAINED	DEGREES OF FREEDOM	REGRESSION EQUATION
19*	1 257	BRICK = 5.56 + (-.003 DIST)
33*	2 256	BRICK = 2.60 + (-.002 DIST + .14 LVAL)
5*	1 257	STONE = 4.43 + (-.002 DIST)
8*	2 256	STONE = 2.79 + (-.001 DIST + .08 LVAL)
-	1 257	TIMBER = 16.55 + (-.001 DIST)
17*	2 256	TIMBER = 4.99 + (+.003 DIST + .54 LVAL)
-	1 257	STORES = 4.59 + (-.001 DIST)
10*	2 256	STORES = -1.83 + (+.001 DIST + .30 LVAL)
-	1 257	RESIDENTIAL = 44.55 + (+.001 DIST)
1	2 256	RESIDENTIAL = 38.30 + (+.003 DIST + .29 LVAL)
5*	1 257	HEIGHT 1 = 9.58 + (-.002 DIST)
18*	2 256	HEIGHT 1 = 5.58 + (-.0008 DIST + .19 LVAL)
1	1 257	HEIGHT 2 = 12.58 + (-.002 DIST)
23*	2 256	HEIGHT 2 = 3.59 + (+.001 DIST + .42 LVAL)
13*	1 257	HEIGHT 3 = 8.41 + (-.004 DIST)
39*	2 256	HEIGHT 3 = 2.98 + (-.002 DIST + .26 LVAL)
5*	1 257	HEIGHT > 3 = 2.10 + (-.001 DIST)
6*	2 256	HEIGHT > 3 = 2.61 + (-.001 DIST + -.02 LVAL)

* = significant at .05 level

Table 8.9

RESULTS OF REGRESSION ANALYSIS

N=440

PERCENTAGE VARIATION EXPLAINED	DEGREES OF FREEDOM	REGRESSION EQUATION
16*	1 438	BRICK = 4.12 + (-.002 DIST)
37*	2 437	BRICK = 1.49 + (-.001 DIST + .15 LVAL)
6*	1 438	STONE = 3.47 + (-.002 DIST)
15*	2 437	STONE = 1.40 + (-.0008 DIST + .12 LVAL)
3*	1 438	TIMBER = 14.44 + (-.004 DIST)
34*	2 437	TIMBER = 0.83 + (+.001 DIST + .76 LVAL)
1*	1 438	STORES = 3.83 + (-.002 DIST)
13*	2 437	STORES = -1.32 + (+.0007 + .29 LVAL)
3*	1 438	RESIDENTIAL = 40.59 + (-.01 DIST)
20*	2 437	RESIDENTIAL = 14.25 + (+.0004 DIST + 1.47 LVAL)
8*	1 438	HEIGHT 1 = 7.99 + (-.003 DIST)
37*	2 437	HEIGHT 1 = 2.33 + (-.0007 DIST + .32 LVAL)
5*	1 438	HEIGHT 2 = 10.78 + (-.004 DIST)
39*	2 437	HEIGHT 2 = 0.77 + (+.0005 DIST + .56 LVAL)
13*	1 438	HEIGHT 3 = 6.51 + (-.003 DIST)
48*	2 437	HEIGHT 3 = 1.47 + (-.001 DIST + .28 LVAL)
5*	1 438	HEIGHT > 3 = 1.53 + (-.0009 DIST)
5*	2 437	HEIGHT > 3 = 1.46 + (-.0009 DIST + .004 LVAL)

* = significant at .05 level

Table 8.10

of the critical values of F.⁴

Twenty of the regressions were not statistically significant at the .05 level, and thus they will not receive further attention. Many of the remaining regressions, although statistically significant, had very weak explanatory value, in some instances due to the very large number of cases and in others due to the presence of explanatory factors other than distance and land value.

8.6 Simple Regressions

The simple regressions used distance from the P.L.V.I. as the independent variable. Using only one independent variable it might be expected that alone it may not have high "explanatory" value. This was true in all but nine cases. The column marked "percentage explained" shows the percentage "explained" using the equation ("explained" means: the proportion of the variance of the dependent variable accounted for by the variance of the independent variable(s), for each regression equation).

Distance explained 26 percent of the variation in the land-value and real property value, when $N = 281$, and 24 percent when $N = 462$. In all instances the signs confirmed the inverse nature of the relationship.

When dealing with the built-up city ($N = 281$), 26 percent of the variation in the distribution of brick building material was explained by distance, there being a negative association between these two variables. Figure 8.1 shows the regression lines for brick regressed against distance. All of the following figures of regression lines have the

REGRESSION LINES
BRICK BUILDING MATERIAL

Fig. 8.1

same scale and format for ease of comparison. The regression lines with sample sizes of 462, 281, 22 and 259 city blocks have been included, (where shown to be statistically significant), those for 440 blocks being omitted for reasons of clarity.

Figure 8.1 shows the regression lines relating to brick building material, the line for 462 blocks indicating a gradual decline in brick with distance away from the city centre. When 181 blocks were excluded, the regression proved steeper than when the analysis was concerned with all 462 and the level of "explanation" increased to 26 percent. The regression line relating to the 22 blocks of the C.B.D. area indicated considerably higher levels of brick in this part of the city, distance alone only "explaining" 17 percent of the distribution. However, this relationship did not prove statistically significant at the 95 percent confidence level and consequently the slope of this relationship does not appear on the figure. In the remaining cases which were statistically significant the relationship between brick buildings and distance proved to be inverse, indicating a decline in brick away from the centre of the city and the P.L.V.I. (see Figures 4.15 and 4.18).

A very similar picture is presented by Figure 8.2, the strong association between brick and stone being noted earlier. Thus, the regression lines for stone building material on distance are similar, but not as steep as those for brick. Within the sample of 259 (the built up non-C.B.D. area), distance only "explained" five percent of the distribution of stone, probably due to the scatter of stone-built public buildings. Within the whole city ($N = 462$) and the whole built-up city ($N = 281$) the "explanation" achieved was 14 percent. Within the 22 C.B.D. area blocks the correlation coefficient was very low and not statistically significant. This,

REGRESSION LINES
STONE BUILDING MATERIAL

180

Fig. 8.2

after all, is what one might expect since the sample size is extremely small, and indeed stone was an ubiquitous element within the central core. Stone was a prestigious material used either by particular wealthy individuals or by businesses which benefitted from this particular geographical location (see figures 4.16 and 4.19).

The previous analyses have shown that the distribution patterns for timber building material differed considerably from those for brick and stone. Figure 8.3 shows that there was a general and gradual decline in the distribution of timber with distance from the city's centre. However, this line conceals the absence of timber from the undeveloped part of the city and the smaller quantities within the core. The large residential belt, identified in Chapter Six contained the vast majority of timber structures, as Table 8.1 indicates. (See Figures 4.20, 6.1 and 6.5). Distance alone has almost no "explanatory" value when related to the distribution of timber since the main concentrations lay at a distance from the P.L.V.I. and the C.B.D. Nonetheless, the correlation coefficient obtained ($r = -0.22$) does show that there is orderliness in the data.

Figures 8.4 and 8.5 show the regression lines for two important land-uses, stores and residential land-use. The regression lines for industrial and public land-use were omitted because of the lack of association between these dependent variables and distance, as seen from the correlation coefficients and the very low percentages "explained" by distance. These variables were in fact influenced by factors other than distance from the P.L.V.I.

With regard to the whole city, the regression lines for 462 and 281 blocks show quite a marked decline in stores away from the centre to the edges of the city, the correlation coefficients being respectively

REGRESSION LINES
TIMBER BUILDING MATERIAL

182

Fig. 8.3

STORES Fig. 8.4

REGRESSION LINES
RESIDENTIAL LAND-USE

184

462 BLOCKS : $RES.=34.74+(-.007DIST)$

281 BLOCKS : $RES.=34.85+(+.008DIST)$

22 BLOCKS : $RES.=6.59+(+.02DIST)$

Fig. 8.5

-0.31 and -0.30. The results for the C.B.D. area were, as Table 8.3 indicates, not statistically significant. This was not true when the variable "residential land-use" was considered. Within the C.B.D. area ($N = 22$) the correlation coefficient for the variable residential land-use against distance was stronger ($r = +0.46$) and significant at the five percent level. As the sign indicates, the relationship was a positive one; distance explaining 21 percent of the variation in residential land-use (Table 8.8). The regression line for the 22 C.B.D. area block indicates an increase in residential land-use with distance from the P.L.V.I., a truism which is nonetheless empirically verified. However, as might be expected, the line for 462 blocks shows a general decline in residential land-use away from the city centre. This line, where $N = 462$, is seen to be inappropriate for the C.B.D. area and also for the 281 blocks of the built-up city. The apparent contrast in direction of slope for these two samples is in fact a consequence of the partitioning of the data. In this case the exclusion of the 181 undeveloped blocks had a marked effect because of the removal of zero values around the edge of the city.

Figures 8.6 to 8.9 refer to building heights. Figures 8.6 and 8.7 are very similar, as expected, since they deal with one and two-storey buildings respectively. The very shallow slope of all the lines indicates the weakness of the relationship between these heights and distance. This confirms the weak negative correlation coefficients on Table 8.1 (Height 1, $r = -0.34$ and Height 2, $r = -0.27$) where $N = 462$ and also on Table 8.2 where $N = 281$ (Height 1 and 2, $r = -0.26$). The common occurrence of buildings of these heights in all parts of the

city was identified in Chapter Four (Figures 4.7, 4.8 and Figures 4.11 and 4.12).

Figures 8.8 and 8.9 are quite similar, though differing from Figures 8.6 and 8.7. Three-storey buildings appear to be negatively associated with distance, and the C.B.D. area stands out on Figure 8.9. Distance alone "explained" 21 percent of the distribution of above three-storey buildings in the C.B.D. area. Distance also "explained" 23 percent of the distribution of three-storey buildings where $N = 462$, and 25 percent where $N = 281$. Thus the predominance of tall buildings in the core is further emphasised by this part of the analysis.

The remaining two regression lines relating to the simple regressions of land and property value on distance are shown on Figures 8.10 and 8.11. On all the tables of correlation coefficients, (Tables 8.1 to 8.5), land and real property value had quite strong negative relationships with distance. Further, distance "explains" 26 percent of land value and property value when $N = 281$, and 24 percent of each when $N = 462$. Therefore the regression lines have slopes which indicate quite a rapid decline in both assessed land value and assessed property value with distance from the city core. Again, this conforms with the visual analysis (Chapter Four) and with the literature (listed under references four and five of Chapter Five).

REGRESSION LINES
1 STOREY BUILDINGS

187

Fig. 8.6

REGRESSION LINES
2 STOREY BUILDINGS

188

Fig. 8.7

REGRESSION LINES
3 STOREY BUILDINGS

Fig. 8.8

REGRESSION LINES>3 STOREY BUILDINGS Fig. 8.9

REGRESSION LINES
ASSESSED LAND VALUE

191

Fig. 8.10

Fig. 8.11

8.7 Multiple Regressions

The second independent variable chosen for use in the stepwise multiple regression program was land value. It was felt that a greater level of "explanation" would be achieved from the use of these two independent variables, distance and land value. This was certainly the case for brick building material. Within the whole city ($N = 462$) distance "explained" 23 percent of the distribution of brick buildings, but this was raised to 51 percent with the inclusion of land value (Table 8.6). Perhaps more meaningful is the increase in "explanation" from 26 percent to 48 percent with the inclusion of land value in the multiple regression for the 281 blocks of the built-up city (Table 8.7).

The increase in "explanation" due to the inclusion of land value in the equation is not so evident in the C.B.D. area, but this is probably due to high values existing throughout the central area.

A very similar increase in the "explanation" of the distribution of stone building material resulted from the inclusion in the equation of land value, though this was not very important in the non-C.B.D. part of the built-up city ($N = 259$) where many of the stone buildings that existed there were in public land-use and exempted from tax assessment, thus having very low land values.

While in both the C.B.D. and non-C.B.D. areas there was a meaningful and statistically significant relationship between brick and stone, and distance and land value, this was not so for timber. Here the only meaningful relationship between these variables occurred in the non-C.B.D. area (Tables 8.9 and 8.10). In this instance, land value did

have some "explanatory" value whereas distance alone did not. In many cases the lowest value land was in industrial use, especially for timber stacks, and thus timber structures, especially housing, would not be on the land with the lowest assessed value.

As may be expected from Chapter Five, land value had considerable "explanatory" effect for the distribution of stores. Tables 8.6 and 8.7 show that land value had much more effect upon stores than distance alone, and in the C.B.D. (Table 8.8) land value "explained" 42 percent of the distribution of stores, distance having little or no effect.

Only in the case of the 440 non-C.B.D. blocks did land value greatly add to the small level of "explanation" due to distance. Even this case may be due to the presence of 181 underdeveloped blocks, so that the residential land-use was on the blocks with assessed values, and obviously there was little or no residential use on the underdeveloped and unassessed blocks. Elsewhere, land value and distance together had little real "explanatory" effect on the distribution of residential land-use, other factors probably being nearness to place of employment, clustering with like ethnic and religious groups, and compactness due to the lack of public transport in the predominantly residential areas.

On Tables 8.6, 8.7, 8.9 and 8.10 it will be seen that land-value and distance together "explained" a considerably higher percentage of the distribution of building height than did distance alone. This is especially true in the case of three-storey buildings (Table 8.6) where land value plus distance "explain" 67 percent of the distribution of three-storey buildings throughout the city. Even within the built-up city the level of "explanation" for structures of this height is 63 per-

cent, again confirming the predominance of the central high value area and its association with tall buildings.

Since one and two-storey buildings were common throughout the built-up city, it is not surprising to find that land value does not have very much extra "explanatory" effect, although in the non-C.B.D. area (N = 259, Table 8.9) land value "explained" 23 percent of the distribution of two-storey buildings and distance alone had no significant effect. This may reflect the value of the land on which houses were standing, most houses in the poorer parts of the city being two-storeys in height. As seen in the case of residential land-use, houses would not be on the cheapest land, that being in industrial use as lumber stacks. Other areas of very low value would possibly have site considerations, such as steepness of slope if near to the bluff line, or of wetness if near to the Rideau River.

Where the regressions were statistically significant and where they also provided quite high levels of "explanation", it will be seen that there was confirmation of the visual analysis of the preceding chapters. Even where the level of "explanation" was low, as for industrial land, this did not contradict the previous findings, but rather these findings provided reasons for the low level of "explanation" due to distance and land value. In the case of the example of industrial land in the whole of the city (Table 8.6), the two independent variables only gave an "explanation" of two percent of the distribution, but it had already been seen that other factors, such as water power sites and water transportation sites, were of much greater importance. Thus the regression analysis does not appear to detract from the visual analy-

sis, but rather it confirms it.

8.8 Residuals

The residuals from the multiple regression equations were mapped, Figures 8.12 to 8.24, using the whole 462 blocks of the city in order to give a complete picture covering the area within the city limits and thus being comparable with the other maps of the whole city. The areas of negative residuals show areas with a real world value less than that predicted by the regression equation. The positive residuals indicate areas with real world values higher than those predicted. The residuals identified in this study are those equal to or greater than plus or minus one standard error of the estimate of the appropriate dependent variable.

8.9 Maps of Residuals

Figures 8.12 and 8.13 are similar in that they deal with closely related variables, brick and stone, and pick out similar features within the city. On Figure 8.12 the positive residuals pick out the areas of Sandy Hill, the Sussex Street area of the C.B.D., and the area to the south of the Upper Town core of the C.B.D. An isolated, positive residual can be identified as the Protestant Hospital on block 107. While there are known to have been large amounts of brick and stone around the P.L.V.I., it is at first surprising to find negative residuals in this area, but in many cases the negative residuals for brick occur on blocks occupied by positive residuals for stone, and vice versa. Isolated public buildings, often built in stone as seen in Chapters Four and Seven, stand out on Figure 8.13, prominent features being the edu-

RESIDUALS - BRICK BUILDING MATERIAL

Fig. 8.12

RESIDUALS - STONE BUILDING MATERIAL

Fig. 8.13

cational buildings on blocks 136, 137, 270 and 271, the ecclesiastical property on blocks 40, 60, 208 and 233, and the administrative/government buildings on blocks 262, 276 and especially the Parliament on block 147 (Figure 3.1). The stone factory buildings of the Chaudière/LeBreton area are also represented by positive residuals.

Quite a different pattern is shown on Figure 8.14, the positive residuals being located in the heart of Lower Town and on the LeBreton Flats. These two areas are the lower-class housing areas associated with timber structures, and this map confirms the dominance of timber material in these areas. Further, the negative residuals cluster in the core area around the P.L.V.I. indicating even lower quantities of timber there than predicted by the regression. Nine of the blocks with negative residuals are blocks classed as C.B.D. core blocks in Chapter Five. It may also be noted that very few positive residuals for timber are found in Upper Town or in Sandy Hill, areas associated with upper and middle-class housing.

Figures 8.15 to 8.18 show the residuals for the four main land-uses. High percentages of stores are predicted by the equation for the city centre, two of the Upper Town C.B.D. core blocks have positive residuals and two have negative residuals. The two positive residuals confirm the concentration of stores in the C.B.D., along Sparks Street, while the negative residuals represent the areas of the C.B.D. core occupied by financial institutions and hotels. In Lower Town the Sussex Street and Byward market sections of the C.B.D. are represented by positive residuals. The stores along main transport routes, especially Rideau and Wellington Streets, are picked out by positive residuals.

RESIDUALS - TIMBER BUILDING MATERIAL

Fig. 8.14

RESIDUALS - STORES

+1 Standard Error
+2 Standard Errors
 ≥ 3 Standard Errors
-1 Negative Residual
0 PLVI

Fig. 8.15

RESIDUALS - PUBLIC BUILDINGS

Fig. 8.16

RESIDUALS - INDUSTRIAL LAND-USE

Fig. 8.17

RESIDUALS - RESIDENTIAL LAND-USE

Fig. 8.18

In the eastern part of the city, Anglesea Square market (block 30) is represented by a high positive residual (+ 10 standard errors). This wild case is to be expected because of its distance from the stores clustered about the P.L.V.I.

Since distance had such a weak "explanatory" effect on the distribution of public buildings, it is not surprising to see that the residuals for public buildings, Figure 8.16, pick out each block with major public buildings. Most of these buildings and blocks have been identified in Chapter Seven, and in connection with stone building material in this chapter, and so they are not listed again (see Figures 7.8 to 7.11).

The residuals plotted on Figure 8.17 identify the areas of industry, for the same reasons that caused public buildings to stand out, i.e., that distance from the P.L.V.I. had little effect on the location. The one negative residual does emphasise the lack of industry around the P.L.V.I. and in the C.B.D. core. The high positive residuals identify the part of the Rideau Falls industrial area within the Ottawa city limits, the Chaudière/LeBreton area, and the brewery and foundry on blocks 160 and 207 respectively. As noted in Chapter Seven, the gas works accounts for the high positive residual on block 16. Due to the weakness of the relationship between industry and distance this map differs little from Figures 7.1, and 7.3.

On Figure 8.5 it can be seen that the regression line for 462 blocks of the city differs considerably from that for residential land-use on the C.B.D. and non-C.B.D. blocks. It has been noted that there was little residential use on floor one of the C.B.D. area and in the

southern area of 181 underdeveloped blocks. Thus regression line for 462 blocks differs from that for the 259 blocks of predominantly residential use in the built-up city. Since high levels of residential use existed on the 259 blocks, many of these stand out as positive residuals on this figure relating to all 462 blocks. It is not surprising, therefore, that the C.B.D. area has a cluster of negative residuals, thus conforming with reality, and that the large area of positive residuals agrees closely with the distribution map of floor one residential use (Figure 6.1).

Figures 8.19 to 8.22 show the residuals for the regression of height on distance. Since the regression lines for one and two-storey buildings were very similar, it is not surprising that the residual maps are also similar. Figures 8.19 and 8.20 both show areas of negative residuals in the C.B.D. area, indicating the slightly smaller numbers of these buildings in the core, as seen in Chapter Four. The second set of negative residuals on Figure 8.19, to the south of Nepean Street, may be explained because of their lack of buildings, especially those of one-storey, despite their proximity to the P.L.V.I. This may also explain the isolated negative residual in this area on Figure 8.20.

Figure 8.21 shows the residuals for three-storey buildings. Some of the negative residuals in the city centre can be "explained" by the presence of positive residuals for buildings of above three storeys, Figure 8.22. The positive residuals around the edge of the C.B.D. core indicate the area of transition between the commercial core and the residential areas associated with one and two-storey buildings. The positive residuals on the Chaudière/LeBreton Flats area, Figure 8.21, can be

RESIDUALS - BUILDINGS WITH ONE STOREY

Fig. 8.19

RESIDUALS - BUILDINGS WITH TWO STOREYS

Fig. 8.20

RESIDUALS - BUILDINGS WITH THREE STOREYS

Fig. 8.21

RESIDUALS - BUILDINGS WITH OVER THREE STOREYS

Fig. 8.22

"explained" by the tall factory buildings, their presence there not being dependent on distance from the P.L.V.I. On this map, the houses of the rich on block 152 also stand out as having a positive residual of one standard error. The isolated positive residuals on Figure 8.22, can again be identified as public buildings, in ecclesiastical, medical and educational use.

The final two residual maps, Figures 8.23 and 8.24, show the residuals for land and real property value. These two maps agree closely with the location of the C.B.D. blocks (Chapter Five). On both figures nine blocks stand out as having positive residuals of ≥ 3 standard errors, all of these being in the area classed as C.B.D. core. On both of these figures the extensions of high value along the main transport routeways can be seen.

The negative residuals on blocks 36, 37, 147 and 148, Figure 8.23, are due to this government property being exempt from tax assessment. On Figure 8.24 the inclusion in the data of a real value for the Parliament on block 147 produces a positive residual of two standard errors. The two other negative residuals on Figure 8.2 can be explained by the tax exemption for the land in public use on block 276, and the low value industrial land of block 88 next to the canal basin. The cluster of negative residuals around Cartier Square can be explained by the lack of data for the educational buildings on blocks 137, 270 and 271. The remainder can be explained by the lack of development of Cartier Square despite its close proximity to the P.L.V.I.

Isolated peripheral blocks are shown on both figures as having positive residuals. On Figure 8.23 these identify the factories of the

RESIDUALS - ASSESSED LAND VALUE

Fig. 8.23

RESIDUALS - ASSESSED REAL PROPERTY VALUE

Fig. 8.24

Chaudière area. These factories are also identified on Figure 8.24, along with the lumber mills on block 176 and the small commercial nucleus in the centre of the LeBreton Flats. At the opposite end of the city the Protestant Hospital on block 107 is identified.

8.10 Conclusions

The correlation coefficients confirmed the associations between certain variables as seen in the previous chapters. In certain cases the lack of association was also noted. All of the high correlation coefficients confirmed the findings of the visual analysis. Except in the few instances where the *raison d'être* was indeed different from outlined in the introduction to this chapter (i.e., industry, public buildings, ancillary services, and timber buildings) the signs of the coefficients confirmed the hypothesised relationships.

While the explanatory power of the two independent variables varied from one land-use to another, the level of "explanation" achieved by use of land value and distance in conjunction one with another showed there was indeed orderliness in the data. The highest percentage variation "explained" was 67 percent; the lowest statistically meaningful result accounted for 2 percent of the variation. Obviously in such circumstances factors other than distance and land value must be taken into account.

The analysis of the residuals pointed to the importance of transportation routes. They also showed where Government, freed from the constraints of taxation and normal economic competition, had erected public buildings. In addition, the residuals confirm the areas of particular importance for specific variables, and indeed specific areas such as the C.B.D.

REFERENCES

1. Comparison of Tables 8.1 - 8.5 is made here in substantive rather than in statistical terms since, (a) correlation coefficients are not directly comparable per se and, (b) the possibility of achieving significance with so small a sample is indeed remote.
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CHAPTER 9

LAND-USE AREAS OF OTTAWA IN 1878

9.1 Introduction

The purpose of this chapter is to draw together the findings and delimitations of the previous chapters into a unified picture of Ottawa's land-use pattern in 1878. The areas of the city where a particular land-use, or set of land-uses, predominated have been identified, with special reference being made to the C.B.D. core. In addition the relationship between certain land-uses and factors such as land value and structure have been examined. It has also been seen that one land-use type may strongly influence the location of another. The attractions of the C.B.D. and the industrial areas as places of employment, consequently influencing the residential location of the workers, has been noted. An important aim of this thesis though, was a complete picture of the land-use pattern for the whole city, identifying the location of each land-use type in relation to the others.

Once the pattern of land-uses for the whole city has been established, this will be related to the historical context, outlined in Chapter Two, and to the major theories of urban form. The influence of Ottawa's past history on the pattern seen in 1878 will be examined so as to assess its importance as a factor shaping urban form. The main theories of urban form to be considered in this concluding chapter are those of

Burgess and Hoyt¹, since these seem most applicable to a nineteenth-century western city. Reference is also made to Harris and Ullman's concept of multiple-nuclei.

Following discussion of the land-use pattern, the influences of Ottawa's history, and the relationship of Ottawa's form to the applicable theories of the form of western cities, the summary conclusions are presented.

9.2 Ottawa's land-use pattern in 1878

Many maps have been used to show the distributions of various land-uses and of all the associated factors, however, Figure 9.1 shows the land-use pattern for the whole city. This refers to the floor one pattern since this floor had the greatest importance in terms of economic competition, as seen in Chapter Five. The C.B.D. and the areas of industrial activity have been emphasised by heavy shading so that their locations, relative to residential areas, may be seen.

Here, as in Chapter Five, the C.B.D. has been identified as 15 core blocks, in terms of land value, building heights and material, and land-uses. Nothing in the chapters following Chapter Five detracted from this identification of 15 blocks, but the transition area around the C.B.D. has been modified due to the presence of industry, public land-use, and residential land-use. The C.B.D. core is seen to be quite compact (Figure 9.1), the four blocks on either side of Sparks Street being of particular importance and value, thus confirming the importance placed on this part of the street by the historians.

In 1878 the seven C.B.D. core blocks east of the canal still had considerable importance, though having lost their former dominant position.

OTTAWA LAND-USE AREAS 1878

The PLVI

The CBD core

Positive residuals of stores - little residential

Transition blocks - mixture of land-uses

Residential blocks - $\geq 40\%$ of Floor 1 residential

Industrial blocks - $\geq 17\%$ of Floor 1 industry + lumber

Blocks with predominately public land-use

Cemeteries

Fig 9.1

Although linked only by the Dufferin and Sappers Bridges, these two areas should be seen as parts of one core because of their proximity, high land and property values, and land-uses. Whether east or west of the canal, the similarity of land-uses, building materials and building heights within the core confirms its unity. This unity was assured because of the tramway route cutting through the middle of the seven blocks east of the canal and the eight blocks west of the canal. The tramway route made the C.B.D. area equally accessible, in terms of distance, from the housing of northeastern Lower Town and also from the western side of the city. Its very position, therefore, confirms its "centrality" as a core.

As noted in Chapter Five, the outer limits of the C.B.D. area are very difficult to determine; a transition zone conforms more with reality rather than a firm line. This transition zone around the C.B.D. core has been modified from Figure 5.17. The four blocks south of the Upper Town portion of the C.B.D. core are not classed as part of a transition zone on Figure 9.1. This is due to the presence on three of these blocks of at least 40 percent of the floor one space in residential use. This makes the blocks consistent with those of the residential areas, although this would suggest an abrupt change between the C.B.D. and residential land-use in this area. There may not, in fact, have been such a sharp change in land-use, but working at the block level, a transition zone could not be identified in this area. The public land-uses on block 276 led to its exclusion from the C.B.D. and from the transition zone, this land-use being linked to high value structures but not being directly linked to commercial activity.

Blocks 228 and 241 (Figure 3.1 and 9.1) have been classed as having importance as industrial blocks, and so they have been excluded from the C.B.D. area and will be discussed later along with the other industrial blocks. Block 204 had greater than 17 percent of its floor one area in industrial use, but also had at least 40 percent of its space in residential use. Thus it was classed as having mixed land-use.

The main transition areas between the C.B.D. and the other land-uses are associated with the main east, west and north road transport routes. It is not surprising that stores, here identified by positive residuals, would be located along major transport routes so as to attract more people passing between the periphery and the city centre.

As noted in Chapter Seven, certain public land-uses also benefited from a near-central location; for example, the police station, main post office, and city hall, and hence these particular uses are represented in the areas of public land-use (including parks) around the edges of the C.B.D. (Figure 9.1).

The C.B.D. was one main area of employment but so too were the areas of industrial activity. The chief areas of industry were at the water power sites, as seen in Chapter Seven, and these formed two large important concentrations. However, around the edges of the city's core there were smaller areas of industrial activity, with the associated employment of the city's residents. Of these near-central minor industrial areas, that of the canal basin stands out best on Figure 9.1. This shows the continued importance of the canal transport route. Of the other two minor industrial areas, that of Lower Town is dominated

by the gas works on block 16, but this would have attracted employment, especially since men were needed to handle the necessary coal fuel.

The minor industrial area on the western edge of the Upper Town C.B.D. area was probably associated with light manufacturing, there being very few firms with many employees but many small establishments, such as bakeries and cabinet makers, with small numbers of employees.

It will be seen from Figure 9.1 that the residential areas of the city lay very close to, and in some cases in between, the main areas of employment. The data did not allow for the inclusion of the minor areas of settlement south of Theodore Street, along the canal bank, and in the southwest of the city, but these were areas of minor importance with very low densities in 1878 (Figure 4.1). The map does show two large residential areas separated by the canal, the canal basin industry, and the near-central public land-uses. A third small area of residential land-use is shown, north of Wellington Street, this being the high-class area of the cliff tops. The upper class areas are differentiated from the lower class and mixed housing areas on the generalized land-use pattern of Figure 9.2. As noted in the case of Toronto, in Chapter Six, two high-class areas remained near the city centre, being close to the C.B.D. and to areas of public land-uses. The proximity of the areas of employment and the areas of residential land-use will be evident from this map.

Figure 9.2 allows easier identification of areas, or sectors, of the city with their predominant land-use. The "L" shaped C.B.D. is emphasised, and the transition zone along Wellington, Sussex and Rideau Streets can be clearly seen. The large areas of near-central public

- The CBD core
- Transitional areas - mixture of land-uses
- Areas of industrial employment
- Prime residential areas
- Lower class and mixed housing areas
- Areas of predominately public land-use
- Railway terminals
- Under developed and vacant land
- Main transport routes from the city

land-use are due to Ottawa's unique position as political capital, to the reservation of Major's Hill and Nepean Point from the first days of the settlement's planning, and to the location there of many municipal services.

Ottawa in 1878 had one "L" shaped C.B.D. with a core of 15 blocks all having C.B.D. land-uses, high land and property values, expensive building materials, and tall buildings. This area was clearly distinct from the rest of the city and from the two peripheral shopping areas, the more important of which was the LeBreton Flats nucleus. Transition zones lay around the C.B.D. core, being most evident along the main transport routes. Two large residential areas existed, with small areas of upper class residential land-use, these being associated with characteristics of site. Some industry, associated with the canal basin, and light manufacturing lay around the periphery of the C.B.D., but the two dominant areas of industrial employment were at the water power sites of the Chaudière Falls and the Rideau Falls. The two areas of railway terminals were on the very edges of the city, being strongly associated with the location of the major industrial areas.

The effect of the horse tramway and main road routes can be seen, with linear development of commercial activity, but the city was still quite compact, there being a large area of little-developed land within the city limits.

9.3 The Influence of History on Ottawa's Form in 1878

In 1878 Ottawa still showed much evidence of its past history, although it differed greatly from the settlement known as Bytown. No

longer was it in two separate and distinct locations, full of antagonisms and rivalries. By the late 1870's it was peaceful, more united physically, if not in terms of language, religion and culture, and it was growing rapidly as a city capable of supplying contemporary services and a wide range of employment opportunities.

Despite the contrasts between the 1870's and the 1840's, for example, the city had, and indeed the central part of the modern city still has, the imprint of its history. This imprint is mostly in the form of the physical layout. The canal was both a barrier to communication, there being only three bridges across it within the city limits, and an aid to communication with its continued importance for passenger and bulky freight traffic.

The main streets laid out by Colonel By - Wellington, Rideau, and Sussex Streets - had retained their prime importance as transport routes. The lack of commercial development or of any other than public land-use on Barracks (Parliament) Hill, Majors Hill and Nepean Point was due to the early city planning. The prime residential sites along the Upper Town cliff tops still had importance and prestige in the 1870's, but these were now in competition with rivals within and outside the city limits. The location of the Protestant and Catholic cathedrals away from the contemporary city core of 1878 was due to the choice of their sites 40 years previously when the settlement had been quite different. However, once built, these important elements of the city's fabric remained equidistant from the newer heart of the city.

Thus, Ottawa had changed considerably within the framework of its site and early planning considerations, but many elements of its

previous history could be seen in the city of 1878 despite the radical changes brought about by the changes in status and the rapid growth of population.

9.4 Ottawa's Form; Concentric, Sectoral or Multi-Nucleated?

Since Ottawa was not built on a flat homogeneous plane, nobody could expect its form to be one of concentric rings. Burgess himself made allowances for considerations of site since Chicago itself fronts onto water, in the form of Lake Michigan rather than a river, and Ottawa was built with rivers on two sides and on land ranging from high, solid and dry, to wet, low and swampy. Despite all of these considerations of site, some elements of a concentric form may be detected. When looking at the plotted land values (Figure 4.4) it can be seen that they were highest in the geographical centre of the city, being surrounded by arcs of medium and low values. Of all the maps, this one perhaps gives the best indication of a concentric pattern, although elements of a concentric pattern can be detected from other maps. Since brick and stone were strongly associated with high land values, the distribution of these materials also shows something of a concentric pattern. This is also true for three-storey buildings, though lower buildings were ubiquitous and taller ones were scattered. If the barrier effect of the Ottawa River is considered, then elements of a concentric pattern may be detected on Figures 9.1 and 9.2, with an arc of residential land encompassing three sides of the C.B.D. These two maps do suggest a form other than concentric though.

The generalized land-use pattern, Figure 9.2, may indicate that

transport routes had led to the development of sectors within the city. Not only may transport routes have been responsible for this, but also the considerations of site. It was factors of site that led to the establishing of the two main industrial areas. The C.B.D. of 1878 was equidistant from these industrial areas but close to a third area of some industrial/warehousing importance. On Figure 9.2 the effect of the routeway, notably the horse tramway, between the core and the industrial areas can be seen; the main transitional areas lie along these transport routes.

The residential areas can also be seen to represent sectors, the two main ones being that of Upper Town and that of Lower Town. Other smaller areas existed, the southern-most being associated with the road and canal routes to the south, and the canal bank industry. Of the two main upper class residential areas, one is separated from the rest of the Upper Town residential area by the commercial development along Wellington Street, and the other, Sandy Hill, is seen within the Lower Town residential area but partly separated from the lower classes by the commercial development along Rideau Street.

The near-central public land-uses stand out as being sectors, their form and location being due largely to the influence of early planning. The peripheral areas of public land-use, and other small outlying areas, should not really be seen as sectors because of their size and independence of major transportation routes. It is true that the accessibility along Rideau Street may have influenced the location of the Protestant Hospital and the cemeteries, but the location may also have been due to the availability of large, cheaper areas of land at the edge of the built-

up city. With these exceptions, many of the other land-use areas within the city limits, including the under-developed land, may be seen in the form of sectors due to the north-south routes of Sussex Street and the canal, and the east-west routes of Wellington and Rideau Streets.

The only indication of multi-nucleation can be seen in the LeBreton Flats area (Figures 2.1 and 9.2). The area was densely populated, the housing being close to the industry. The area contained some shops and hotels, three blocks having considerable retail importance plus a mixture of other land-uses. This area of shops cannot be classed as a rival of the city core though, and it may also be seen as an extension along the horse tramway of the commercial activity of Wellington Street.

9.5 Conclusions

In 1878 Ottawa had one commercial core in the centre of the city. When a series of variables are used (Figure 5.2) Ottawa is seen to have exhibited a single core. Yet it might be argued that this result has been obtained by creating a composite picture of C.B.D. usages and that analysis of particular elements might well point to the existence of more than one core. That this was not so can be seen in examination of the final figure, Figure 9.3, where the highest frequency of particular variables (banks, financial institutions, offices, stores, hotels and restaurants) is recorded. The results clearly point to Upper Town as the core area within the C.B.D. as defined. Lower Town in 1878 remained an area with high percentages of stores and restaurants but with few of the other functions. It may well have remained a focal point for a different clientele and way of life from that of Upper Town. Whether or not this was so lies beyond the topic of this thesis. From

TOP THREE CATEGORIES OF EACH VARIABLE

- Highest percentages of Stores
- Highest percentages of Offices
- Highest percentages of Banks and Financial Institutions
- Highest percentages of Hotels and Restaurants
- Offices + Banks and Financial Institutions
- Offices + Banks + Stores
- Offices + Stores
- Banks + Hotels and Restaurants

Border of C.B.D. core.

C.B.D. Transition zone.

Fig. 9.3

a structural viewpoint there was one core centred largely upon Upper Town. In 1878 distinct housing areas had developed, some of which had retained their character for 50 years. The form of the city was still influenced by its history, although great changes had occurred since the canal building and pre-Confederation phases. Considerations of site had also shaped the city, and of great importance were the transportation routes. Linear development along the horse tramway was very marked. Areas away from the main thoroughfares were often in residential use, the poorest people being on the lowest and least accessible land. Because of the importance of the transport routes the city had a form exhibiting elements of sectoral development¹, at the same time having some elements of a concentric pattern. Bi-nodal in its early years, the settlement had developed to the stage of having one high-value core area. Around this central core the other land-use areas were distributed in an orderly fashion.

REFERENCES

1. For the shape of the C.B.D., its geometric pattern, and for discussion of outward expansion along transport axes in the form suggested by R. Hurd and H. Hoyt, see Hartman, G.W., "The Central Business District - A Study in Urban Geography", Economic Geography, Vol. 26, (1950), pages 237-244.

CHAPTER 10

SUMMARY CONCLUSIONS

The express aims of this thesis, set out in Chapter One, have been achieved. It was possible to reconstruct the city of Ottawa as it existed in 1878 from the primary source materials, so that patterns of land-use, building characteristics and the associated values could be seen. Definite patterns did exist, certain of them helping to identify the single C.B.D. of 15 blocks. This commercial core was differentiated from the rest of the city in terms of value, building materials and height, as well as by land-use. Since the C.B.D. area stood out in terms of height, this confirmed the initial assumption that, even in 1878, C.B.D. land-uses would be associated with a cluster of tall buildings. Obviously not as tall as the buildings of today, there was a strong relationship between the central tall buildings and the C.B.D. of 1878.

The overall pattern of land-uses, discussed in Chapter Nine, contained elements of the main theories of urban form. The distribution of land-values especially showed a similarity to the Burgess model, but perhaps more striking was the influence of transportation routes. Thus the form of the city in 1878 showed elements of a sectoral pattern, considerable linear development being seen along the North-South and East-West routeways. Even the areas between these routeways may be seen as distinct sectors. Yet the patterns are not perfect. Perhaps as Doucet

recognised in his study of Hamilton, Ottawa had, like Hamilton, not yet reached an adequate size for such patterns to be better identified. It is of course possible that such models are not appropriate to the Canadian experience. However, until these models are replaced by less universal and more genuinely Canadian models they would seem to serve well. Subsequent study of Ottawa at a later time will help clarify the usefulness of these concepts.

The presence of stores and of high-density housing on the LeBreton Flats may suggest some form of multi-nuclear development but this is unlikely. If this is, in fact, to be seen as a separate nucleus, it was undoubtedly subordinate to the C.B.D. as the map of land-values would seem to suggest. It may be better to see the LeBreton Flats area as an extension of the Wellington Street transport route with a considerable linear development of commercial/retail activity between two major areas of employment (i.e., the C.B.D. and the Cahudière Falls industrial area). Although the settlement had at least two distinct nuclei in its earliest days, by 1878, using the block as the level of analysis, a single C.B.D. was recognised. It is of course that had the level of analysis been conducted at a different scale that more than one node might have identified with it. The overall morphology, while having elements of Burgess's model, most closely resembled the sectoral pattern of Hoyt in 1878.

In many ways the city of 1878, though small and compact, resembled the modern city in embryonic form. The modern city has a much taller C.B.D. with much more vertical zonation of land-uses, and the border of today's built-up city is far less distinct; but modern Ottawa clearly developed from the city of 100 years ago. Government action has greatly increased the administrative role of the city, at the expense of industry,

and the advent of mass public transport has led to further linear development and distant suburbs. There has been little change though in the status of Sparks Street and many, if not all, of the 15 C.B.D. blocks of 1878 would still be classed as being core blocks today.

Sandy Hill has changed somewhat in status, while remaining in residential use, but the Lower Town area still retains many of its characteristics. Thus a reconstruction of the former land-use pattern of Ottawa gives insight, not only into the history of this and other cities, but also into the stage of development.

With respect to development, in the period before 1878 Ottawa was bi-nodal, in 1878 it more closely resembled the western model of the C.B.D. focussed city; in 1977 it has again changed in the direction of multiple nucleation. This would appear to give some support to the notion of form and stage of development as interdependent and of cities lying along a continuum. Here again only time and subsequent research in this and other cities will tell.

Drawbacks became obvious during the research and analysis. The level of analysis, being the city block, may have been too large, but division of all the blocks, or some of the blocks, could also have presented problems. Using whole blocks as the unit of analysis meant dealing with 462 units, while subdivision would have resulted in many more. Considerable problems would also have resulted from deciding which blocks to divide and how to divide them.

The study only looks at land-use and residential land-use irrespective of tenancy or ownership. Although this distinction may be more in the field of the social history or characteristics, it may also have

helped to differentiate better between residential areas.

In any study of a city there is always the problem of overwhelming data and with this the associated problems of data aggregation. Despite drawbacks, it was felt that aggregating to the level of the city block, and expressing each variable in terms of percentages of the block and of the occupied position of the block was most useful. It may be suggested that actual numbers of structures or a uniform grid pattern would have been better units of analysis. However, both of these have associated problems; the use of buildings alone would have led to too much variation in the size of unit, while the use of a standard grid would have caused problems associated with the exclusion of roadways and of waterways. Thus, though not perfect, the use of the city block and aggregating to the level of the city block was found to be most useful.

The statistical analysis confirmed the visual analysis of the maps, indicating in many cases that the dependent variables were positively associated with land-value and negatively associated with distance from the P.L.V.I. Its particular use lay in a succinct description of the land-use patterns of the time. Faced with a plethora of data, it provided a confirmation of the generalities obtained visually and permitted the identification of residual areas which reflected the operation of particular events in history or particular site conditions.

Despite certain drawbacks associated with the gathering of the data, the unit of analysis and the problems of aggregation, the study does provide an accurate picture of the city as it once existed, giving insights into its form and functions, and achieving the aims as originally set out.

[illegible]

MIXED BUILDING MATERIALS (BRICK PLUS STONE/CONCRETE) AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL				
MIN.	.00	5.40	10.80	16.20
MAX.	5.40	10.80	16.20	21.60
PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL				
20.00	20.00	20.00	20.00	20.00
FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL				
1	2	3	4	5
SYMBOLS	.....	.....	.....	.....
FREQ.	455	4	2	0
				1

VENEERED BUILDINGS AS PERCENTAGE OF BLOCK AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	9.80	19.60	29.40	39.20
MAX.	9.80	19.60	29.40	39.20	49.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS

FREQ.	448	13	0	0	1
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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

MIN.	.00	7.80	15.60	23.40	31.20			1
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MAX.	7.80	15.60	23.40	31.20	39.00	46.80	54.60	62.40	70.20	78.00	85.80	93.60	101.40	109.20	117.00	124.80	132.60	140.40	148.20	156.00	163.80	171.60	179.40	187.20	195.00	202.80	210.60	218.40	226.20	234.00	241.80	249.60	257.40	265.20	273.00	280.80	288.60	296.40	304.20	312.00	319.80	327.60	335.40	343.20	351.00	358.80	366.60	374.40	382.20	390.00	397.80	405.60	413.40	421.20	429.00	436.80	444.60	452.40	460.20	468.00	475.80	483.60	491.40	499.20	507.00	514.80	522.60	530.40	538.20	546.00	553.80	561.60	569.40	577.20	585.00	592.80	600.60	608.40	616.20	624.00	631.80	639.60	647.40	655.20	663.00	670.80	678.60	686.40	694.20	702.00	709.80	717.60	725.40	733.20	741.00	748.80	756.60	764.40	772.20	780.00	787.80	795.60	803.40	811.20	819.00	826.80	834.60	842.40	850.20	858.00	865.80	873.60	881.40	889.20	897.00	904.80	912.60	920.40	928.20	936.00	943.80	951.60	959.40	967.20	975.00	982.80	990.60	998.40	1006.20	1014.00	1021.80	1029.60	1037.40	1045.20	1053.00	1060.80	1068.60	1076.40	1084.20	1092.00	1100.00	1108.00	1116.00	1124.00	1132.00	1140.00	1148.00	1156.00	1164.00	1172.00	1180.00	1188.00	1196.00	1204.00	1212.00	1220.00	1228.00	1236.00	1244.00	1252.00	1260.00	1268.00	1276.00	1284.00	1292.00	1300.00	1308.00	1316.00	1324.00	1332.00	1340.00	1348.00	1356.00	1364.00	1372.00	1380.00	1388.00	1396.00	1404.00	1412.00	1420.00	1428.00	1436.00	1444.00	1452.00	1460.00	1468.00	1476.00	1484.00	1492.00	1500.00	1508.00	1516.00	1524.00	1532.00	1540.00	1548.00	1556.00	1564.00	1572.00	1580.00	1588.00	1596.00	1604.00	1612.00	1620.00	1628.00	1636.00	1644.00	1652.00	1660.00	1668.00	1676.00	1684.00	1692.00	1700.00	1708.00	1716.00	1724.00	1732.00	1740.00	1748.00	1756.00	1764.00	1772.00	1780.00	1788.00	1796.00	1804.00	1812.00	1820.00	1828.00	1836.00	1844.00	1852.00	1860.00	1868.00	1876.00	1884.00	1892.00	1900.00	1908.00	1916.00	1924.00	1932.00	1940.00	1948.00	1956.00	1964.00	1972.00	1980.00	1988.00	1996.00	2000.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

[illegible]

VENEERED BUILDINGS AS PERCENTAGE OF BUILDING AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	16.40	32.80	49.20	65.60
MAX.	16.40	32.80	49.20	65.60	82.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	392	53	13	3	1

FLOOR 2 STORES AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

1	2	3	4	5
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SYMBOLS					
					

FREQ.	457	3	1	0	1
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FLOOR 2 OFFICES AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	8.60	17.20	25.80	34.40
MAX.	8.60	17.20	25.80	34.40	43.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS				XXXXXXX	
FREQ.	453	4	3	1	1

FLOOR 2 BANKS AND FINANCIAL INSTITUTIONS AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	3.00	6.00	9.00	12.00
MAX.	3.00	6.00	9.00	12.00	15.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ	458	1	2	0	1

FLOOR 2 HOTELS OR RESTAURANTS AS PERCENTAGE OF FLOOR 2 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	12.60	25.20	37.80	50.40
MAX.	12.60	25.20	37.80	50.40	63.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	449	12	0	0	1

FLOOR 3 STORES AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	13.80	27.60	41.40	55.20
MAX.	13.80	27.60	41.40	55.20	69.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	460	0	0	1	1

FLOOR 3 OFFICES AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	20.00	40.00	60.00	80.00
MAX.	20.00	40.00	60.00	80.00	100.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS			////////	XXXXXXXX	XXXXXXXX
FREQ.	458	3	0	0	1

FLOOR 3 BANKS AND FINANCIAL INSTITUTIONS AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	3.40	6.80	10.20	13.60
MAX.	3.40	6.80	10.20	13.60	17.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	458	1	0	2	1

FLOOR 3 HOTELS AND RESTAURANTS AS PERCENTAGE OF FLOOR 3 AREA

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	.00	13.00	26.00	39.00	52.00
MAX.	13.00	26.00	39.00	52.00	65.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

	20.00	20.00	20.00	20.00	20.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

	1	2	3	4	5
SYMBOLS					
FREQ.	443	9	5	4	1

BLOCKS CONTAINING LUMBER STACKS PLUS INDUSTRY

ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

MIN.	1.00	1.50
MAX.	1.50	2.00

PERCENTAGE OF TOTAL ABSOLUTE VALUE RANGE APPLYING TO EACH LEVEL

50.00	50.00
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FREQUENCY DISTRIBUTION OF DATA POINT VALUES IN EACH LEVEL

LEVEL	1	2
SYMBOLS		
FREQ.	438	24

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