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The evolution of the spatial pattern of white residential development and the housing market in Johannesburg

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Ortlepp's *New Map* dated February 1899. In 1905 it was bought by Schlesinger's African Realty Trust subsequently associated with the Killarney Film Studios, which owned a property on the estate. The general residential development at Killarney has many features in common with similar developments of high density at Illovo. The former was closely associated with the Killarney Golf Course and the Transvaal Automobile Club, both large park-like properties with extensive recreational facilities. The Illovo development was near the New Wanderers, a similar prestigious club with even more spacious grounds and also with a golf course. Consequently the people living in these two areas gained much from the clubs there. Whether or not the prices of the single family houses near these clubs reflect their location will be examined shortly. This type of development grew mainly in response to the post-war housing shortage.

Another factor which influenced post-war residential development and the residential property market in Johannesburg was the elimination of the trams and their replacement with electrically-driven and diesel-powered buses. They were more flexible, less noisy and cheaper to operate. They also made the distant townships more accessible to the commercial district of the city contributing to their increasing popularity and indirectly to the down-grading of the inner suburbs. In this regard the decay and general deterioration of the older inner suburbs bears special attention. To both east and west of the Central Business District where the land drops to shallow valleys (on the west, the Fordsburg Dip, and on the east the Natal Spruit) the general condition of the houses began to decline after the Second World War. Doornfontein, Bertrams, Jeppestown and Troyeville all showed signs of blight, although the signs were not substantial. A good indication of this economic and functional deterioration and especially the obsolescence

in architectural style was the declining municipal land values (Fig.6.8). The non-White areas of Vrededorp and Pageview, and further on, Mayfair, Brixton and Crosby were similarly afflicted.

In the northern sector, the opposite was true. Growth and expansion, changes of land-use and increases in density indicated the demand for land there. This spectacular residential development brought the Council's attention back to the question of access to the Central Business District across the railway reserve. The Wanderers Ground had been closed and excavation was proceeding on the site for the new railway station. In the centre of the city alarm was once again expressed at the effects of congestion upon the normal operation of the commercial and financial institutions there. Another factor was the increasing reliance upon the automobile which had brought about this state of affairs. It was also a concomitant of a more dispersed settlement pattern. So the Council decided to improve the linkage between the Central Business District and the Northern Suburbs and this decision inevitably affected the price of houses in the sector (Fig. 6.8). A committee was formed, known as 'The Committee re. Improved Access to the North', and a report was submitted by Major-General Szlumper, the Director-General of Transportation at the British Ministry of Supply. He recommended the lowering of the railway lines through the station to facilitate road access between the north and the Central Business District on the south. The scheme was agreed to and the Council contributed £200,000 towards its cost and £400,000 towards the cost of bridging the gap. They also agreed to covering the lines completely between King George and Twist Streets at a cost of £250,000. Although these measures were completed only a decade later one must note the implications.

In the past the railway reserve had isolated the Central Business District from its prime residential hinterland. When the lines were lowered and the gap was bridged the Central Business District merged imperceptably with the land to the north. So it expanded into Braamfontein, Joubert Park, Wanderers View, Hillbrow and Argyle and put to an end the disequilibrium which was evident in this part of the system. Ultimately it led to the complete transformation of Braamfontein from a residential suburb to a general business and a general residential area, with rather special functions. While these moves affected the north advantageously, the same militated against the other sectors of Johannesburg. Once again the high-status sector grew at the expense of those sectors of poorer quality.

Technological innovations were also important after the Second World War. Until 1938 the Council persistently refused all applications for water supply to properties outside the Municipal area. The reason for this was that a large number of townships within the municipal area still remained to be reticulated, and in fact it was only in February, 1936, that the old policy adopted in 1906, of extending mains only by special assessment was abandoned in favour of financing future reticulations from borrowing powers. By 1938, the programme of internal reticulation was almost complete, and the Council was in a position to give consideration to applications from owners of properties outside its area. Another reason was the prevailing view that the Council's powers to supply water under the Local Government Ordinance were restricted to the premises *inside* the Municipal area but, upon reconsideration it was found that there was nothing to prevent the Council supplying water in bulk *outside* the Municipal area, provided the consumer arranged for pipe-laying from the Municipal boundary at no expense to the Council (Council Minutes, 1948). Accordingly in 1938, the Council

agreed to supply water to consumers outside the Municipal area, provided that the supply was metered at the Council's boundary. The tariff was 10 per cent above that obtaining within the Municipality. In 1946 this resolution was amended to apply only to those townships adjoining the Municipal boundary. The amendment was introduced following the rapid development of extra-municipal townships. The Council could not continue supplying properties outside its boundaries without seriously endangering supplies to its own consumers as the trunk mains were designed only to give adequate supply to consumers *within* the Municipal area (Council Minutes, 1948).

The effects of these innovations were important in influencing the *spread* of settlement since water reticulation was a primary consideration in township development. In Johannesburg, since its inception, the supply of water has continually presented problems for developers. Consequently, the Rand Water Board's view that the supply could be attached to those of new peripheral townships, meant that the primary axis of settlement to the north, could proceed unhindered. These developments at the periphery were accompanied by changes near the city.

At the inner end the higher density of population in Hillbrow, Wanderers View, Argyle, eastern Braamfontein and Joubert Park necessitated enlarging and re-designing all the sewers in the area (Council Minutes, 1948).

Despite the acute financial and economic stringency of the post-war years, and the request from the Government to curtail spending, proclamation of new townships proceeded at a pace reminiscent of that of the Formative Phase of Johannesburg's development. In 1946 Emmarentia Extension, Illovo Extension and Pirie Park were proclaimed townships. The following year

the number of new townships increased to five, wit the proclamation of Bagleyston, Heriotdale, Moffat View, Northcliff Extension 3 and Roseacre. In 1948 there was a veritable proliferation of townships when Birdhaven, Franklin Roosevelt Park and its extension, Chrisville, Greenside Extension 5, Hawkins Estate, Melrose Extension 1, Pine Park Extension 1, Raumarais Park, Risidale, Robertsham, and the industrial townships of Steeldale and Industria West were all proclaimed. In 1949 there were no fewer than thirty applications for new townships, and the proclamation of nine. These were Elton Hill, Greenside Extension 4, Klipriviersberg, Linksfield North, Moffat View Extension 1, Raedene Estate Extension 1, Rewlatch Extensions 2 and 3, and Waverley Extension 2. At the same time extensive surveys of sites in Mofolo Township, Dube Township, Victory Park Estates Small Holdings and Diepkloof No. 9 were completed. In 1950 a further 38 applications to establish townships in or near the Municipal area were received and five new suburbs entered the market. These were Heriotdale Extension 1, Highlands North Extension 3, Waverley Extension 1, West Turffontein Extension 1 and the industrial township of Electron.

The proliferation of new land for both settlement and manufacturing during the period 1945 to 1950 was in response to two forces, both of which have been described. On the one hand, the demand for housing and residential land in Johannesburg immediately after the war was extremely high because of the expanding population and the restrictions of the war years and, on the other, the new component of manufacturing in the system demanded the allocation of land for factories. At the end of January 1950 all control on building was withdrawn and materials became more readily available.

In a spatial sense the many new townships of the immediate post-war years represent mainly extensions to existing schemes, peripheral growth

and internal in-filling. A number of important thrusts of residential development are worth noting. In the north-east the Sandringham development initiated an axis which has since extended as far as Modderfontein; in the south east the Heidelberg Road led to townships and agglomerations of lower socio-economic groups in these sectors, both with large areas of industrial land nearby; internal in-filling took place with the various extensions to Greenside and Emmarentia, which added substantially to the stock of the north-western quadrant, and at the same time Birdhaven was proclaimed and with it extensions to Melrose and Waverley in the northern sector; on the northern periphery extensive building took place in Craighall Park, Illovo, Bramley, Birnam and the Savoy Estates (Fig. 6.8) although beyond the Municipal boundary the true agricultural uses were still largely dominant.

Residential Development 1950 to 1960

The period from 1950 to 1960 was an interesting one for residential development in Johannesburg. During this phase decisions were taken to embark upon a series of major development programmes which embodied entirely new concepts of urban and social engineering. Two forces were responsible for these developments. On the one hand, the Central Business District was showing further signs of over-crowding, congestion and dis-economies of scale. The first of these appeared immediately after the Second World War. On the other hand, the price of centrally located land began to reach levels at which it became economic to decentralize. Each of these processes is the reciprocal of the other but they are inevitably fellow travellers.

The major developments of this phase were *firstly*, the bridging of

the railway reserve and the completion of the new station at a lower level; *secondly*, the decision to build a Civic Centre at Braamfontein; *thirdly*, the clearance of the slums of the Native Western Areas and the introduction of the 'Site and Service' schemes; *fourthly*, the development of the Reid Traffic and Road Plan, a master scheme of expressways to alleviate Johannesburg's congestion problems; *fifthly*, the construction of the Escom Centre in Braamfontein at a time when the latter was an area of single family dwellings; *sixthly*, the proposal to move the fresh produce market and abattoir from Newtown to an outlying site; *seventhly*, the development of Coloured Townships in the western sector; *eightly*, the proliferation of suburbs beyond the Municipal boundary; and finally an external factor, the importance of the growth of the Orange Free State Goldfields. These developments were largely responsible for the price of houses in Johannesburg and the extent of residential development in different areas, although in most cases the reaction-time was relatively slow and the full impact upon price and quality only became evident in the next decade. As Alonso (1964) notes 'the reaction-time of the urban system tends to be too slow to permit a purely pragmatic approach'. These developments must be viewed against a world-wide shortage of steel and building materials, a general move throughout the world to re-arm in the face of ideological conflicts in both Korea and French Indo-China, a shortage of money and credit (the result of a general economic stringency), and finally the increasing number of people in Johannesburg. Three periods can be identified. The first from 1950 to 195', a three year phase in which the post-war building boom continued, and caused a rapid increase in costs and a shortage of labour and materials. During this period the system was still endeavouring to make up the back-log of housing created by the non-productive war years. The boom failed in

the middle fifties when supplies of White housing approached an equilibrium situat.on,with the demand approximating the supply. During this lull the supplies of material and labour eased, prices of properties softened, although not appreciably, and growth slowed. Towards the end of the fifties however, the tempo increased once more, and the heat only left the economy when a note of doubt and uncertainty was introduced by the events cu' inating in the Sharpeville shootings in March, 1960. This is the background against which to examine the anatomy of Johannesburg and especially that of its residential component.

From 1950 to 1952 the Johannesburg city economy was an expansionary one. In the latter two years there were over 200 blocks of flats constructed, almost 90 blocks of offices, 70 factories, 135 shops, 9 hotels and 50 warehouses (City Engineer, 1953). The number of private dwellings built in the same period is not available but it must clearly have been related to these statistics. New townships developed in 1951 included the industrial estate of Micor on Langlaagte No. 13,and further extensions to Pine Park, Roseacre and Selby. The following year saw the proclamation of Benrose the industrial estate on Doornfontein No. 24, and extensions to City and Suburban, Industria, and Marshalls, all of which were industrial townships. The following residential townships were also proclaimed : Cheltondale, Franklin Roosevelt Park Extension 1, Greymont Extension 1, Melrose North Extension 2, Northcliff Extension 5, and Rewlatch Extension 4. So, land for building houses was made available to all status groups, and especially in the lower categories.

Internal re-organization manifested itself in the move by the Electricity Supply Commission to establish its headquarters to the north of the railways reserve in residential Braamfontein. The siting of this

building, the largest office block in Johannesburg, and the first in Braamfontein (at a cost of £750,000) initiated the process of office decentralization, which has persisted ever since (Fig. 6.9). In the next decade the price of land in Braamfontein attained levels comparable w . those in the Central Business Area. This decentralization inevitably affected the price of residential land in the inner areas. To the east of the City, in Doornfontein, the poorer locational qualities precluded a similar invasion of offices and shops. In this area, in terms of the new zonings of the Town Planning Scheme, houses were displaced by factories, usually of the small-scale type which were non-noxious and closely linked to the large shops of the central complex, so land prices were not as high as in Braamfontein. However they were still high enough to destroy the residential quality. Consequently Doornfontein became the twilight or 'grey' zone in which both social and physical decay were evident. Initially, of course, much of Braamfontein fell into the same category, for the encroaching offices, low-rise flats and small factories (along the railways reserve)which operated upon a neighbourhood of functionally and economically obsolete houses, encouraged socially deleterious influences. Thus, during this period the lower portions of Braamfontein harboured an undesirable element in which vice and crime were partners to poverty. The northern sections in which the University, the Johannesburg College of Education and the Breweries were principal occupiers of land, were able to withstand these influences, and changes from housing to apartments, associated with shops, restaurants and offices, took place in an orderly fashion.

By the end of 1952 the wide-scale private building activity which had continued in Johannesburg since the Second World War showed signs of decreasing (Fig. 5.1). Despite this however, the wages of artisans

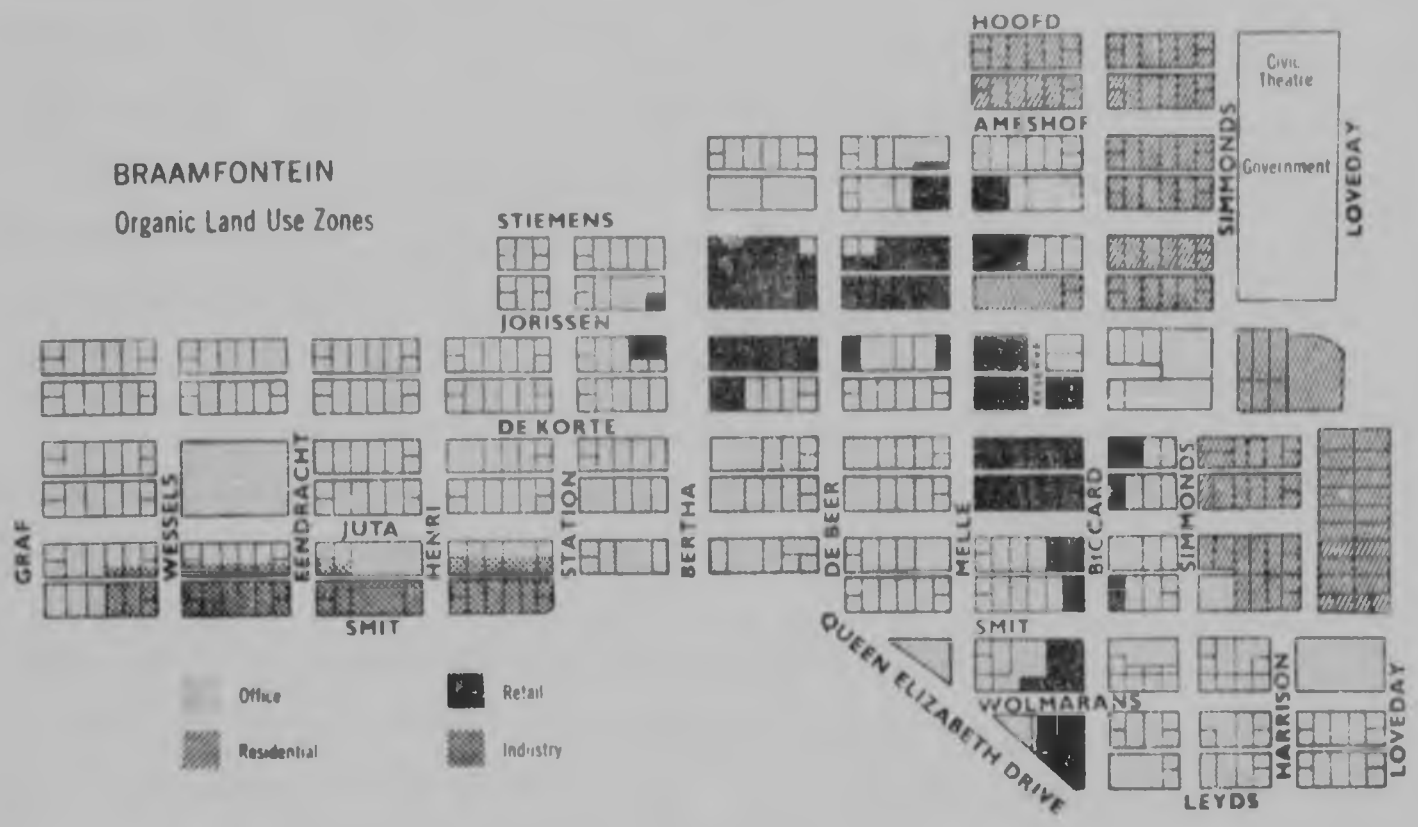


Fig. 6.9 - Braamfontein : Organic Land Use Zones of the Middle-Sixties (Hart, 1969)

increased for the third year in succession by 7 per cent, giving an overall inflation in building costs between 1950 and 1952 of 30 per cent (City Engineer, 1953). This is one reason why the fifties showed overall increases in house prices of such great magnitude (Fig. 4.2).

In 1953 the recessive tendency in the economy took effect and as the supply of labour and materials improved, the clearance of the Native Western Areas began. The objective, conceived with the central government planners, was to remove non-Whites from the slums of Sophiatown, Martindale and the Western Native Township to Meadowlands, Orlando East and

Diepkloof. In view of the tremendous back-log in non-White housing the 'site and service' scheme was introduced. This was regarded as the first stage in a process directed towards full housing. The progress of the schemes in large measure influenced the extent of the government grants. The local authority provided rudimentary services and sites on which temporary shacks, could be erected pending the construction of permanent dwellings. The services consisted of a minimum water reticulation, with stand pipes in the roads at intervals from which the residents could draw their water. Where sewerage was available the reticulation was extended and a permanent water closet was built. Rudimentary roads, sufficient to operate the sanitary services were provided, as also were street lighting along the bus routes (City Engineer, 1955).

The areas vacated by the non-Whites were re-sewered, re-surveyed and incorporated into the stock of housing land for Coloureds and Whites. This resulted in an increase in values in the western sector. A number of factories were built in the industrial estates where entrepreneurs were anxious to tap the latent skills of the Coloured people.

In 1953 the Northern Suburbs of Johannesburg were again strengthened by the choice of a 25 acre site for the new Civic Centre on the Braamfontein ridge. It was perhaps inevitable that a site at the inner edge of the high status sector should be chosen. A Civic Centre is a symbol of a city's status and 'the pride of its citizens'. It is inevitably located on a prominent site which is immune from deleterious influences. *In fact* however, the position was chosen because of the dominance of the site and its relation to the railway station, the Institute of Medical Research, the University, the Normal College, and other public buildings (City Engineer, 1953). The Council's decision to purchase this land was reflected in the comment that

'in a few years time the cost of expropriation in this area will be prohibitive' (City Engineer, 1953). The decentralization of the municipal functions from the City Hall to Braamfontein should be seen as further evidence of the changing land values in the inner regions. Many residents of the mansions of Parktown, still then the premier suburb, were unaware of the insidious advance of functions which in the course of the next decade were to destroy their way of life. It should be emphasised that the initial perpetration of this process stems from the decision to lower the railways and to bridge the gap from the city northwards. This linkage encouraged the process and it shortly manifested itself beyond the Central Business District.

Township development in 1953 added another extension to City and Suburban, thereby increasing the area of industrial land in the eastern sector. Extensions to residential townships occurred in Elton Hill, Melrose North and Saxonwold, and Tulisa Park was also proclaimed. Trojan, an industrial township on Booysen Estate No. 20 and Turffontein No. 19 was proclaimed in mid-1952.

The Expressway System

The next event to affect both the settlement pattern of Johannesburg and the behaviour of those purchasing residential property, was the appointment of a traffic consultant to devise a plan to alleviate congestion. The report of Lloyd B. Reid of Chicago, Illinois, was received in 1956. It largely confirmed proposals which had previously been considered by the Council. It advocated a system of expressways which would skirt the central area and divert through-traffic from it, while at the same time acting as feeders for traffic wishing to enter it. The main recommendations were a north-south expressway 11.5 miles long, from Westgate to join the

Pretoria road, 3.5 miles beyond the municipal boundary; an east-west expressway 7.8 miles long, from the intersection of the Main Reef Road and Treu Road to join the Main Reef Road again at Heriotdale; and finally, a central area perimeter distributor, 1.1 miles in length, from the east-west expressway near End Street, to Saratoga Avenue (Fig. i.2). The cost of these roads was £23.2 million. Other suggestions involved spending £1.8 million on improvements to existing thoroughfares, £600,000 on parking structures and £141,900 on parking meters and traffic control improvements (City Engineer, 1956). Most of the funds allocated to improving existing thoroughfares were to be spent initially on widening Jan Smuts Avenue from Ameshoff Street (Braamfontein) to Oxford Road (Parktown) and subsequently as far as the Zoo (Parkview). Empire Road was also to be widened as far as Richmond, a link road was to be built across the ridge, and through the site of the Fort, and Houghton Drive was to be widened in its passage through The Wilds.

All these developments to ameliorate the traffic problem harboured one underlying grand concept, namely the *perpetuation* of the Central Business District as the *pre-eminent* centre of shopping and finance. It presupposed that for the forseeable future this area would continue to be the main employer of people, necessitating a high degree of accessibility.

On the one hand, in passing through the centre of the high status sector the expressways were to cause substantial amenity destruction. The exact amount of loss incurred will be examined presently. The widening of roads in the inner areas also had a deleterious effect upon residential property prices. On the other hand the former rural-urban fringe to the north, much of which had been surveyed into the townships of Bryanston

and the agricultural holdings of Morningside, Ferndale and Rivonia were placed in a most favourable position. Whereas these areas had previously been regarded as remote, especially in terms of the time taken to reach the centre of Johannesburg, the expressway placed the Central Business District virtually upon their doorstep. Prices and settlement responded accordingly.

New Township Development

As the pace of the economy quickened in the late fifties the number of new townships gazetted increased. In 1955 there were sixteen, of which six were industrial, seven were extensions to existing townships, and three were new. Of the latter, Montgomery Park is of interest since it reflects some significant behavioural responses. The township was bordered by Roosevelt Park on one side, and by the West Park Cemetery on the other. Originally proclaimed as Roosevelt Park Extension 2, the name was changed when the objections of the Roosevelt Park Ratepayers' Association, were upheld. Their objections were due to the fear that the smaller-sized stands in Montgomery Park and the taint of inferior quality would affect the status of their properties.

Between 1956 and 1959 a further sixteen townships were gazetted adding appreciably to the stock of land in all categories of the market. Six of these were for industrial land while extensions to the Southern Suburbs were appreciable (Figs. 6.10 and 6.11). The City Engineer (1959) noted that there was now very little building land left within the Johannesburg Municipality, and that further growth would be confined to the peripheral areas. In all there were 282 townships. The phase of Acceleration came to an abrupt end in March 1960 with the Sharpeville revolt.

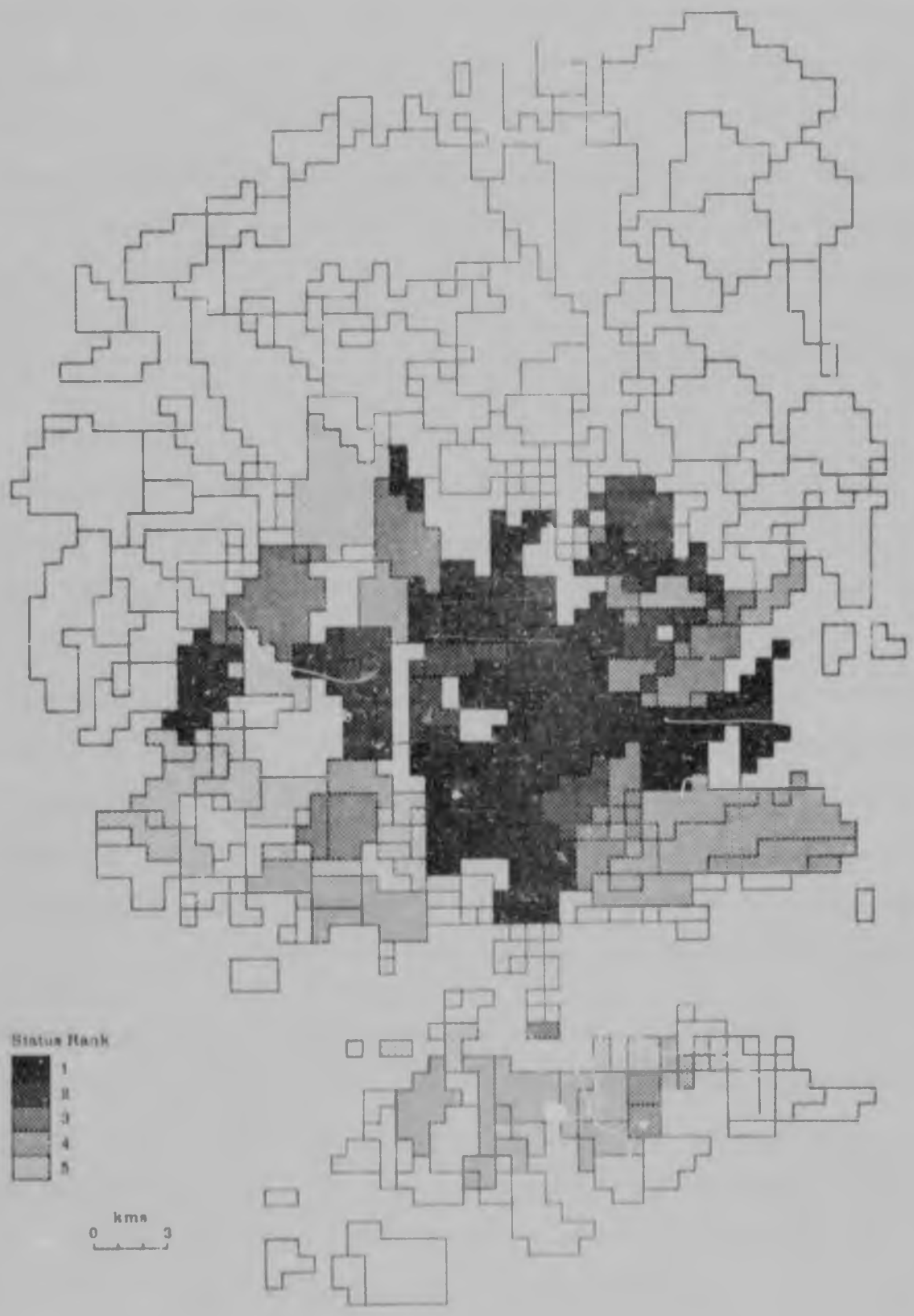


Fig. 6.10 - Johannesburg : Mean Municipal Valuations per Suburb, 1952 (Ranked by Socio-Economic Status)



Fig. 6.11 - Johannesburg : Mean Municipal Valuations, 1958 (Ranked by Socio-Economic Status).

A Synthesis : Determinants of Residenti evelopment, Residential Properly Prices : Their Spatial Manifestation and Linkage to the Underlying Theories and Models

Two aspects of Johannesburg's residential development emerge as the dominant features of the phase of Acceleration from 1932 to 1960. Firstly, the rapid increase in the Municipal and market values of residential land. Secondly, the great spatial development of the residential areas. The determinants of this behaviour can be enumerated as follows :

The Economic Determinants

The first and most important economic determinant was the abandonment, by South Africa, of the Gold Standard in 1932. Prior to this date the national economy was depressed, and residential development and residential land prices in Johannesburg were maintained only by the vigour of the economic base of the town. Following the departure from the Gold Standard the manufacturing component increased rapidly, especially in the field of iron and steel; capital entered the country at an unprecedented rate (much of it destined for the gold mining industry); between 200,000 and 300,000 migrants moved into the towns of the Witwatersrand creating a large market; and changes in fiscal policies (especially insofar as preferential transportation tariffs were concerned) nurtured the Witwatersrand in general, and Johannesburg in particular. These events created an unusual demand for houses and this, in turn, inflated the prices of residential properties. These spatial patterns of growth and of property values are reflected in Fig. 6.12 where one notes the strengthening of the peripheral townships of the Northern Suburbs, the spatial development of the north-western quadrant and the thrust eastwards in the Southern Suburbs. These events reflect the



1904



1913



1922



1928



1934



1940



1946



1952



Fig. 6.12 - Johannesburg : Mean Municipal Valuations per Suburb, 1904 to 1967 (Ranked by Socio-Economic Status) (Municipal Valuation Roll).

views of Weiss (1972) that business cycles strongly influence the behaviour of building cycles. It also reflects the situation which obtained between 1900 and 1930 namely, that the swings in business cycles were more violent than at the present time (1973).

The economic consequences of the Second World War are reflected in the shortages it created, especially in building materials and skilled artisan labour. These shortages were in turn translated into increases in the price of houses and could be noted also in the small number of townships proclaimed during this period. Township

development is closely related to the business cycle. During prosperous times when development capital is readily available, land for residential development is made available in all categories of the housing market, and particularly in the high status areas. The reverse is true during uncertain times and under economically recessive conditions such as existed during the Second World War. Beckmann's (1955) view that stand size is a key variable in the value of real property is confirmed by the township proclamations in Johannesburg between 1932 and 1946. During the prosperous phase following the Great Depression until the outbreak of the Second World War a number of townships were proclaimed in Johannesburg in the localities of high status and with large stand sizes. During the war years no new high status townships were proclaimed. In fact proclamation took place only in low status localities where stand sizes were small and relatively few of these were proclaimed. The economically rooted determinant which most influenced residential development and residential property prices from 1946 to 1960 was once again the business cycle. In the present chapter a number of phases have been identified which individually do not adequately reflect the pattern of development and price increases. Collectively however, they confirm processes which have been identified by both Clarke (1951) and Muth (1961) regarding population densities in cities. Large migrations of Whites and non-Whites increased densities near the centre of Johannesburg changing the character of Hillbrow, Berea, Yeoville, Joubert Park and Braamfontein, on the one hand, and introducing a new generation of peripheral townships (of which Blairgowrie is a good example) on the other. The pattern of municipal land values between 1946 and 1967 is shown in Fig. 6.12. The major thrust of residential development during this period was to the north of the town, in the north-western sector and in the north-eastern sector. Within the

high status sector complexes of apartment buildings developed at Killarney, and to a lesser degree at Rosebank and at Illovo. So spatially Johannesburg's socio-economic structure corresponded very closely to Hoyt's (1939) model. The high rental neighbourhood was located on one side of the city and formed a sector which took the form of a wedge extending from the centre to the periphery. The intermediate rental areas adjoined the high rental area on either side. The low rent areas extended from the centre to the edge of settlement also forming sectors. These socio-economic areas were the outcome of the events and the decisions of earlier phases of development, but in particular, the physical environment, the location of the leaders of society, the disposition of the natural resources, the initial cadastral pattern and the pattern of land ownership and the direction of the earliest road network. So although the spatial pattern of residential development and of residential property prices in Johannesburg was underpinned by economically rooted determinants, these were supported by a wide variety of other factors.

The Social Determinants

Hart's (1973) factorial ecology of Johannesburg presents a model of the socio-economic structure, the structure of family status and the ethnic structure of the city and is based upon statistics which were relevant in 1960. Davies' (1964) study on social distance and the distribution of occupational categories in Johannesburg relies upon similar data. Both studies are particularly applicable to the phase of Acceleration in Johannesburg's development since they yield valuable insights for the city's residential mosaic. Firstly, the socio-economic structure of Johannesburg corresponds closely to the structure of residential property prices. This

confirms Beckmann's (1955) view that residential accommodation and location is a direct function of income. Spatially the pattern of residential property values is increasingly sectoral as is illustrated by Fig. 6.12. As might be expected the sectors show some accordance with the employment sectors shown by Davies' (1964) study.

Insofar as family status is concerned the zonal arrangement postulated initially by Shevky and Bell (1955) and elaborated by the factorial ecologists is absent in the pattern of land values in Johannesburg in 1960. Zones of houses of different ages were reflected by the extent of the decay of different parts of the town. These zones were determined by the combined effects of transportation technology, the physical structure of the urban site and the functional and physical obsolescence of the buildings. The processes of invasion and succession identified by Burgess (1928) operated most noticeably in the eastern sector and contributed to the downward trend in residential property prices which were a feature of the last years of the phase of Acceleration. In keeping with Hoyt's (1929) views the socio-economic pattern whose foundations had been laid in earlier phases was perpetuated with a strong high-status secto to the north of the Central Business District, middle-status communities in sectors on either side of it, low-status communities in the western sector, the Southern Suburbs and in the inner parts of the eastern sector. The leaders of the community and their institutions (social and sporting clubs etc.) continued to play an important rôle in defining the city's socio-economic structure.

In his first paper (1939) Hoyt noted that 'de luxe high rent apartment areas tend to be established near the business centre in old residential areas... When the high-rent single-family home areas have moved far out on the periphery of the city, some wealthy families desire to live

in a colony of luxurious apartments close to the business centre ...' This syndrome was represented by the growth and development of the Killarney apartment area which has been shown by Hart (1973) in his factor analytic study to be an area in which Jewish people preponderate.

The Political Determinants

Weiss (1972, has observed the significance of the oscillations of the business cycle in affecting residential development and residential property prices. Political developments are also significant determinants for their effects upon the general level of economic activity. In this regard the Second World War (already alluded to) and the Sharpeville Revolt were important political events.

Other Determinants

Of the remaining determinants those of a technical nature were particularly impressive in their effects upon housing and house prices. The key determinant of the economic accessibility models (of which Alonso's (1964), Beckmann's (1957) and Nourse's (1968) are representative, is the transportation factor.Alonso observed that transportation is a device to overcome the friction created by space. In Johannesburg during the phase of Acceleration, technological innovations in transportation enabled the residential component of urban land use to spread rapidly in all directions away from the core, and especially northwards. The age of the tramcar gave way to that of electric- and diesel-powered buses and the motor-car eliminated the bicycle as the mode of transport of the household. Consequently people could live further from their work places, a fact which created a new generation of peripheral townships and incidentally contributed to the down-grading of

the older suburbs. Other technological innovations which influenced residential development were the reticulation of water to townships beyond the Municipal boundary and improvements and restructuring of the system of sewage disposal , both important factors in township development.

The influence of legal factors upon urban systems was one of Rodwin's (1950) concerns in his theory of residential growth and structure. In the present study this element became important in 1931 when the first Town Planning Scheme was introduced. This formalised various developments which had emerged through the city growth process, the most significant of which was the metamorphosis of Braamfontein, Wanderers View, Argyle, Hillbrow and Berea. In these areas new zonings permitted changes in land use and increases in both density and bulk. The lowering of the railway lines further encouraged these changes.

At Rosebank, the first sub-regional shopping centre of Johannesburg emerged when major commercial firms from the Central Business District developed branch offices there. This development can be seen as evidence of the city's growing maturity and in many respects accords with the multiple-nuclei model of Harris and Ullman(1945).

Cadastral and historical factors are evident in the great residential development in the north-western quadrant following the death of Lourens Geldenhuys in 1929 and the transition of his farm Emmarentia from agricultural to township land shortly thereafter. In the post-war period many new residential townships developed in this sector and with them a new generation of important roads. This growth is illustrated by Fig. 6.12.

CHAPTER 7 - METROPOLITANISATION : RESIDENTIAL DEVELOPMENT AND THE HOUSING MARKET, 1960 - 1972

By the 1960's the emergence of Johannesburg as a metropolitan area was clear. Settlement had spread well beyond the city's boundaries to produce new nodes of growth while the city centre retained its commercial and financial dominance as the region's core and major employment centre. The construction of a freeway system had been commenced which was not only a response to the increasing metropolitan character of the area but in time was destined to enhance the metropolitan status of the region and to contribute to its greater articulation and integration. Residential growth and the development of the residential property market must be seen both against Johannesburg's metropolitan character and against economic and social events elsewhere in the country. As in previous chapters, therefore, economic trends in South Africa for this phase are briefly traced and then followed by a description of the business and building cycles from 1960 to 1972. The analysis then turns to the economic trends in Johannesburg itself during this period and to the important question of population growth. The first part of the phase, that from 1960 to 1962 is examined separately since recessive conditions adversely affected residential development and the housing market during this period. The second phase, that from 1962 to 1966 was one of economic revival during which a resurgence of building activity and township proclamation was noted. This phase is concluded with a review of social and economic developments in the metropolitan area and an analysis of residential property prices, residential growth and the volume of sales from 1962 to 1966. The final phase is that from 1966 to 1972 which was largely

dominated by cost inflation and a high level of economic activity. The developments during this period are examined as also are residential growth and the housing market. This is concluded with a general synthesis of residential development, the spatial patterns of residential property prices and their linkage to the underlying concepts and models.

National Economic Trends 1960 - 1972

Early in 1960, a confrontation between the South African Police and a group of Africans at Sharpeville, near Vereeniging, resulted in almost 200 of the latter being shot, and a number killed. This incident had a significant effect upon the South African economy. A considerable amount of capital was withdrawn from the country and a climate of hesitancy, uncertainty and pessimism settled upon the community. Outside sources of investment declined, and net emigration exceeded immigration for the first time since the Second World War. The prices of residential properties fell sharply, reversing the pattern which had obtained since the thirties. Elsewhere in Africa, political events did not combine to produce a climate of economic confidence. Revolutions broke out in both Angola and Portuguese East Africa, there were good reasons to believe that the collapse of the Federation of Rhodesia and Nyasaland was imminent and, added to the civil disobedience and the declaration of a state of emergency in South Africa, was its withdrawal from the Commonwealth. Stringent measures were taken to prevent the outflow of further capital, and instructions were given for the repatriation of all funds held in other countries. In May 1961 the bank rate was raised, import controls were intensified, restrictions were imposed upon commercial bank loans for hire-purchase and stock-exchange dealings, and foreign-exchange transactions were reduced (Houghton 1967). Non-residents were permitted to sell securities on the Johannesburg Stock Exchange but were prohibited from repatriating their capital.

The restrictions led to an improvement in the foreign- exchange position, a favourable balance on current account for 1961 of R190 million and, despite a capital outflow of R72 million during the year, a recovery in foreigh-exchange reserve from R153 million in May 1961 to over R316 million in February 1962 - the reserves of gold and foreign-exchange thus exceeded the figure at which they had stood in January 1960 (Houghton, 1960). This recovery is indicative of the inherent strength of the economy and it confounded many African and Communist countries and some in Europe and America who predicted the imminent collapse of White rule in South Africa. The effects upon the building industry were significant when for a brief spell in 1960 the market for houses became a buyers' market (Fig. 7.1, and Appendix B).

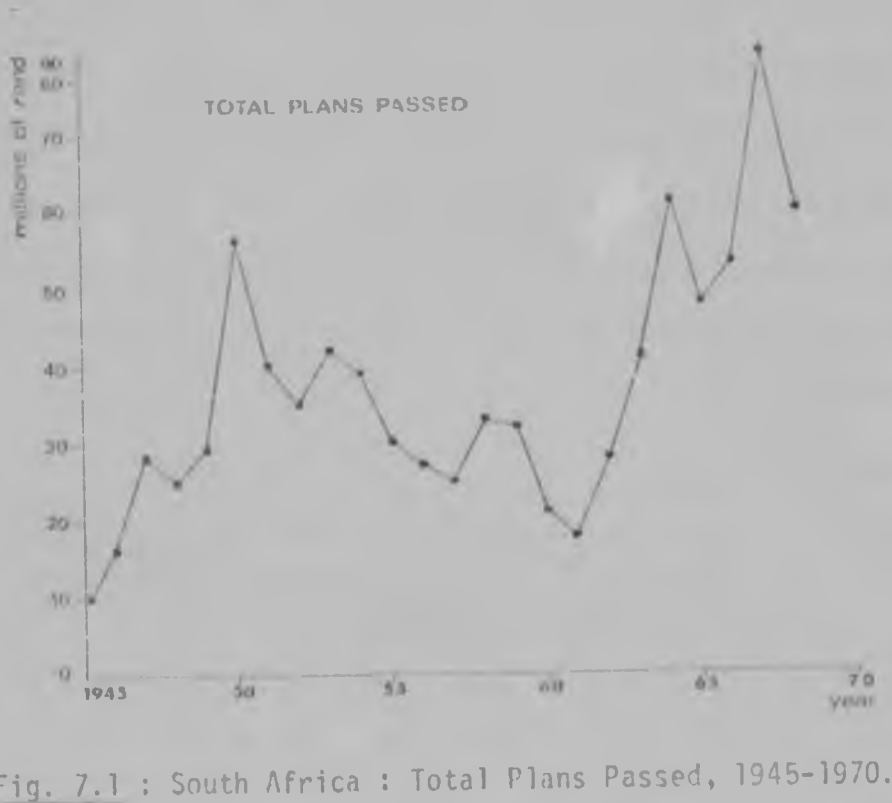


Fig. 7.1 : South Africa : Total Plans Passed, 1945-1970.
(Report, Association of Building Societies of South Africa, 1971)

As a result of the uncertain conditions the government took various

monetary and fiscal measures combined with a policy of industrial expansion, particularly in the State-controlled sector, to stimulate growth. The Bank Rate was reduced from 5 per cent in December 1961 to 3½ per cent a year later and liquidity was increased with a concomitant increase in the rate of spending. Public authorities led the way so that from being in a recession in mid-1961 the economy became expansionary by the end of 1962.

In 1963 the stimulus moved from the public to the private sector where investment began to develop a strong upward momentum. The construction industry which had been relatively dormant for some years found itself with more orders than it could immediately execute (Houghton, 1967). The index of building and constructional activity which stood at about 70 at the beginning of 1962, climbed rapidly through 1963 and 1964 and reached a peak of over 200 in June 1965. Houghton (1967) notes that capital expenditure on building and construction increased from R585 million in 1962 to R674 million in 1963, and R795 million in 1964, an increase of over R200 million in the two-year period. The situation was most satisfactory since this growth was accompanied by little inflation. Interest rates remained low (Fig. 7.2), and the rise in the cost of new construction (Fig. 7.3) did not portend the changes which were imminent.

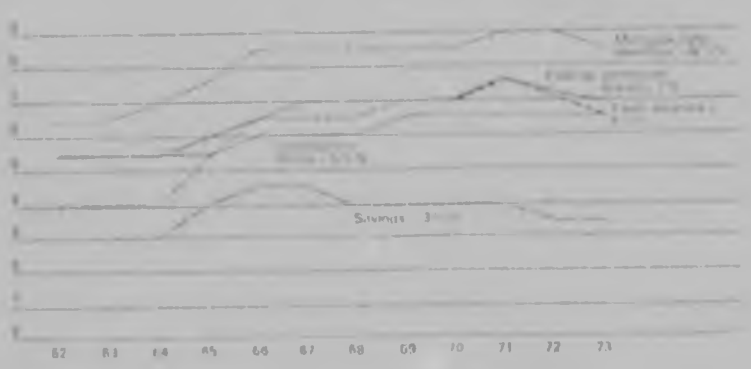


Fig. 7.2 - South African Interest Rates, 1961-1973
(Report, Association of Building Societies of South Africa, 1974)

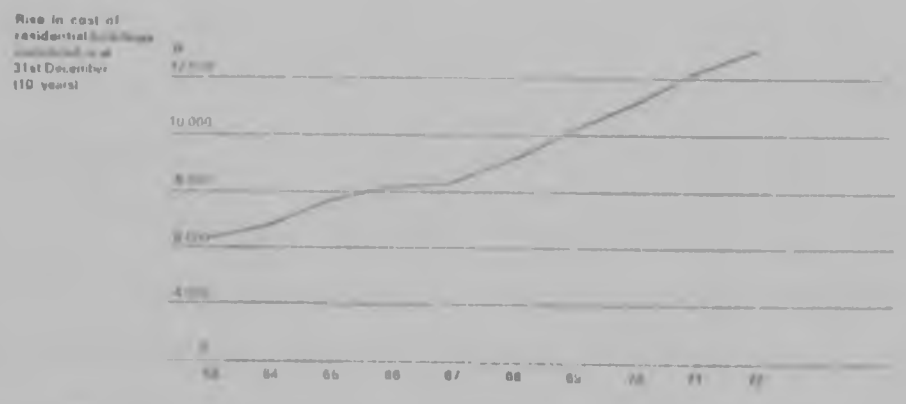


Fig. 7.3 - South Africa : Rise in the Cost of Residential Buildings, 1961-1972.
(Report, Association of Building Societies of South Africa, 1973)

Favourable conditions continued until mid-1965 when bottlenecks began to appear in the economy. Three such shortages are important here. The first was the dearth of skilled labour. In the face of a number of large structures being built especially in Johannesburg, with major road developments and water conservation and irrigation works, and allied to a restrictive labour policy, there were not enough men to do the jobs. Consequently wages began to rise. The second bottleneck was the result of the first, namely a shortage of building materials, especially steel. This further inflated the cost of construction. Finally, shortages in transport equipment caused problems in the movement of goods. Stocks piled up and shortages ensued. All these factors contributed to the inflationary situation. In an attempt to cool the economy the bank rate was increased, but had little effect as more capital came from abroad as entrepreneurs and investors looked with confidence to the remarkable growth of the South African economy. Houghton (1967) maintains that, together with Japan, South Africa probably had the highest growth rate in the world at this time !

During the latter part of 1965 there were signs that the level

of inflation was declining. Import control was tightened in August and this, together with the changes in the domestic economy led to a lower, though still high rate of importation in the last quarter of the year (Houghton, 1970). The levelling off enabled the Reserve Bank to report that 'the latest available evidence confirms that the long cyclical economic upswing in South Africa, which began about the middle of 1961 levelled off about the middle of 1965' (S.A. Reserve Bank, December 1965). During 1966, and continuing between then and 1970, a large inflow of capital countered the deflationary efforts of the authorities and militated against effective monetary curbs. As time progressed the shortage of labour raised salaries to unrealistic levels as the gap between incomes and productivity widened. Much of the excess money went into non-productive channels such as housing and contributed to increased prices. The Reserve Bank commenting upon the situation said :

> During 1969 and more particularly during 1970, the South African economy became overheated as domestic monetary demand exceeded domestic supply by a margin which increased progressively every quarter ... a huge deficit was recorded on the current account of the balance of payments, while increases in prices of goods and services began to accelerate and a number of administered prices were also increased in 1971 ... This imbalance could not, of course be allowed to continue indefinitely and it is, therefore, not surprising that the authorities persistently have been taking steps to curtail most types of domestic spending, while at the same time they have been trying to promote higher production and the creation of additional production capacity. (S.A. Reserve Bank, March 1971).

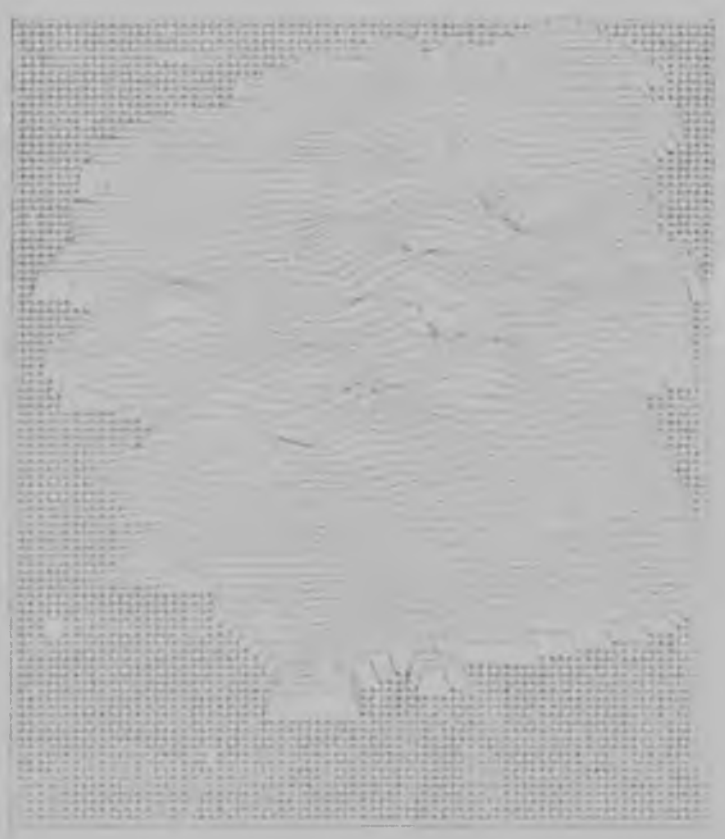
In 1972 the government devalued the Rand by 12.28 per cent thereby raising the official gold price from R25 to R28.50 per fine ounce, and adding to the inflationary tendency. At the same time the mortgage rate climbed to 9 per cent, the highest it had been during the decade (Fig. 7.2).

These events are the principal ones against which residential development and residential property prices in metropolitan Johannesburg

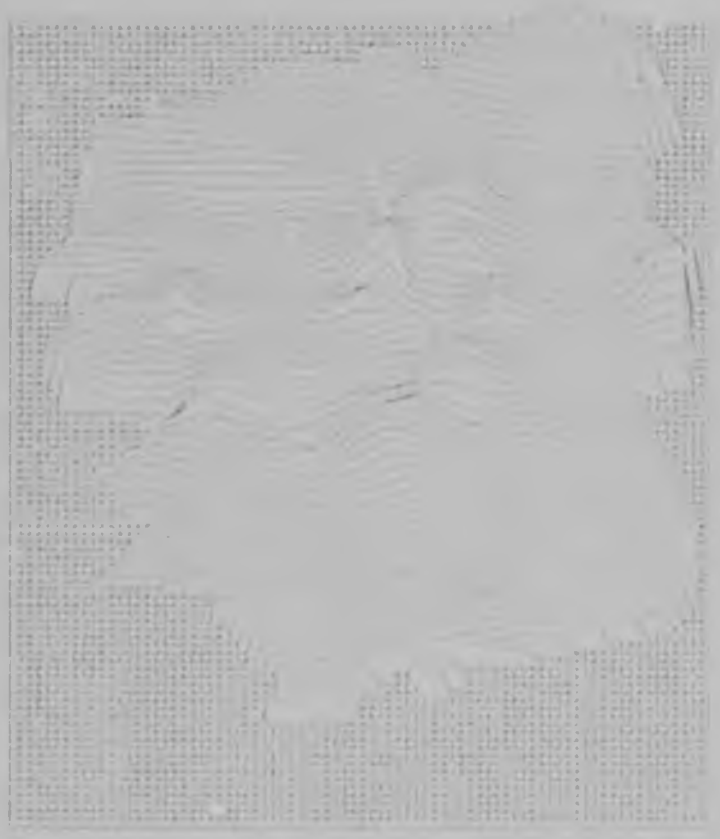
between 1960 and 1972 are viewed. While the market for residential property cannot reflect the year-to-year changes in the economy, there is no doubt that the overall pattern is evident. The concern here is as much for the changes which take place between different zones and socio-economic sectors as for those of an overall nature. The data are shown in two forms : the first is a series of SYMVU three dimensional maps which reflect the January mean sales of houses for each suburb in Greater Johannesburg for the years 1960, 1962, 1964, 1968, 1970 and 1972. These patterns (Fig. 7.4) show the spatial evolution of residential prices during the twelve year period. The second form of data representation is graphical and tabular (Appendix B and C). Here are shown the mean monthly sales by value, the maximum and minimum monthly sales by value and the volume of sales for each month for selected suburbs from 1960 to 1972. From these graphs and tables the rates of growth or decline (Table 7.1) are computed and different sectors and different zones in the city are compared. While it is possible to show the sales data in graphical form for all the suburbs in Greater Johannesburg in 1972, a sample is sufficient to illustrate the principal trends. In this study therefore the performance of a few townships in each category of the market is examined. These townships are chosen from each sector, and in different zones of each sector. As in previous chapters the analysis is temporal and spatial and is couched in terms both of the problems associated with metropolitanisation and the behaviour of typical consumers of residential property.



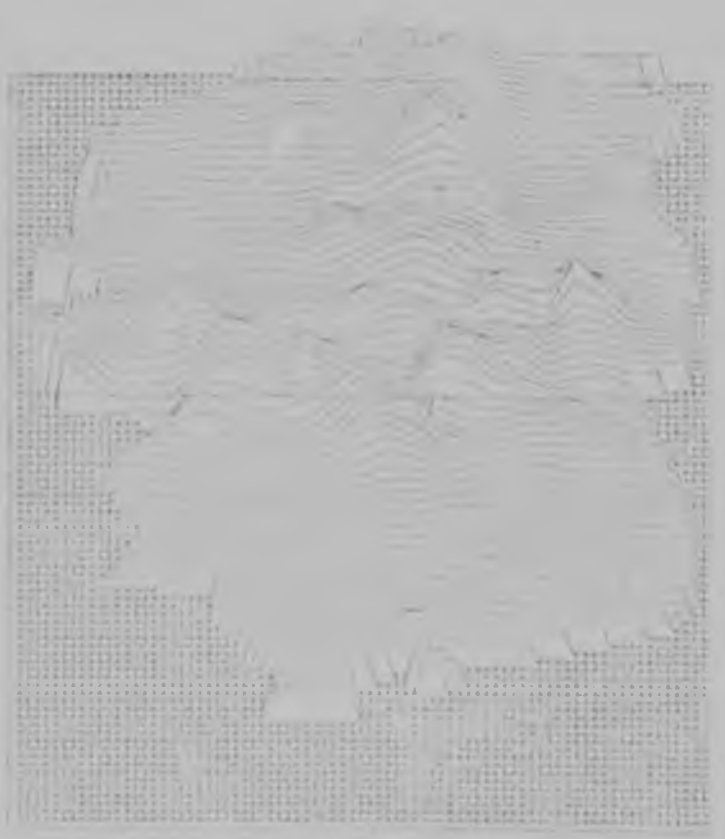
1960



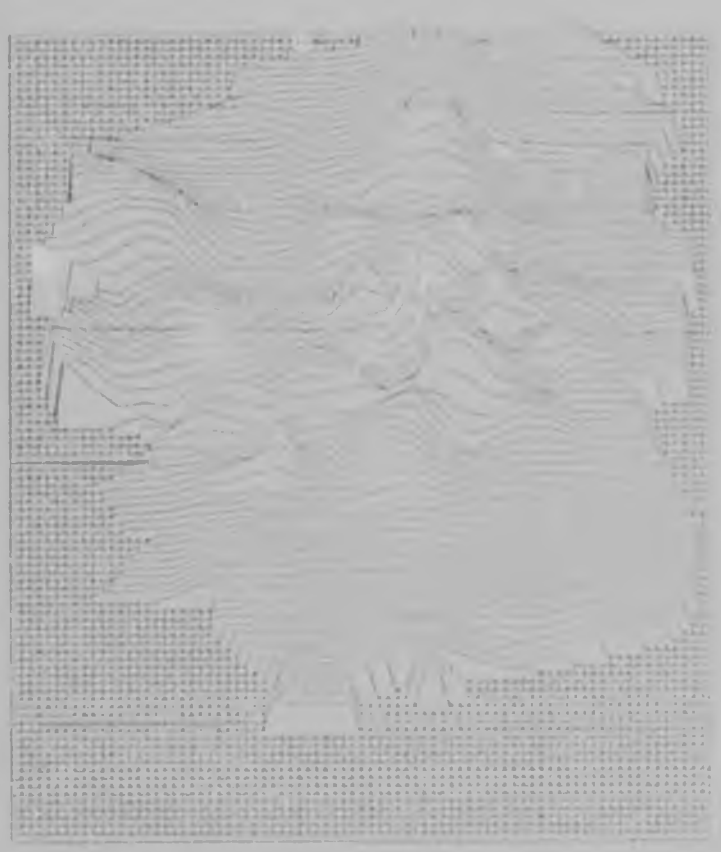
1962



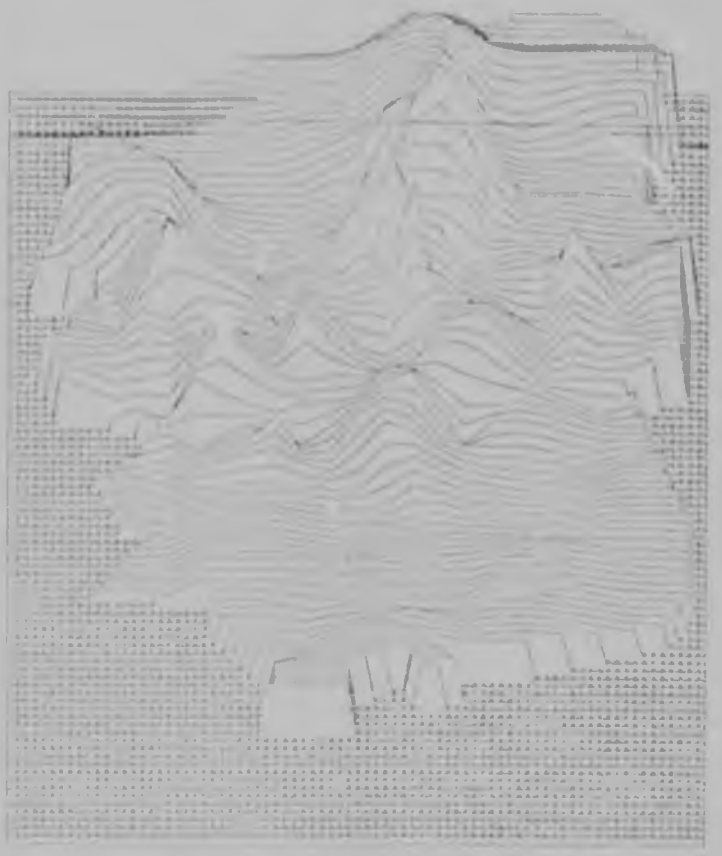
1964



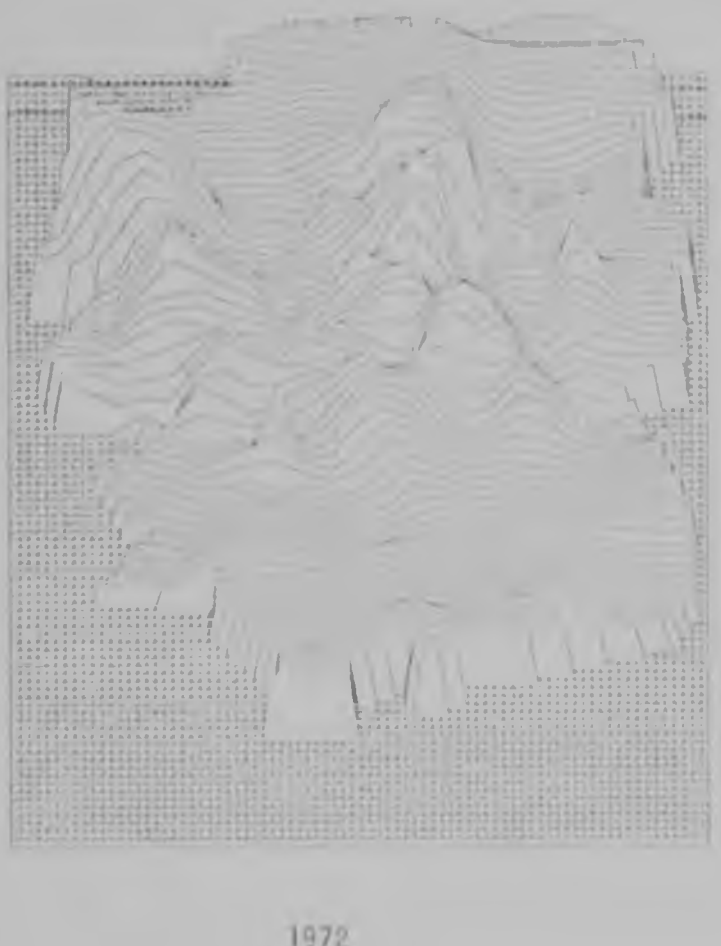
1966



1968



1970



1972

Fig. 7.4 - SYMVU Maps Reflecting January Mean Housing Prices in Metropolitan Johannesburg in Even Years, 1960-1972.

(Viewed from South)

Table 7.1 - Compound Interest Growth Rates in 126 Johannesburg Residential Townships, 1960-1972, based upon mean January property transactions in even years.

	1960-62	1962-66	1966-68	1968-72	1960-66	1966-72	1960-72
NORTH SECTOR							
Sandhurst	-18.1	-3.7	64.8	18.5	-8.8	32.3	9.8
Parkwood	- 9.1	16.0	-5.1	15.6	6.9	8.3	7.6
Parkview	- 1.1	5.5	25.1	14.1	3.2	17.7	10.2
Bryanston	- 4.9	14.6	6.2	15.2	7.7	12.2	9.9
Dunkeld	-17.0	22.4	-10.2	19.7	7.5	8.8	8.1
Parktown	- 6.2	18.0	6.1	12.2	9.3	10.1	9.7
Parkmore	8.0	7.8	11.0	10.9	7.9	11.0	9.4
Parkhurst	-16.8	17.2	5.7	18.1	4.6	13.8	9.1
Saxonwold	0.0	6.2	20.6	15.8	4.1	17.4	10.6
Sandown	31.7	6.7	-5.7	17.0	14.5	8.9	11.6
Inanda	-14.1	6.6	-8.4	23.8	-0.8	11.9	5.4
Oaklands	- 7.6	-2.1	-1.1	40.0	-4.0	24.7	9.4
rest Town	- 1.0	15.5	4.7	14.9	9.7	11.4	10.6
Bramley	0.9	4.4	20.2	12.0	3.2	14.6	8.8
Birdhaven	-14.1	10.1	7.4	18.9	1.3	15.0	7.9
Hurlingham		2.2	20.7	14.3		16.4	
Atholhurst			22.5	6.5		11.6	
Victoria	-18.0	-1.4	85.2	4.7	-7.3	26.6	8.4
Greenside East	- 6.8	4.4	17.2	9.5	0.5	12.0	6.1
Elton Hill	- 5.3	18.4	9.9	1.7	9.9	4.4	7.1
Greenside	4.3	8.7	-5.2	22.6	7.3	12.5	9.9
Greenside X 1	- 3.0	5.5	7.6	16.1	2.6	13.2	7.8
Abbotsford	- 9.4	9.3	3.6	22.7	2.7	15.9	9.1
Rosebank	-18.9	12.8	20.8	12.7	1.0	15.3	7.9
Dunkeld West	- 2.2	13.2	33.1	3.6	7.8	12.7	10.2
Athol	-18.8	16.2	24.3	17.7	3.1	19.9	11.2
Parktown North	- 9.9	12.4	15.1	10.2	4.4	11.8	8.0
Hyde Park	- 8.0	7.5	-2.4	22.1	2.1	13.3	7.6
Blairgowrie	- 7.8	13.3	6.0	13.0	5.8	10.6	8.2
Craighall Park	- 4.4	11.8	11.9	13.9	6.1	13.2	9.6
Houghton Estate	0.0	12.3	24.6	7.5	8.1	12.9	10.5
Waverley	-19.9	12.0	32.3	-3.0	0.2	7.6	3.8
Savoy Estate	- 4.9	7.4	5.4	9.2	3.1	7.9	5.5
Gardens	- 2.1	7.5	6.7	14.9	4.2	12.1	8.1
Orchards	10.1	8.9	20.3	14.4	9.3	16.4	12.8
Athol X 1			0.0	21.9		14.1	

Table 7.1 contd.

	1960-62	1962-66	1966-68	1968-72	1960-66	1966-72	1960-72
SOUTH SECTOR							
The Hill	6.9	1.2	15.5	12.6	3.1	13.5	8.2
Kenilworth	0.0	4.4	1.6	12.7	2.9	8.9	5.9
La Rochelle	-5.1	12.5	-8.7	15.8	6.3	7.0	6.6
Rosettenville	4.4	4.7	2.1	14.3	4.6	10.1	7.3
Regents Park	14.1	12.0	-6.5	10.5	12.7	4.6	8.5
W. Turffontein	2.1	4.7	6.5	19.8	3.8	15.2	9.3
Rewlatch	6.5	6.7	-2.9	16.9	6.6	9.9	8.2
Haddon	113.4	0.8	16.4	12 6	-4.2	13.8	4.5
South Hills	-2.9	10.9	3.9	16.1	6.1	11.9	9.0
Crown Gardens	1.1	6.6	17.1	11.6	4.7	13.4	9.0
Linmeyer	0.0	2.9	6.1	15.3	1.9	12.2	6.9
Mondeor	11.8	5.1	-0.8	19.3	7.3	12.2	9.7
Ridgeway		6 3	3.4	11.2		8.5	
Robertsham	1.4	6.4	11.3	12.1	4.7	11.9	8.2
Turffontein	-7.3	6.3	11.2	23.9	1.6	19.5	10.2
Gillview			3.1	16.8		12.0	
Evans Park			6.9	5.7		6.1	
Turf Club	0.0	7.8	-11.1	5.7	5.1	-0.2	2.4
Hurst Hill	-9.5	18.9	-4.0	7.3	8.6	3.4	5.9
Risidale	18.8	6.2	0.0	12.0	10.2	7.8	9.0
Moffat View	0.8	7.0	1.8	18.2	4.9	12.5	8.6
Reynolds View	-4.1	8.3	-4.7	14.2	4.0	7.5	5.7
Southdale			8.0	13.3		11.5	
NORTH WEST SECTOR							
Fairlands			-3.6	20.8		12.0	
Montgomery Park	-5.4	1 .1	14.9	15.6	5.8	15.3	10.4
Robindale	-11.3	11.4	14.3	14.9	3.3	14.7	8.8
Berario	5.4	6.6	9.2	10.0	6.3	9.7	8.0
Linden	1.1	5.9	9.4	17.8	4.3	15.0	9.5
Victory Park	2.2	17.3	7.0	3.7	12.0	4.8	8.3
Blackheath	0.0	2.6	9.5	15.2	1.8	13.2	7.3
Ferndale	21.9	7.3	13.3	8.5	12.0	10.0	11.0
Franklin Roosevelt Park	3.4	3.1	13.8	11.5	3.2	12.2	7.6

Table 7.1 contd.

	1960-62	1962-66	1966-68	1968-72	1960-66	1966-72	1960-72
WEST SECTOR							
Albertkroon	46.1	-1.6	-5.1	24.6	12.2	13.8	13.0
Westdene	-13.4	2.9	-4.3	33.4	-2.9	19.4	7.7
Albertsville	-13.4	-25.4	7.4	8.8	-21.6	8.3	-7.8
Mayfair West	-19.0	8.3	1.8	19.7	-1.7	13.4	5.6
Triomph			8.2	18.4		14.9	
Bosmont	-34.1	33.7	-44.1	66.6	5.7	15.8	10.6
Melville	-16.7	13.8	7.5	11.5	2.6	10.1	6.3
Newclare	-12.3	33.7	15.9	16.8	16.2	16.5	16.3
Greymont	-12.3	24.5	-29.3	15.7	10.8	-1.8	4.3
Paarls Hoop			-3.2	20.4		17.5	
Richmond	32.3	-6.3	16.3	29.5	5.1	24.9	14.0
Vrededorp	-35.0	13.9	1.6	13.6	-5.5	9.4	1.7
Judith Paarl	-7.8	-6.5	42.0	20.0	-6.9	27.2	8.8
Rossmore	15.3	0.5	39.9	23.3	5.2	28.6	16.3
Newlands	19.7	-1.2	-5.0	25.6	5.3	14.4	9.8
Mayfair	4.3	3.4	6.1	10.5	3.7	9.0	6.3
Crosby	-1.6	7.7	4.8	18.9	4.5	14.0	9.1
Auckland Park	17.1	0.0	17.8	14.1	5.4	15.3	10.3
Brixton	10.6	-1.4	16.0	21.0	2.4	19.3	10.6
Homestead Park	9.5	3.9	4.7	15.4	5.8	11.7	8.7
MOUNTAIN [illegible]							
Mountainview		25.7	-15.1	15.5		4.2	
Northcliff and Extensions	-14.4	8.4	23.0	11.5	0.2	15.2	7.5
Westcliff X	5.7	-0.2	0.8	19.2	1.7	12.7	7.1
Observatory X	-32.6	19.8	-0.3	23.3	-1.1	14.8	6.6
Linksfield and X 1 - X 3	-7.6	28.9	-2.2	3.1	15.4	1.3	8.1
Westcliff	49.5	7.0	13.4	13.0	11.0	13.1	12.1
Senderwood	-26.4	14.1	-1.1	18.9	-1.4	11.8	5.0
Observatory	-11.1	7.9	22.8	19.6	1.1	20.7	10.5

Table 7.1 Contd.

	1960-62	1962-66	1966-68	1968-72	1960-66	1966-72	1960-72
EAST SECTOR							
Fairview	-15.5	11.3	4.3	18.9	1.5	13.8	7.5
Troyeville	-4.8	17.0	-21.5	27.8	9.2	8.6	8.9
Bedfordview	-5.6	3 4	1.?	25.0	0.3	16.5	8.1
Jeppestown	22.5	14.4	3.2	2.6	17.0	2.8	9.7
Bezuidenhout Valley	9.0	-2.5	19.2	14.7	1.2	16.2	8.4
Kensington	5.3	2.1	11.2	12.8	3.1	12.2	7.6
Yeoville	-12.3	5.1	9.9	2.3	-1.0	4.8	1.8
Bellevue Central	-27.5	13.6	2.1	11.3	-2.2	8.1	2.8
Bertrams	-6.7	45.6	-28.5	2.6	25.5	-9.0	6.9
Malvern	-13.2	6.9	-12.5	25.1	-0.3	11.0	5.2
NORTH EAST SECTOR							
Birnam	5.8	8.5	10.7	3.5	7.6	5.8	6.7
Buccleugh	-21.8	21.5	2.1	24.5	4.9	16.5	10.6
Edendale	11.8	1.9	3.5	11.0	5.1	8.5	6.8
Percelia Estate	-16.1	6.6	11.1	17.3	-1.6	15.2	6.5
Bellevue Estate	2.5	1.9	21.9	20.1	2.1	20.7	11.0
Raumarais Park	-7.6	5.6	12.8	11.2	1.1	11.8	6.3
Highlands North X 1	-7.7	6.1	11.5	8.8	1.3	9.7	5.4
Bellevue	-11.6	4.9	6.3	23.8	-0.9	17.7	8.0
Wendywood			17.1	11.7		13.5	
Kew		15.6	18.0	12.6		14.4	
Lyndhurst	1.4	15.8	11.0	13.3	10.8	12.5	11.6
Lombardy East	-3.4	18.1	10.1	11.8	10.4	11.3	10.8
Highlands North	17.2	4.3	15.6	8.2	8.4	10.6	9.5
Cyrildene	-7.6	7.5	-1.8	20.5	2.2	12.0	7.3
Norwood	21.9	8.1	17.8	2.5	12.5	7.4	9.9
Orange Grove	-9.1	7.9	5.2	15.8	1.9	12.1	6.9
Sandringham	-10.2	3.4	22.3	11.9	-1.3	15.3	6.6
Sydenha	1.2	9.2	2.9	26.7	6.5	18.2	12.2
Glenhazel	8.5	7.0	11.9	10.4	7.5	10.9	9.2

Economic Trends in Johannesburg 1960 - 1962

The recession of 1960 was precipitated by uncertainty due to various political events, although prior to this there was evidence that the expansionary phase in the building industry during the late fifties was levelling off. Be that as it may, the decline in construction in 1961 (Tables 7.2 and 7.3) was dramatic. In Johannesburg there were 600 plans passed for private dwellings in 1960/1961 with an estimated value of R4,741,650, while in the following year the number had dropped to 569 with an estimated value of only R4,015,100 (Table 7.3). The fact that the decline was registered only nine months after the precipitating events is a common characteristic of building cycles. Weiss (1972) has noted in this regard that 'building is a cyclical industry which corresponds roughly with the changes in the business cycle and with changes in the growth rate of the Gross Domestic Product. If anything, the swings in building activity are somewhat more pronounced and follow the general up or down-turn with a time lag of from nine to twelve months.' So the pattern was consistent with the behaviour of the residential property market during previous recessions.

Another important factor which influenced the rate of residential development and the price of housing in Johannesburg during the early sixties was the rapid growth of the White population.

Table 7.2 - Johannesburg : Gross Estimates of Costs of Buildings, and Number of Plans Approved 1960/61 - 1970/71

(City Engineer's Reports 1960/61-1970/71)

Year	No. of Plans	Estimated Value
1960/61	5806	R29,864,385
1961/62	4577	22,314 580
1962/63	4394	26,651,432
1963/64	4471	32,384,000
1964/65	4373	65,085,350
1965/66	4456	62,346,570
1966/67	4476	52,087,439
1967/68	5284	64,755,971
1968/69	5160	95,589,837
1969/70	6791	81,556,830
1970/71	6769	107,427,931

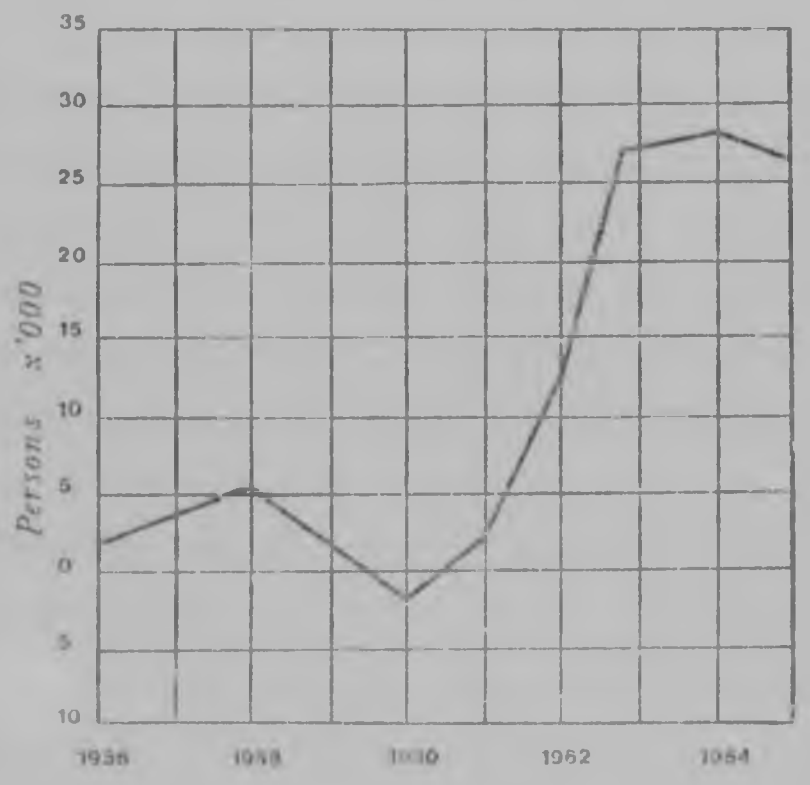
White Population Growth and the Housing Market

Prior to 1960 the policy of the Government had not favoured immigration and there was, in consequence, very little during the inter-censal period (Fig. 7.5). Soon after 1960, however, active recruitment of foreign immigrants began, fares were heavily subsidized and their numbers grew from 30,000 in 1965, to approximately 40,000 in 1955 (City Engineer's Report, 1965). Most of these (judging from the subsequent demand for residential accommodation in Johannesburg and the increase of population in the City) came to the core of the primate centre. At the same time migration from the rural areas of South Africa and from other towns in the country increased, and metropolitan Johannesburg began to grow at a greater rate than did the nation as a whole, or, for that matter, the Transvaal or the Witwatersrand (Table 7.4). This remarkable increase in population was due to the range and variety of employment opportunities offered by Johannesburg which, with the Witwatersrand, now

Table 7.3 - Johannesburg : Estimates of Building Plans Approved in each Category 1961/62 - 1969/70

(City Engineer's Reports 1961/62 - 1969/70)

Year	Private Dwellings		Flats		Other Residential Buildings		Industrial/Commercial Buildings		Other Buildings	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
1959/60	531	4,411,100	109	13,539,600	8	776,000	185	13,034,900	32	3,215,000
1960/61	600	4,741,650	53	5,818,700	5	248,000	139	9,642,600	45	2,892,900
1961/62	569	4,016,100	27	2,335,100	8	416,200	133	5,340,750	51	4,765,100
1962/63	880	5,614,080	35	4,098,200	2	181,600	191	10,255,380	59	3,136,700
1963/64	584	4,663,410	54	7,135,000	3	944,000	256	18,085,920	44	2,907,300
1964/65	810	7,222,405	60	15,204,200	7	1,362,870	231	25,805,555	50	9,689,785
1965/66	799	8,780,378	40	6,828,493	9	2,714,901	180	22,732,001	52	6,578,052
1966/67	574	7,236,933	44	8,979,775	5	1,420,921	149	18,693,048	318	9,317,693
1967/68	644	8,957,697	56	17,025,061	18	2,523,801	102	13,497,684	22	5,991,166
1968/69	568	8,249,652	59	10,229,866	8	3,680,293	71	13,513,473	51	9,718,864
1969/70	632	13,119,050	99	14,845,835	4	4,518,000	141	28,254,627	34	5,133,583



Note : above o figures are net immigrants
below o figures are net emigrants

Fig. 7.5 - South Africa : Net Immigration 1956-1965 (Greater Johannesburg Area Population Report, 1965).

completely dominated the South African urban hierarchy (Davies and Cooke, 1969). Naturally this explosion of people, who were predominantly in the early stages of the life cycle (a common attribute to migrants) (Lee 1970, and Ravenstein 1885) placed a strain upon the stock of residential accommodation,so the City Engineer (1964) noted that from being a buyers' and a renters' market in 1961, when a few thousand flats were empty, the position changed to one of gross under-supply in 1964. Another factor which influenced the population structure was the so-called 'baby-boom' which followed the Second World War. It is common knowledge that a noticeably higher birthrate occurred in most western countries in the middle and late forties. This population explosion manifested itself in the labour market and in the housing market two decades later in

the mid-sixties, and added to the pressures induced by immigration. In a spatial sense the pattern is illustrated by the SYMVU maps representing the market prices for 1960, 1962 and 1964 (Fig. 7.4). There is relatively little visible change during these five years. However, by contrast, commencing in 1966, the great northern thrust of development into Randburg, Bryanston and Rivonia is clearly shown as a prelude to the spread of the contemporary period. This characteristic is evident also in the status rankings of municipal valuations (Fig.7.6). New township development in the Southern Suburbs was also extensive. The Southern Suburbs had been relatively static for a considerable period while the more spectacular developments had occurred to the north of the Central Business District. However the demand for virgin land near the C.B.D. and at a low price resulted in the proclamation of Mondeor, extensions to Robertsham and South Hills, Southdale, Ridgeway, and Crown Gardens. A feature of this development was the rapidity with which these townships were occupied. Whereas the older suburbs of the area had harboured a considerable number of vacant stands until the Second World War, the new Southern Suburbs grew very much more rapidly. This can be explained in terms both of the prevailing economic climate and the new techniques used by real property developers. Upon proclamation most, although not all townships suffer a period (usually a number of years) during which the first few buyers occupy stands. Dwellings are usually separated from each other by open country, so they are relatively isolated from one another. In the course of time a sufficient number of houses are built to encourage others to buy land and construct homes in the locality so the next phase of development is one of intensive construction. The developer is finally left with a residual of stands which are difficult to dispose of easily. This pattern of

Table 7.4 - Growth of the White Population, 1904-1985 (Greater Johannesburg Area Population Report, 1965)

Year	Republic	Transvaal	Witwatersrand	Johannesburg Metropolitan	Jonannesburg Magisterial	Johannesburg Municipal
1904	1,117,234	297,717				
1911	1,276,319	420,570				
1921	1,521,343	544,973	233,194	158,937	155,338	151,955
1936	2,003,334	820,756	406,251	269,358	262,434	256,276
1946	2,372,044	1,063,121	547,836	-	-	-
1951	2,641,689	1,204,712	650,221	365,657	363,567	341,218
1950	3,088,492	1,468,305	766,379	413,15	404,143	368,987
1965	3,407,000	1,617,000	845,000	456,000	446,000	392,520
1970	3,815,000	1,811,000	947,000	511,000	500,000	
1975	4,238,000	2,016,000	1,054,000	570,400		
1980	4,704,000	2,238,000	1,170,000	642,200		
1985	5,203,000	2,476,000	1,294,000	724,400		619,300



Fig. 7.6 - Johannesburg : Mean Municipal Valuations per Suburb, 1967 (Ranked by Socio-Economic Status)

township development is modelled in Fig. 7.7. Here the curve D_SD_S1 represents the number of houses built (D_1-D_4) expressed as a percentage, over a period of years (T_1-T_4). The initial settlement between township proclamation (T_1) and the point in time when there are sufficient houses to actively encourage development (T_2) is the most costly period to the developer. During this phase expenditure exceeds income. Clearly the objective of the entrepreneur is to reduce or eliminate the slack phase between T_1 and T_2.

During the course of the early and mid-sixties house construction companies built a number of speculative homes in the new townships. These were equipped by the soft-furnishing trade, the gardens were landscaped and prepared and the townships were presented to the buying public with an element of maturity in their physical appearance. In this way costs incurred in waiting for the critical *'take-off'* point were eliminated, and the physical aspects of settlement, supported by a rapidly growing population, spread quickly across the new townscape. The procedure described here was followed not only in the Southern Suburbs. It became a feature of residential township development elsewhere and is well illustrated by the graphs of Montgomeor and Blairgowrie (Appendix C) which, although located antipodally to one another, have similar sales histories. In both concept and design they serve the same socio-economic community and differ only insofar as the former has half the stands of the latter, and is located very much closer to the city. This last fact is indicative of the lower status accorded the Southern Suburbs.

By the middle of 1962 most indicators of economic trends in the country showed that the recession which began in 1960 had come to an end. There was a sharp decrease in immigration (Fig. 7.5), a proliferation of new townships, an increase in the number of building plans passed (Fig. 7.1)

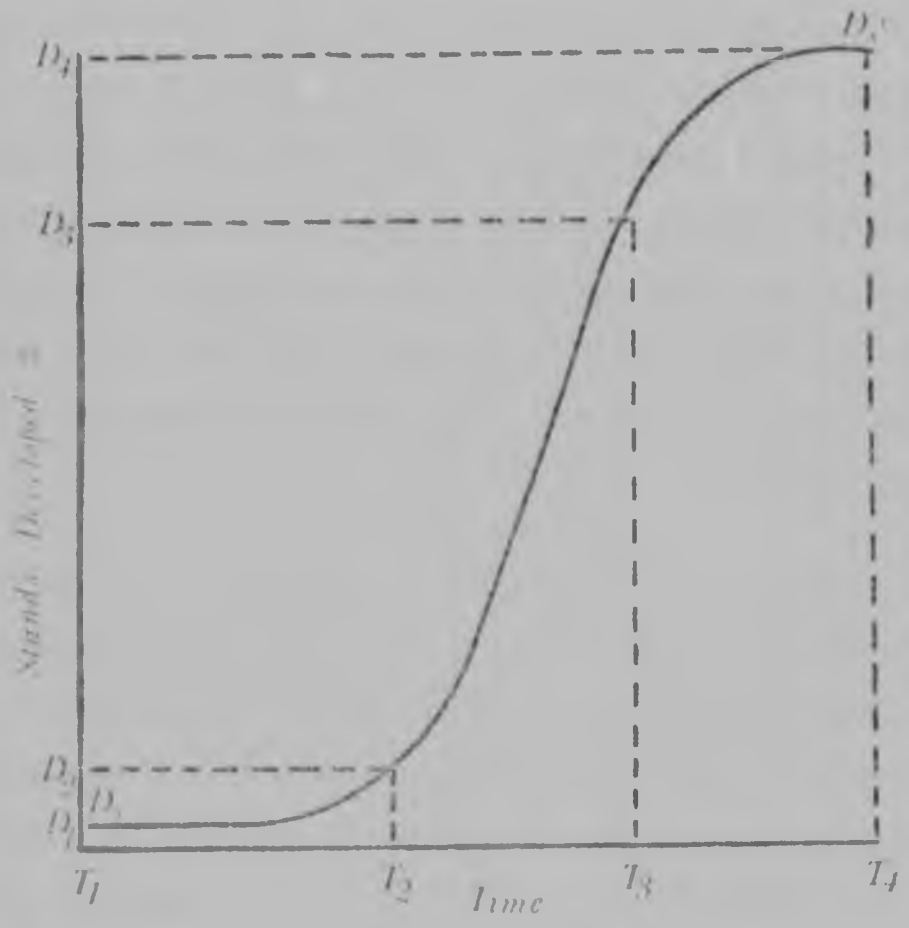


Fig. 7.7 - A Diagrammatic Representation of the Pattern of Suburban Residential Development

and early in 1963, an increase in the mortgage rate (Fig. 7.2). It is appropriate at this stage, therefore, to analyse the residential property prices of Johannesburg for this period.

Analysis of Residential Property Prices 1960-1962

The spatial manifestation of the recession in 1960 is reflected in Table 7.1 in which the [illegible] interest growth rates of 126 suburbs in metropolitan Johannesburg are computed for selected periods. In view of the sectoral pattern which has emerged from the analysis thus far (Fig. 7.8) these statistics are grouped in the sectors in which the townships occur.

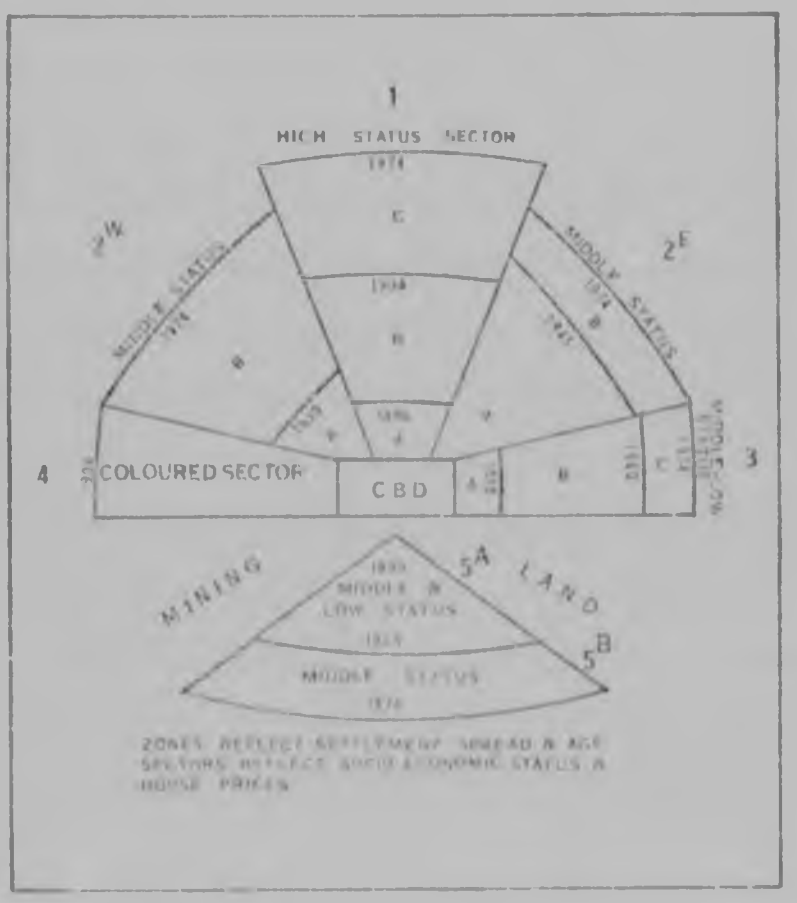


Fig. 7.8 - Johannesburg : Socio-economic status patterns with sectoral and zonal overlays.

The northern sector of high socio-economic status and the prestigious suburbs on the elevated Witwatersrand ridge reflect the uncertainty of the period (1960-1962) more substantially than the lower status townships. Of the 33 townships in the high status category, no less than 26 or 78 per cent showed negative growth ranging from 19.9 per cent in Waverley to 1 per cent in Forest Town. In the Southern Suburbs a low status area, 31 per cent of the townships registered declines in value. Townships in the remaining sectors were distributed between these extremes. It is significant that the high status residential townships near the top of the hierarchy were most severely affected. Sandhurst, Dunkeld, Inanda, Rosebank, Birdhaven and Waverley declined between January

1960 and January 1962 (in terms of the January mean sales) by 18.1 per cent, 17.0 per cent, 14.1 per cent, 18.9 per cent, 14.1 per cent and 19.9 per cent respectively. The high positive growth of Sandown (31.7 per cent) during the same period can be attributed primarily to extensive subdivision of former agricultural holdings in the area which inflated property values. This pattern of the behaviour of high and low status residential property prices which followed the political disturbances of 1960 can be interpreted through a set of demand and supply curves which are illustrated in Fig. 7.9. These can be viewed from either the demand side or the supply side. The steeper slope of the supply curve of high status residential property (SS) reflects the higher prices and the greater range of prices of these properties as opposed to those of low status (S_1S_1).

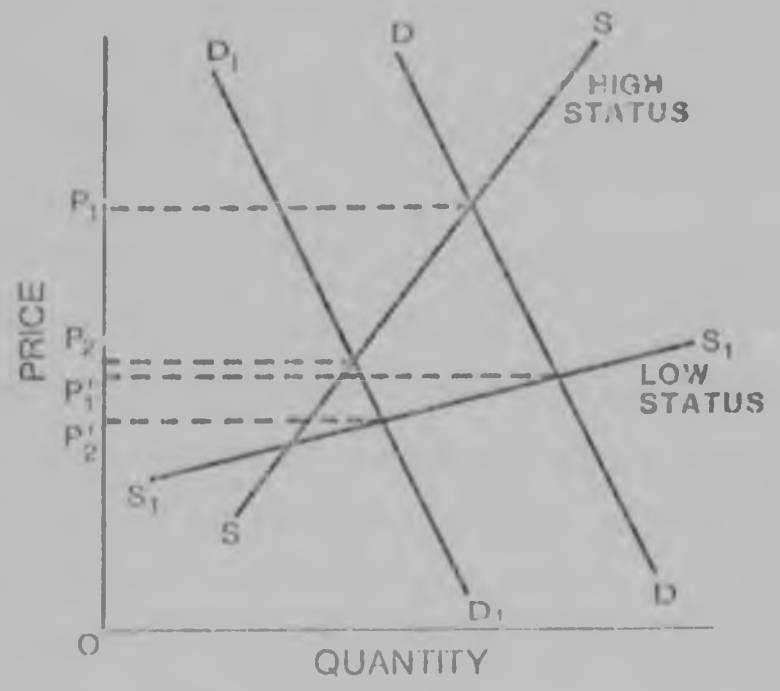


Fig. 7.9 - Price fluctuations in high and low status residential property following a change in demand.

The curve DD reflects a particular demand intensity at which the respective price responses of the two status groups are P_1 and P_1'. A fall in demand (D_1D_1) as happened after the Sharpeville revolt introduced a new price response, P_2 and P_2'. These changes show the relatively greater price elasticity of demand of the more expensive residential properties, a phenomenon which is particularly evident in times of political uncertainty.

The situation can also be interpreted from the supply side. The crisis of confidence engendered after 1960 caused a brief net outflow of people from South Africa (Fig. 7.5) which inevitably increased the number of residential properties on the real estate market. The increased supply had a depressing effect upon prices. This is borne out by the volume of sales, particularly in the high status localities. In Houghton Estate for example with 2105 residential stands, the average monthly sales in 1960 and 1961 was 4 or .2 per cent; in Dunkeld, with 196 residential stands, the average monthly sales wereless than 1 or .32 per cent; a similar situation obtained in Birdhaven where only 5 transactions took place in the two-year period, while in Dunkeld West with 136 residential stands the average monthly sales were .88 or .65 per cent.

The price elasticities of supply of the less expensive residential properties in the high status sector reflect the greater resistance of these properties to the recessive conditions. In Forest Town for example there were 33 residential property transactions between 1960 and 1961, representing 1.38 per month or almost 1 per cent; in Parkview, with 949 residential stands, there were 93 sales (3.88 per month) or almost 1 per cent; and in Parkwood, with 804 residential stands, 63 sales (2.68 per month) were effected representing .33 per cent.

In the residential districts of lower status there is less evidence

of a fall-off in the volume of sales of residential properties, or in the average prices following the Sharpeville revolt. In Mayfair, for example there were 45 transactions in 1960, 37 in 1961 and 47 in 1962; in Melville the corresponding figures were 43, 20 and 32; in La Rochelle, 19, 18 and 15; and in Forest Hill 35, 24 and 30 (Appendix B and C). In each of these townships the sales volume in 1961 was marginally depressed over those of the other two years, a fact which is in keeping with views expressed on the time-lag between the property market and the business cycle.

One explanation of the pattern of residential property prices and of the volume of sales in different localities from 1960 to 1962 can be found in the distribution of incomes in the population. The relatively greater number of participants in the lower categories of the property market imparts to it an element of stability which protects it from wide price fluctuations in the short term. Conversely, the number of individuals in the high income group is relatively small, and their influence on the prices of residential properties is therefore less appreciable. It is this pattern of behaviour which contributes to the elasticity of both supply and demand in high status property.

The recession which began in 1960 came to an end in mid-1962 as capital flowed into South Africa from abroad, and the construction industry responded with a resurgence of activity.

Resurgence of Building Activity

The resurgence of building activity in 1963 was a feature of the improved economic conditions to which reference has been made. In the central city area, 74 plans for buildings in excess of R50,000 were passed

in 1963 while further out a great demand for luxury flats was noted. In all, 4394 plans were approved between June 1962 and June 1963 valued at R26,600,000 or an increase of R4,290,000 over the previous year. A number of large structures were planned for the Central Business District, the most important of which was the Carlton Centre complex in Commissioner Street, new premises for the Star newspaper and tower blocks for the Standard Bank and the Trust Bank. These developments were important indicators of the changed conditions and were associated with a new planning code which relaxed the 59° height line restriction which had previously been in force. By allowing an increase of height the Town Planning Scheme (as amended) required a reduction in the width and depth of structures. Linked to the increased height was a 5 foot (1.5 m) building line restriction on all street frontages, so that pavements could be widened. A bonus of bulk was given as compensation for this loss.

The new developments in the Central Business District of Johannesburg which occurred in the mid-sixties should be seen against the process by which the city further developed its metropolitan character. Most of the structures grew in response to the demand for more office and other commercial space which was the physical manifestation of the city's national financial and commercial function. They were also an indication of the concentration of basic economic functions which were taking advantage of large-scale production, and further developing the sophiticated technical, economic and social infrastructure. Johannesburg's Central Business District represented the core of the 'primate or 'mother city' which has been described by Miles (1970).

The problem of housing the non-White communities was partially solved in 1963 when the Management Committee of the City Council and the

Niemand State Committee[1/] discussed plans for the development of an area solely for the Coloured community. It was appropriate that a part of the Western sector in which were the townships of Coronationville, Western Township, Newclare and Bosmont, was chosen. The proposals provided for a business and civic centre for the cultural, shopping and social needs of the community. This complex, together with the new township of Riverlea was designed to concentrate the Coloured people into areas where facilities could be provided to develop them into a more closely-knit community. In view of the shortage of land in the sector two and three storey flats were introduced. This plan represented the first formal attempt to create an ethnic area within the city, and although the area's antecedents reflected this pattern, this had some influence upon future housing developments.

In 1964 the boom was reflected in the increase in the number of building plans from 4394 the previous year to 4471 (Table 7.2) and the value from R26,651,432 to R32,384,000. These included 65 structures of more than R100,000 in value, most of which were again in the Central Business District. The demand for luxury flats was also evident, and in Killarney 10 blocks were initiated in the course of the year. Several residential hotels were built in the Yeoville-Berea area, and the great movement of office blocks into Braamfontein accelerated. The old Carlton Hotel was demolished and excavations to a depth of 90 feet (27.43 m) were completed for the New Rand Daily Mail building. Both structures were in the eastern parts of the Central Business District. New townships of Forbesdale, Gillview, Towerby Extension 2, Reuven Extension 1, Victory Park Extensions 14 and 18 and Evans Park were proclaimed, bringing the total number of townships in Johannesburg to 318.

1/ This committee subsequently became the State Committee for Johannesburg Areas and was comprised of members drawn from the Johannesburg Municipality on the one hand, and the Department of Community Development on the other.

In 1965 the Carl von Brandis mechanical parking garage was opened on the site of Von Brandis Square. This was a 14 storey structure for 390 vehicles. Later in the year the two level underground garage at Hedley Chilvers Gardens at the south-western corner of Rissik Street and Wolmarans Streets was opened. Its capacity was 225 vehicles. It is of interest to note that the major termini for motor cars in the Central Business District were located at approximately the same positions as the four original squares delimited by Jos de Villiers in 1886. This suggests that despite the technological innovations during the intervening years the principles and motives underlying the movement of people into the city have remained the same.

As 1964 proceeded the economic situation in the country improved and the newly constituted Forward Planning Branch of the City Engineer's Department began the preparation of a master development plan for the city. This provided a comprehensive transportation study, a land utilization plan and a financial plan which would further facilitate urban renewal. The surveys underpinning this master plan were a home survey origin-destination study a truck interview origin-destination study and a study around the city known as the external cordon study which noted the movements of all cars without Greater Johannesburg registrations (Johannesburg, Randburg, Sandton). In addition studies were made of the use made of public transport, as also surveys of flats and their occupants, shopping and the Central Business District . Other schemes to ameliorate the traffic problem involved the commencement of work on the 585, 2 level, underground parking garage on the Library Gardens site. The cost of this structure was R1,400,000. Between 1964 and 1966 the final 20,700 feet (6309 m.) of tram tracks were lifted in the city's streets thereby removing the last vestiges of a technology which had served the city well during the phases of Consolidation.

Shortfalls in Residential Accommodation

Despite the resurgence of construction in Johannesburg which followed the general economic recovery throughout the country after 1961, the increase in the White population was sufficient to create serious shortfalls in residential accommodation by the mid sixties. Consequently in 1964 building control was introduced by the central Government to curtail the construction of large luxury buildings and to encourage the erection of houses. Plans for various classes of building in excess of certain values had to be referred to a regional representative of the Minister of Community Development. In addition a complete list of plans approved for buildings over the cost of R1000 had to be submitted for information to the Government Controller. These regulations were relaxed in 1966 in respect of blocks of flats used exclusively for residential purposes (City Engineer's Report, 1965).

As 1967 progressed the housing shortage became more acute. Immigrants poured into the country and it became clear that the Government would have to introduce further curbs on the country's over expanding economy. The building control initiated by the Government in 1964 had some effect of channeling more of the country's building potential to housing, but this was countered by the sharp increase in the rate of interest for housing loans (Fig. 7.2) and the switch of the industry to commercial buildings. Another aggravating factor was the difficulty which the Building Societies experienced in attracting funds in the face of bullish conditions on the Stock Market. The central Government's building control measures in respect of residential flat buildings were removed in December 1966 but the size of other buildings that could be erected without a permit was reduced by half, and industrial buildings became controlled. The effect of the control measures is reflected in the value of private buildings for

which plans were approved in 1966/67 (Table 7.3).

In an endeavour to overcome the housing shortage a new state committee was formed along the lines of the Niemand Commission to assist the City Council in its urban renewal schemes in Vrededorp, Pageview, Jeppestown and Troyeville. Graded rates of interest were introduced by the State based upon the salary of the recipient. These were essentially a form of subsidized rentals.

The period from 1960 to 1966 represents a phase in the trade cycle when the South African economy moved from a recession (in 1960) through a phase of recovery (from 1961 to 1964) and back to a levelling off of economic activity in 1965. Consequently it is appropriate to make an analysis of the fluctuations of residential property prices which occurred during this period.

Analysis of Residential Property Prices 1962-1966

The patterns of compound interest growth rates in the prices of residential properties in Johannesburg from 1962 to 1966(computed from mean January sales in even years) are closely related to the business cycle. For much of this period the economy was extremely bouyant. Consequently house prices rose throughout Johannesburg. In the high status Northern Suburbs the overall growth rate was 9,62 per cent per annum, although 17 of the 34 townships enumerated, registered increases of more than 10 per cent. The increases in residential values in this sector reflect a close accordance between expensive properties and high rates of appreciation. This is well illustrated by the cases of Dunkeld and Parktown, both of which are near the top of the hierarchy of residential townships and whose compound interest growth rates were 22.4 and 18.0 per cent

respectively between 1962 and 1966. The latter figure may well represent entrepreneurial interest in Parktown's latent potential for commercial development at that time. Another important feature of the high status sector between 1962 and 1966 is the rate of appreciation of the new and the peripheral townships. The prices of residential properties in Athol, for example, increased at the rate of 16.2 per cent, those in Elton Hill at 18.4 per cent and those in Bryanston at 14.6 per cent. As has been noted, the growth in the prices of the new high status townships reflects the prosperity of the times, the improvements in the communications pattern, the preferences for space and country living and the flexibility and the dominance of automotive transport. At the inner edge of the same sector the older established townships also reflected satisfactory improvements in their sales. In Forest Town for example prices improved by 15.5 per cent per annum, in Houghton the increase was 12.3 per cent, in Rosebank 12.8 per cent, in Parkwood 16.0 per cent and in Birdhaven 10.1 per cent. Two special situations are reflected in the prices paid for properties in Parkhurst and Parktown North. In the former, consumer interest was due to the availability of very small stands (one-eighth acre, or 500 sq.m.) at relatively low prices, but extremely well located with reference to the high status sector. In the later the Parktown North acres (4000 sq. m.) were in the process of being sub-divided into pan-handled properties, a fact which increased the density of settlement and caused prices to rise sharply. Consequently between 1962 and 1966 Parkhurst's properties appreciated by 17.2 per cent and those of Parktown North 12.4 per cent. One notes therefore that although a strong sectoral pattern of high status residential townships with high growth rates continued to dominate the Johannesburg residential property market, there is in fact no annular pattern of prices.

The Southern Suburbs, located antipodally to the northern high status sector were distinguished between 1962 and 1966 by having a very much lower general growth rate. Whereas the northern sector grew by 9.62 per cent per annum, the southern sector grew by 6.98 per cent; and whereas half of the northern townships achieved growth rates above 10 per cent only four of the twenty southern townships achieved this level. These characteristics of high and low status areas appear to have held throughout Johannesburg's development, so that profits from speculation in high status residential property have good expectations during booms and poor expectations during recessions. In low status areas the fluctuations with time are of a lower order. In the Southern Suburbs only Hurst Hill (18.9 per cent), South Hills (10.9 per cent), Regents Park (12.[illegible] per cent) and La Rochelle (12.5 per cent) had gains in excess of 10 per cent. The last two townships began to experience a considerable degree of structural renovation in the mid-sixties due to the influx of Portuguese from metropolitan Portugal and this is one factor which contributed to the growth rates experienced there. As in the northern high status sector no zonal pattern of prices is discernable in the Southern Suburbs at this stage, which in itself is quite significant, since the 'old' and the 'new' Southern Suburbs were definitely separate residential entities by 1965.

The western sector was still predominantly non-White in the mid-sixties although most of the population was Coloured as opposed to the large African element which had previously lived there. Consequently, home ownership was restricted to the relatively few White townships, a fact which clearly influenced the general level of residential property prices. The compound interest growth rate for the western sector from 1962 to 1966 was 5.70 per cent which, as might be expected, was the lowest rate of

growth of any socio-economic sector in metropolitan Johannesburg. However, what was true of the sector as a whole was certainly not true of its parts, as is shown by the growth rates in Bosmont (33,7 per cent), Newclare (33,7 per cent), Greymont (24,5 per cent) and Vrededorp (13,9 per cent). These rates of growth in residential property prices can largely be attributed to substantial expenditure by the National Housing Commission on new housing schemes in these areas or near them. The Sophiatown-Martindale scheme, for example, is one such project which changed the face of the landscape, from one dominated by slums, to one dominated by model low-status semi-industrial housing. Another consideration which affected residential property prices was the City Council decision to allocate large parcels of land on and near the rail reserve in the western sector to industrial uses. This made the sector more desirable as a residential area for blue collar and factory workers, a fact which is borne out by Davies' (1964) findings on the location of occupational categories in Johannesburg. At the inner margin of the sector the sound rate of growth in Melville (13.8 per cent) can in large measure be attributed to its good location *vis-à-vis* the Central Business District and the growing commercial district of Braamfontein, the ripeness of its buildings for renovation, its elevated outlook and its relatively low prices.

Contrasting with the low growth rate of the western low status sector with its admixture of non-White townships and sub-economic housing schemes, was the high appreciation rate of the townships situated on the Witwatersrand ridge, from Northcliff to Linksfield . The SYMVU maps (Fig. 7.4) of this period (1962-1966) clearly portend the trends which were a feature of the housing market in the latter years of the decade. No fewer than fifty per cent of these suburbs had compound interest growth rates of over 14 per cent during this period, and of the others, Northcliff and its extensions grew by 8.4 per cent, Observatory by

7.9 per cent and Westcliff Extension by -0.2 per cent. An examination of the appropriate table, (Appendix B) shows Westcliff Extension as a township with very few sales, due both to the tightly held land there and to the small number of stands in the suburb, so a decline in prices over this period (1962-1966) does not adequately reflect the behaviour of buyers in the area. The appreciation of Linksfield (28.9 per cent) and Senderwood (14.1 per cent) can be attributed to the dominance of a wealthy, middle-aged Jewish community in that locality who has for reasons which will shortly become apparent, bid up the price of residential properties. Stand sizes are large, the environment is of a high quality and recreational facilities and the institutions in the area are almost unparalleled elsewhere in Johannesburg. The overall growth rate of the townships on the Witwatersrand ridge between 1962 and 1966 was 13.97 per cent which was approximately 4 per cent per annum (compounded) higher than the second order or magnitude (the northern sector), and almost three times the growth rate of the Southern Suburbs. Two factors are largely responsible for this pattern. On the one hand it reflects the demand by the wealthy for large properties on elevated sites and with good views to the north,on the other it reflects the influence of the business cycle and the bouyancy of the national and the local economies (Fig. 7.10 and 7.11) between 1962 and 1966.

The eastern socio-economic sector which commences in Doornfontein next to the Central Business District and terminates at Bedfordview, had a compound interest growth rate of 7.9 per cent between 1962 and 1966. An interesting feature of this pattern is the strength of the inner, older residential townships. Thus, Fairview (11.3 per cent), Troyeville (17.0 per cent), Jeppestown (14.4 per cent), Bellvue Central (13.6 per cent)and

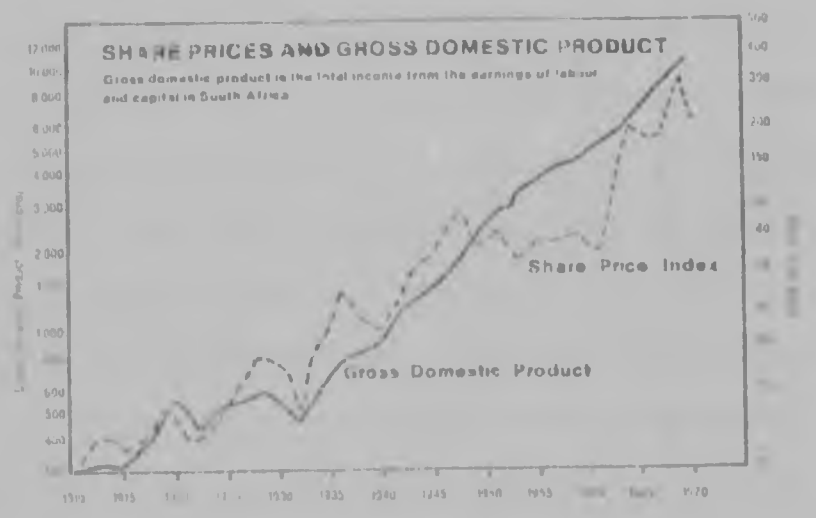


Fig. 7.10 - South Africa : Share Prices and the Gross Domestic Product 1910 - 1972

(Johannesburg Stock Exchange, 1973)

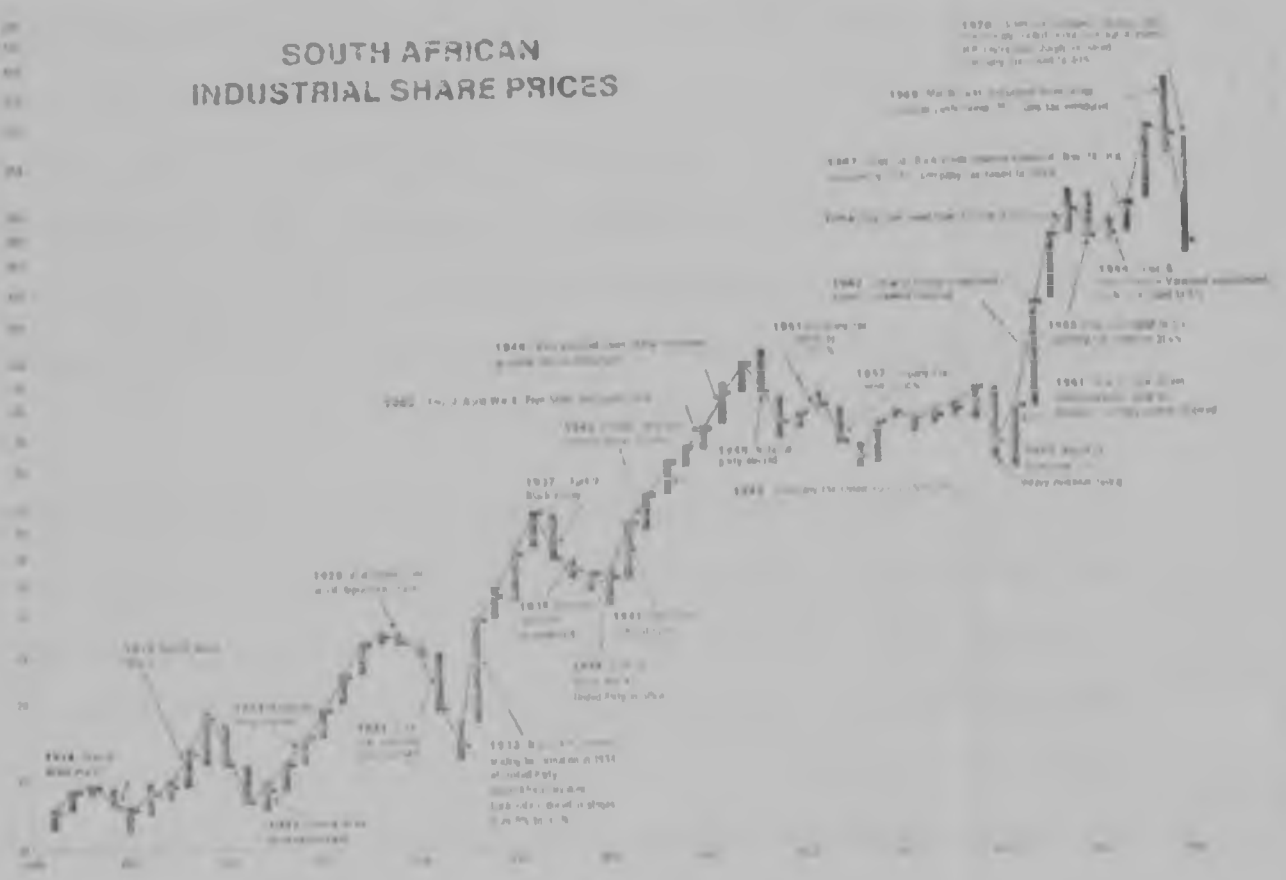


Fig. 7.11 South Africa : Industrial Share Prices, 1910 - 1970

(Johannesburg Stock Exchange 1973)

and Bertrams (45.6 per cent) all appreciated by more than ten per cent. To understand this behaviour which is inconsistent with that of low status neighbourhoods elsewhere in Johannesburg, one must adknowledge that the innereastern townships were at this time experiencing an invasion of commercial uses from the Central Business District. This, together with the municipal housing schemes mentioned elsewhere, no doubt caused prices to rise as entrepreneurs purchased delapidated houses in anticipation of changes in the zoning from special residential to general commercial usage. Elsewhere in the sector prices remained subdued. In Bedfordview at the periphery, small agricultural holdings were being subdivided into acre stands (4000 sq.m.) and the boom in residential development there was about to commence. However, between 1962 and 1966 the growth rate was only 3.4 per cent per annum (Table 7.1).

The residential property market in the north-western sector achieved most of its growth in the peripheral townships. Robindale (11,4 per cent), Victory Park (17,3 per cent) and Montgomery Park (11,9 per cent) all produced good results. The pattern of prices in Victory Park (formerly a group of agricultural small holdings) is reminiscent of those obtaining in Linksfield, St. Andrews and Senderwood. The Jewish institutions in this area attracted a strong and prosperous Jewish community who materially affected the pattern of prices. The north-western sector, like its counterpart to the north-east is a socio-economic sector of middle order housing so that the overall growth rates of 8,28 and 8,56 per cent respectively are what might be anticipated. They thus fall between those socio-economic areas of high and low status.

The analysis of residential property prices in Johannesburg between 1962 and 1966 has, thus far, been concerned solely with compound interest

growth rates and their spatial variation. It remains therefore to examine absolute prices so that price changes can be viewed in monetary terms.

In the high status northern sector the Parktown residential properties continued to dominate the Johannesburg housing market (Appendix B and C). In June 1966 the average price for properties sold in Parktown was R71,500. In the same year the average price in Hyde Park was R50,000 (April), in Hurlingham R47,000 (October), in Dunkeld R45,000 (May), in Inanda R42,000 (July), while Houghton, Athol, Waverley and Westcliff all reflected mean monthly sales between R28,500 and R33,000. Thus the inescapable fact of Parktown's pre-eminence is revealed. A problem arises, however, when one notes the view which prevailed regarding the future of Parktown. Neither the Johannesburg City Council nor the Transvaal Provincial Administration seemed able to formulate a plan for the future comprehensive and co-ordinated development of this suburb. Consequently residential stands in Parktown were purchased by entrepreneurs who anticipated that [illegible] would be allocated to the area in the short term, and in this way the prices were bid up unrealistically in the early sixties. Be that as it may, however, one feature which Parktown's residential sites share with those of the other eminent suburbs is the size of their stands. All the townships noted here have stands of one acre (4000 sq. m.) and more, and this inevitably leads one to the view that spatial preference is a prime characteristic of the very wealthy. The amenities created by large stands can be assessed from a number of viewpoints. Firstly, they afford a high degree of privacy they allow low density urban living, they encourage those qualities encompassed in the phrase *rus-in-urbe* and they militate against automotive congestion and pollution. Secondly, large stands encourage space consuming activities so it is not surprising to find such facilities as private tennis courts on many residential properties in the high status sector. The clear accordance

between income, density, and the preference for space is reflected in Figs. 7.12 and 7.13.

The second important aspect of the prices of residential properties in the high status sector between 1962 and 1966 is their spatial variation



Fig. 7.12 - Johannesburg : Population Density (Whites) 1965
(Greater Johannesburg Population Report, 1965)

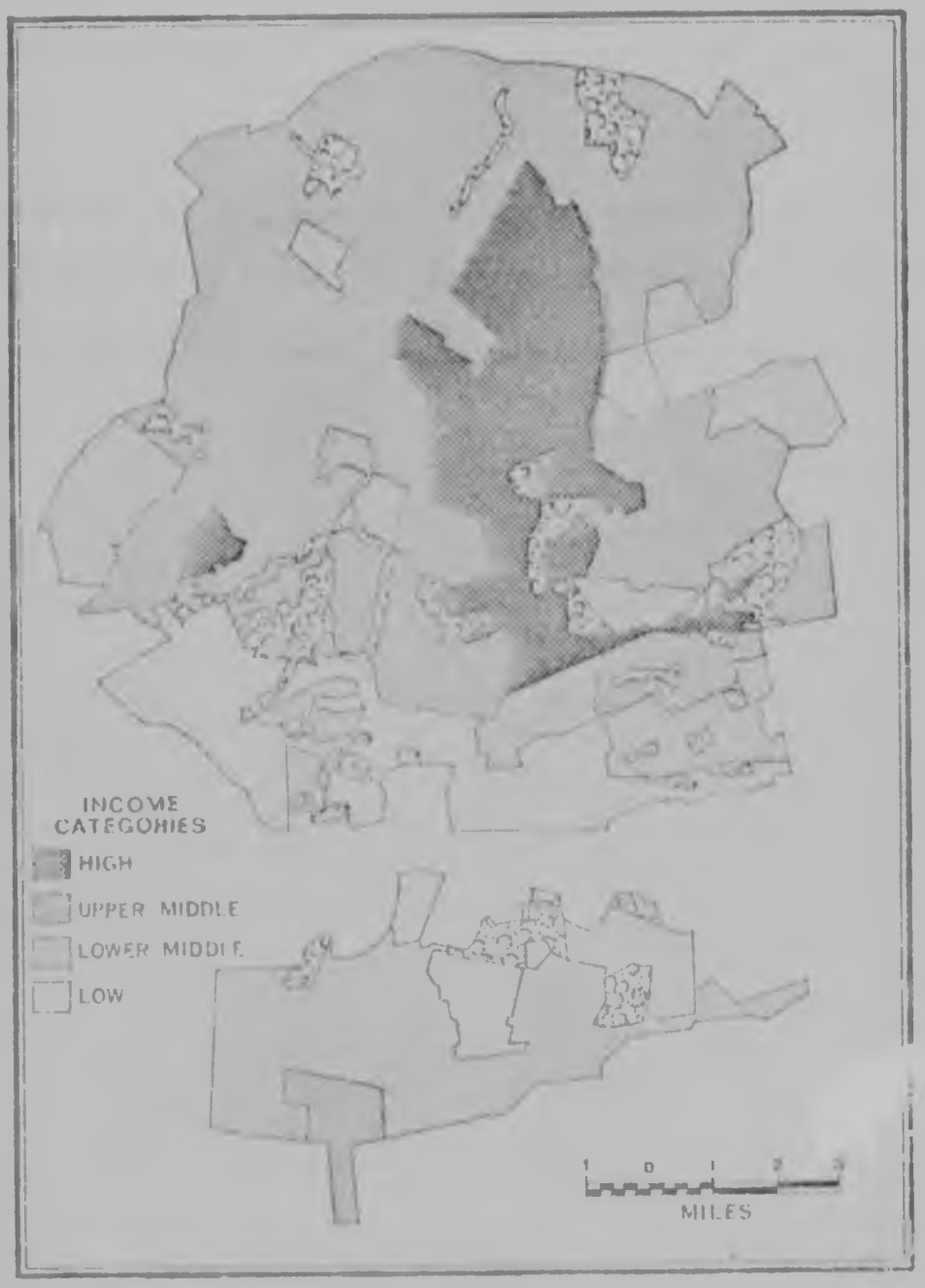


Fig. 7.13 - Johannesburg : Income Distribution (Whites) 1965
(Greater Johannesburg Population Report, 1965).

Most accessibility models, and concepts concerned with the spatial pattern of the prices of urban residential properties recognise the importance of distance decay functions which, when well-behaved, generally yield negative exponential or asymtotic curves. These are very steep near the Central

Business District and become progressively less steep as one moves to the periphery. Two common constraints which give credence to these theories are the unreal assumption of stands of similar size and of an urban system on an isotropic plain. In Johannesburg the curve representing residential property prices in the northern sector from the Central Business District to the periphery bears very little resemblance to that described above. This is due mainly to the settlement history of the metropolis and to the variation in stand size between townships. Despite this however it is possible to recognise a zonal arrangement (Fig. 7.8) in which a number of factors combine to give certain areas similar values. Thus in 1966 the mean maximum prices ruling in Forest Town, Parkview, Parkwood, Saxonwold, Westcliff, Oaklands, Rosebank and Parktown North fell within the range R18,500 and R36 000. The next zone embracing Dunkeld, Illovo, Inanda, Melrose, Birdhaven, Athol, Hyde Park, Hurlingham, Craighall, Sandhurst and Sandown fell within the range R40,000 and R54,000. Finally the periphery in the northern sector comprising parts of Ferndale, Bryanston and its extensions, the separate village of Rivonia and the agricultural holdings of Morningside yielded prices ranging up to R21,000. Within this pattern the dominant price determinant was stand size and the age of housing with accessibility contributing to the price of properties in the inner area.

Turning now to the price of residential properties elsewhere in Johannesburg in 1966 one notes firstly, the topographic influence which was largely responsible for the mean monthly prices of R24, 000 in Northcliff, R38,000 in Linksfield Ridge R32,000, in upper Houghton and R71,500 on the Parktown Ridge . Stand sizes in all these townships are large, so that it is difficult to determine the relative importance of stand size on the one hand, and of an elevated position on the other. In the Southern Suburbs

the mean monthly prices achieved in 1966 were in general below R10,000. The only exception was Mondeor, a peripheral township belonging to the new group of townships proclaimed in the fifties, and the prices here were barely 10 per cent above the southern region as a whole. The western sector's residential property prices in 1966 reflected its ethnic overtones, the poor quality of the environment and the small stands. Mean price levels of houses are well illustrated by those prevailing in Westdene(R6,180), Vrededorp (R3,625), Triomf (R5,683), Newclare (R2,200), Newlands (R4,066), Mayfair (R5,583), Greymont (R3,760), Bosmont (R1,370), and Albertskroon (R4,850). So in general, the western sector was representative of a price category whose mean monthly maximum seldom exceeded R5,000. Isolated exceptions to this rule are noteworthy. Rossmore, Auckland Park and to a lesser extent Melville all reflected residential property prices which departed substantially from the general level of the western sector, and were, in most cases above those ruling in the Southern Suburbs. Thus the mean annual figure for Auckland Park in 1966 was R10,427, that for Rossmore was R14,200 and that for Melville R7,125 (Appendix B). These prices reflect the better environment of these townships, situated as they are around the extensive open spaces of parkland and golf courses of the Johannesburg Country Club, the larger stand sizes, their remoteness from the non-White areas, the elevated quartzite ridges with their fine northern aspect and views and their relative closeness to the Central Business District. In short, these suburbs are quite out of character in the western sector.

In 1966 the north-eastern and north-western middle class residential sectors had house sales whose mean prices fell within the rather large range of R10,000 to R20,000. Variations within these sectors can be ascribed to factors of stand size, (as is reflected in the low prices of Norwood, Orange

Grove and Parkhurst) the age of residential establishments (as shown in the lower prices in parts of Parkview, Forest Town, Greenside, and Parktown North) environmental factors (as indicated by higher prices near major parks and lower prices near main roads) accessibility and closeness to the centre of the city (reflected in the inner north-eastern sector) and finally, ethnicity (as shown, for example by the high prices paid for properties in largely Jewish areas of which Victory Park and Emmarentia Extension would be representative).

The eastern socio-economic sector of residential townships in Johannesburg can be divided into three parts (as shown in Fig. 7.8) for the purpose of this analysis. Prices in the inner townships, those settled up to 1888 were generally depressed in 1966. While commercial invasion from the edge of the Central Business District, on the one hand, and urban renewal schemes, on the other, raised prices in some localities, the overall process was one of blighting which was accompanied by many socially deleterious influences. Consequently in 1966 the mean annual price of residential properties in Jeppestown was only R5,933, that in Bertrams R5,680, that in Fairview R5,400. The second relatively homogeneous socio-economic area in the eastern sector, that described as 3B in Fig.7.8 embraced Kensington, South Kensington, Bezuidenhout Valley, Malvern and Cyrildene. The newer houses, the larger stands and the more salubrious environment contributed to the higher residential prices in this locality in 1966. Mean monthly prices in Cyrildene ranged from R14,000 (January) to R21,500 (May), in Kensington (due to its great size and variety) a mean annual price of R8,600 was recorded, while Malvern (R7,365) and Bezuidenhout Valley (R6,541) represented a much denser pattern of settlement with a concomitant depressing effect upon the price of properties. The peripheral parts of the eastern sector were taken up by

Bedfordview, a large area under a separate town council and management committee. It was proclaimed a separate township in the fifties, having evolved from a large number of agricultural small holdings. Possibly because of this the initial survey attempted to retain the atmosphere of a semi-rural environment so stands of an acre (4000 sq.m.) and more are common. The township became popular during the sixties when the development axis from Johannesburg to the international airport further east by-passed Bedfordview. So it was well located to house a relatively high socio-economic group many of whom were employed along this axis . Added to the locational and spatial advantages are those associated with a particularly fine natural setting with the quartzites of Germiston to the south and the wide valley of Gillooly's Farm to the north. The average annual price of residential properties in Bedfordview in 1966 was R18,633.

In reviewing the sectoral pattern of average prices in Johannesburg in 1966 one notes that the high status northern sector was dominated by Parktown and that in general, prices exceeded R20,000; in the middle-status sectors residences were sold for prices which ranged from R10,000 to R20,000; in the Southern Suburbs prices ranged from R5,000 to R10,000, and in the western sector prices were, with few exceptions, below R5,000. Finally in the eastern sector houses were sold in most categories of the market depending upon location and other characteristics of quality.

Social and Economic Developments 1962 - 1966 : A Review

In reviewing the expansionary period from the recession of 1962 to the bouyant phase of 1966 a number of important insights emerge. Perhaps of paramount significance was the decision taken in the fifties by the City Council to introduce a motorway system for metropolitan

Johannesburg. This decision which coincided with the first signs of traffic congestion in the Central Business District tempted entrepreneurs to extend their operations in the downtown area and militated against extensive decentralization. Consequently, as has been pointed out, a number of very large structures were built during the early and mid-sixties, all of which generated further traffic. So many of the major arteries near the Central Business District had to be widened, a most costly procedure, and these and the motorways had to be linked to numerous parking termini which also involved further expenditure. The deleterious consequences of expropriations of many residential properties, and those of driving motorways through select residential areas are self-evident, and in the final reckoning, the motorway system has failed to cope with the increased traffic. Unfortunately, the scheme was founded upon false premises. An efficient and flexible mass transit system would have contributed to the partial eradicatic of the automobile, while motorways simply encouraged its use. The combined effects of the motorway system, technological innovations, immigration, and shortages of skilled labour and building materials caused a spread of housing outwards in all directions, on the one hand, and an escalation of prices, on the other. These were the first symptoms of the rampant cost and wage inflation which was to be the dominant feature of the housing market and the construction industry from 1966 to 1972. Internal reorganization took two forms. On the one hand, the local and national governments introduced numerous housing schemes and urban renewal schemes to cater for the lower socio-economic White groups, the Coloureds and the Africans while, on the other, the forces of invasion and succession were evident in Braamfontein and Parktown. The completion of the physical linkage between Braamfontein and the Central Business District, allied to both the traffic congestion, the high land prices and the lack of parking in the latter, encouraged

entrepreneurs to extend their operations northwards. This was not a decentralization process but rather an extension of operations to cheaper sites where parking was available and where congestion was, at first, non-existent. In terms of the Town Planning Scheme (as amended) the general business zoning for much of Braamfontein caused a complete change in that part of the townscape between 1955 and 1965 from one of housing to one of office blocks, flats and ribbon shopping. Most of the offices were the administrative headquarters of establishments requiring little direct contact with either subsidiary organizations or employees (Hart, 1969). The fate of Parktown was not materially different. The initial commission of enquiry into Parktown's future which sat in May and June, 1962, proposed a rezoning from special residential to institutional and general business. Despite some concessions with regard to height and bulk considerations the character of the township was irrevocably changed. The effects of these new uses is evident in the escalation of prices in Parktown and in the volume of sales (Appendix C). A more detailed study of the Braamfontein-Parktown invasion process will be undertaken in the following chapter.

The spatial changes in the price of housing from 1962 to 1966 confirmed the strong sectoral overlay which had been a feature of the market from its inception. The high status areas proved to be those with the highest rate of appreciation in the five year period, and those townships located on elevated land were placed at the top of the hierarchy. The Southern Suburbs continued to be a poor investment area thus perpetuating the low order of social standing which has always been attached to them. The non-White and low status White townships of the western sector remained at the bottom of the system. The market values of the middl class north-eastern and north-western sectors grew at 8.56 and 8.28 per cent respectively so their performance was identical for all practical purposes.

Inflation of Residential Property Prices 1966 - 1970

Following the expansionary phase from 1962 to 1966 and the slight recession of the mid-sixties, came the period of maximum inflation in property prices between 1966 and 1970. Although it is difficult to identify the precise causes of the escalation in property prices at this time, it is possible to point out the probable reasons. The first cause was cost inflation (Fig. 7.3) which emanated from shortages of both labour and materials. The labour shortage was an artificially created one in which skilled jobs were in the hands of White workers. Consequently artisans' wages rose in sympathy with the demand, and this cost was passed on to home owners. The second cause was a land shortage. Property speculation during the sixties was such that most of the virgin land surrounding metropolitan Johannesburg was held by real estate companies. As a result, price manipulation followed, with the supply offered in most localities failing to meet the demand. A third cause of price escalation was the state of the money market. During this period conditions of unusual liquidity prevailed. The share price index rose from 65 in 1960 to over 300 in 1968 (Fig. 7.10) and huge profits from the sale of equities were not unusual (Fig. 7.11). Under such conditions and in the face of a contracting property market, prices increased rapidly. A final factor which will probably assume great importance in the future reflects the usefulness of property as an investment medium. Due primarily to the pursuance of a policy of full employment, there has appeared, since the Second World War, the spectre of a rapid rate of erosion in the value of money. This is the outcome of an even widening gap between the nation's production function and the wages of its workers. Inevitably therefore

the investor seeks a medium which promises to increase at a rate greater than the prevailing rate of inflation. Land is thought to provide such a hedge. So more individuals are now using real property as an investment medium and prices are affected accordingly. The overall effects of the inflation of residential property values from 1966 to 1972 are evident from the analysis which follows.

Analysis of Residential Property Prices 1966 - 1972

In December 1965, the South African Reserve Bank reported that 'the latest available evidence confirms that the long cyclical economic upswing in South Africa, which began about the middle of 1961 levelled off about the middle of 1965'. The recession was only transitory however for in 1966 a large inflow of foreign capital precipitated a surge in economic activity. By 1969 the economy became overheated as domestic monetary demand exceeded domestic supply by a margin which increased every quarter. The increases in the prices of goods and services began to escalate and a number of administered prices were also increased in 1971.

One of the effects of this buoyant economic situation was to raise substantially the prices of residential properties. In the present review of price fluctuations in Johannesburg three periods are considered. The first is that from 1968 to 1972 and covers the phase of most rapid change in property prices in 1968, and the gradual levelling which occurred after the fall in equity prices in mid-1969. The second period is that from 1966 to 1972 which includes the phase of recovery following the slight recession in 1965. Finally, the period from 1969 to 1972 allows one to examine the behaviour of the residential property market during the whole cycle.

The data from the property market are presented as in other sections

of this chapter as compound interest rates of growth, in monetary terms, in graphical form and cartographically as three dimensional SYMVU maps. A word of caution is perhaps in order here, particularly with regard to the data based upon the compound interest growth rates. When considering these it should be borne in mind that relatively small price fluctuations in low status housing yield large changes in compound interest growth rates; conversely, relatively large price fluctuations in high status housing may yield small changes in compound interest growth rates. One is therefore reminded that the critical factor with this type of measure of changing values is the base price. To offset this disadvantage monetary changes are once again considered in conjunction with compound interest growth rates.

Some measure of the rate of growth of residential property prices from 1962 to 1966 as against those between 1966 and 1972 can be gauged from the fact that high status prices appreciated at 9.62 per cent in the former period and at 1[illegible].52 per cent in the latter. Comparative statistics for the north-eastern sector were 8.56 per cent and 13.98 per cent; for the north-western sector, 8.28 per cent and 13.11 per cent; for the eastern sector, 7.9 per cent and 14.31 per cent; for the western sector, 5.70 per cent and 21.83 per cent; for the Southern Suburbs, 6.98 per cent and 13.82 per cent and finally for the towships on the Witwatersrand ridge, 13.97 per cent and 15.51 per cent. The initial impression created by these statistics is the remarkable general rate of growth in the latter period as against that in the former. One notes also that the low status properties, particularly those in the eastern and western sectors had extremely good growth rates between 1968 and 1972. There are a number of reasons for this pattern. The first reflects the lower base prices of the low status houses. Prices of residencial properties in Bosmont for example averaged less than R2,000 in 1962, and rather more than R6,000 in 1969, a change which represents

a threefold increase, or approximately R4,000. By contrast, the mean annual price of residential properties in Houghton in 1962 was less than R20,000 but rose to R46,710 in 1969. In this instance the price between the first and second periods increased by a factor of only two, yet in monetary terms this amounted to an appreciation of R26,000. This pattern can be illustrated by many similar examples (Appendix B).

While it is necessary to clarify the apparent anomalies introduced by the use of compound interest rates of change (which are most useful for investment purposes) it would be unwise to decry too much the changes which occurred in the western low status sector. This leads one to examine the second reason for the pattern of change.

In Johannesburg the Coloured population has a high growth rate so that the decision by the City Council to develop parts of the western sector as a Coloured area caused this group to congregate there and so increase the demand for residential accommodation. Allied to this were a number of housing schemes for Coloureds which appreciably improved the residential quality of the environment in the western sector. A second factor was the growth of institutions and the consequent increase in construction and spending in the sector, a fact which will be examined in greater detail in the following chapter. The third reason for the good compound interest growth rates in the low and middle status residential areas was the result of the economic climate in South Africa. The inflationary trend and the erosion of money which caused residential property price to escalate, created a downward filtering among house buyers. Individuals who would previously have purchased properties in the higher status localities were compelled to seek accommodation of an inferior quality. This pattern of consumer behaviour is well illustrated by a comparison of the volume of sales in Houghton and Parkhurst, the former having 2105 stands, and being near the top of the hierarchy of residential townships in Johannesburg, and the latter having 2130 stands and being

marginal between high and middle status. The average number of sales of residential properties in Houghton from 1962 to 1966 was 6.54 per month. During the same period those in Parkhurst averaged 12.0. From 1968 to 1972 the mean monthly property sales in Houghton fell to 5.98. During this period those in Parkhurst increased to 16.5 per month. This reveals a declining interest in the more expensive properties and an increasing interest in cheaper homes. Estate agents have noted that the volume of sales of residential properties priced above R40,000 has declined relative to the housing stock as a whole. If this observation is correct it lends weight to the often stated link between income, residential quality and location.

Thus far an attempt has been made to establish the causes of price fluctuations during certain periods at the mes cale. Within the various sectors substantial price changes occurred between townships (Table 7.1). In the high status sector the youthful townships tended on balance to grow more rapidly between 1968 and 1972 than the older townships. Athol (17.7 per cent), Athol Extension (21.9 per cent), Hyde Park (22.1 per cent) Inanda (23.8 per cent) and Oaklands (20.0 per cent) all produced excellent results. However within the same sector growth rates of less than 10.0 per cent occurred in Savoy Estate, Waverley, Houghton Estate, Dunkeld West, Greenside, Greenside East, Victoria and Atholhurst. From these results one cannot distinguish any zonal pattern in residential property price appreciation. In the Southern Suburbs the compound interest growth rates exhibit an equally random pattern. Turffontein for example, one of the oldest of townships, appreciated at 23.9 per cent per annum, while Mondeor, one of the most youthful appreciated at 19.3 per cent. In the north western sector compound interest growth rates ranged from 7.0 per cent in Victory Park to 20.8 per cent in Fairlands; in the north-eastern sector, from 3.5 per cent in Birnam to 26.7 per cent in Sydenham; in the eastern

sector, from 2.6 per cent in Bertrams and Jeppestown to 27.8 per ce[illegible] Troyville, and finally in the western sector from 8.8 per cent in Albertsville to 66.6 per cent in Bosmont. Only in the suburbs located along the Witwatersrand ridge were the compound interest growth rates relatively homogeneous. All except one of the townships appreciated by more than 10.0 per cent, while only the extension to Observatory showed a growth rate in excess of 20.0 per cent.

Perhaps of rather greater significance than the short-term price fluctuations of residential properties in Johannesburg are the long-term changes which are illustrated in Table 7.1 for the period from 1960 to 1972. The high status properties reflected sound rates of growth over this period. Although the overall average compound interest growth rate in the northern sector was only 8.78 per cent, 8 of the 33 townships in the sample (25 per cent) appreciated by more than 10 per cent per annum; a further 15 by more than 8 per cent per annum; and the remainder ranged from 3.8 per cent (Waverley) to 7.9 per cent (Rosebank). This pattern of growth is reflected in the SYMVU maps based upon the January mean residential property prices in even years from 1960 to 1972. In monetary terms growth rates of over 10 per cent represented large sums. Prices in Forest Town rose from generally less than R12,000 in 1960 to over R35,000 in 1972; in Parkview they rose from R10,300 to R30,200; in Sandown, from R12,600 to R63,000; and in Hyde Park, from R20,000 to R62,000. From these statistics one notes that prices very nearly tripled in most cases between 1960 and 1972 in the high status townships. By contrast the average rate of growth in the eastern sector during the same period was only 6.69 per cent per annum. None of these townships achieved average growth of more than 10 per cent and some ranged as low as 1.8 per cent (Yeoville) (Table 7.1). In monetary terms the sums involved were relatively small. Average monthly prices in Troyeville in 1960 were generally below R5,500. These rose to R12,100 in 1972. In Jeppestown

comparable figures were R3,800 and R11,500 and in Bertrams R6,000 and R10,000. In the north-eastern and north-western middle class areas average compound interest growth rates of 8.86 per cent and 8.55 per cent respectively were recorded between 1960 and 1972. These were not accompanied by the great monetary rewards recorded in the high status areas. Of special interest is the performance of the north-western townships which, with the exception of Linden were developed after the Second World War, and in which much of the house construction was completed during the decade of the sixties. Of the sample, all the townships achieved mean growth rates of over 7.6 per cent per annum and Ferndale attained the unusually high figure of 11.0 per cent. The changes which occurred in the western sector were, for reasons which have been enumerated, very varied. Consequently, those townships which acquired new Municipal houses or urban renewal programmes such as Newclare, Triomf and Newlands averaged good growth rates, while those influenced by institutional developments, such as Rossmore, Melville, Westdene and Auckland Park had a fair share of the prosperity. On the other hand, the townships with neither of these attributes faired rather poorly, as is illustrated by the decline in values in Albertsville, and the low growth rates in Mayfair West, Greymont, Vrededorp, and Mayfair (Table 7.1). In the Southern Suburbs, of those townships enumerated, only Turffontein had an average compound interest growth rate of over 10.0 per cent between 1960 and 1972 and the average for the sector was 7.53 per cent. Prices in general were below R20,000 although in the newer areas such as Mondeor, figures of up to R25,000 were achieved in 1972.

In reviewing the prices of residential properties in Johannesburg during the Metropolitan Phase one notes the impact of the business cycle, the great divergence of prices both between and within sectors, and the influence of some aspects of the process of metropolitanization. In the

final chapter some of the more important problems of metropolitan growth will be examined with their effects upon the housing market. It remains to draw together the various threads of this analysis in a synthesis which relates the determinants of residential growth and residential property prices to the underlying concepts, theories and models.

A Synthesis : Determinants of Residential Development, Residential Property Prices : Their Spatial Manifestation and Linkage to the Underlying Theories and Models

In developing an appropriate synthesis one is concerned *firstly* with the determinants of residential growth in metropolitan Johannesburg from 1960 to 1972; *secondly*, with the determinants of residential property prices in esburg over the same period; and *finally* with the extent to which the erlying theories and models are congruent with the practicalities and the realities of the Johannesburg urban land market.

Residential development in Johannesburg from 1960 to 1972 can largely be ascribed to the process of metropolitanisation which was the dominant process affecting the urban system during this period. Residential growth was stimulated by the sheer size of the metropolis, by the increasing number of people, by the development of new towns such as Randburg and Sandton both previously groups of residential suburbs, by the increasing use of automotive transport and by the proliferation of sub-centres of economic activity. Spatially, residential growth manifested itself on the periphery where numerous new townships were proclaimed, and internally where large residential properties were subdivided to afford greater densities, where much of the old stock of housing was renewed by renovation, where high-rise residential structures became an important adjunct to single family residences and where both economic and sub-economic housing schemes fulfilled the needs of low income

groups and replaced houses in blighted districts. A more detailed study of these aspects of the metropolitanisation process is the subject of the next chapter of this thesis. The peripheral residential development was facilitated by major advances in and the development of new sewerage schemes, main roads and motorways, the reticulation of water and of electricity. These technologies were especially significant in facilitating development to the south-east of Johannesburg, to the north and to the north-west. The eastern sector was stimulated by the growth of the Jan Smuts International Airport around which new towns and manufacturing districts proliferated, all eager to share the economies offered by a location near the major import-export centre of the country. Inevitably the freeway linking the airport complex to the heart of Jonannesburg attracted to it a new generation of middle and lower middle class townships. The demand by basic and non-basic activities for non-White labour encouraged not only the development of extensions to the African townships of Soweto, but also to the Coloured suburbs in the western sector which by 1972 extended over 10 miles (17 km.) from the centre of the city. If one was to distinguish between the metropolitan phase and those which preceded it, one could note that while earlier phases were dominated by centripetal forces, the metropolitan phase was largely, although not entirely, centrifugal in character.

The determinants of residential property prices in Johannesburg between 1960 and 1972 are rather more difficult to identify than the determinants of residential growth . This is due not only to the multivariate nature of price determinants, but also because different socio-economic and ethnic groups view the same circumstances in different ways. The most important price determinant during the phase was, as in the past, the

business cycle and the rate of increase in the gross domestic product. Residential property prices fluctuated in complete sympathy with the business cycle, as also did the cycle of residential construction. The prices of properties in the high status northern sector were controlled largely by life style, by accessibility to the Central Business District, by income, by ethnic origin, by certain deleterious influences such as the motorways and main roads and by considerations of status. The question of life style is important since it is reflected in both the prices paid for very large residential properties and also those which have a high degree of accessibility to the downtown area. The townships located along the Witwatersrand ridge acquired much of their value from the elevated nature of their positions. This clearly is an attribute which is highly prized by certain members of the high status community. High market prices here are the result of excellent uninterrupted northerly views, large stands which offer low density living and freedom from noise and pollution, while at the same time, in most instances, being close to the Central Business District. If socio-economic status can be manifested through housing then the prices paid for residential properties in the high status suburbs of Johannesburg tend to support this contention. The escalation of property prices, especially during the latter years of the metropolitan phase indicated a rapidly widening price gap between the high- and low-status areas. In general residential properties throughout Johannesburg increased between 1960 and 1972 by between two and three times, but in monetary terms the increasing divergence between different socio-economic groups was remarkable.

In the Southern Suburbs a new generation of townships was planned along the Kimberley Road and in the hills of the Klipriversberg. These catered for middle income groups and the prices of houses reflected their nearness to the city centre on the one hand, and their southern location

on the other. Except in areas where topographic considerations determined otherwise, stand sizes were small and prices were depressed accordingly.

Residential property prices in the western sector were controlled in some areas by institutional development, by new construction on the part of both the Municipality and the National Housing Commission, by stand size, by the strong ethnic component of the Coloured townships and by the deleterious influences of industry and the Railways Reserve along the southern margin. In the north-eastern and north-western sectors, both middle-class areas, the primary determinants of residential property prices were stand size on the one hand, and accessibility to the city centre on the other. Secondary considerations are ethnic factors and local environmental influences.

The economic market approach to the study of residential property prices offers much that is of value in the analysis of Johannesburg's urban housing market. One notes for example the importance of accessibility to the Central Business District which has been demonstrated by Hurd (1903) in his statement of the complementarity of rent and location; by Haig's view of the relationship between rent and transport costs, by Wingo (1961) whose ideas are similar to those of Von Thünen (1826), by Alonso (1964) who interpreted the accessibility of a site through a set of indifference curves, and by Evans (1973) who tries to integrate the accessibility factor into a general behavioural model.

In the present study a close accordance has been shown between stand size, income of consumers, density of settlement and the price of residential properties. Size, income and price vary inversely with density.

Similar results have been demonstrated by, amongst others, Beckman (1957), Alonso (1960 and 1964) and Evans (1973). The insights gained from these authors are among the most significant in determining the spatial variation of residential property prices in the city.

The importance of the business cycle and with it the building cycle in determining the general level of residential property prices is almost universally ignored by theoretical writers on the urban land market. Only Wendt (1957) produced a model which is explicitly aimed at secular and cyclical changes in aggregate land values. This is an important omission, particularly in a study such as this, where business cycle indices are an indispensable part of the analysis. It would in fact not be too extravagant to say that Johannesburg's residential property market reflects first and foremost the general level of economic conditions in the country as a whole and only secondarily factors of the local environment. This is particularly true where the fluctations of the money market influence property prices. In the present study a close correlation has been found to exist between changes in administered prices, the volumes of sales in specific categories of residential property and the absolute prices.

A final significant contribution of the economic market approach to the study of residential property prices emanates from those factors generally referred to as market imperfections and over which the individual has either very limited knowledge or very limited control. The market imperfections include matters relating to zoning practices, servitudes, rights of way, taxation, administrative charges, certain aspects of the supply of and the demand for residential property,the prices of the factors of production and the prices of other properties in the urban system. Turvey's (1957) *The Economics of Real Property : An Analysis of Property Values and Patterns of Use* draws one's attention to the imperfections

of the market. These are seen to be most significant in areas where new zonings, and with them new uses, appear imminent. Both Braamfontein and Parktown fall into this category.

The socially rooted determinants of residential growth and residential property prices rely to a great extent upon the work of Hoyt (1939)who formulated the classical model which Johannesburg most closely resembles, the behaviourists, represented by Quinn (1940a), Firey (1945) and Rodwin (1950), the social area analysts, Shevky and Bell (1955) and the factorial ecologists to whose school of thought Berry (1972) was a major contributor. Johnston's (1971 and 1973) collative work provides a useful analytical framework while the findings of Davies (1964), Lipworth (1961) and Hart (1973 and 1974) in their empirical studies of Johannesburg support those of the present analysis. Watson's (1955) view of distance as a manifestation of psychological rather than economic space has a clear influance upon house prices. Ethnic clustering and questions of life style and family cycle are seen as important influences in the residential mosaic . Historical factors were shown by Quinn (1940a) to be relevant while site size, socio-economic status and the location of the society's leaders were all part of Hoyt's sector model. Finally, the various urban processes which have not been dealt with in the present chapter, especially those relating to invasion, succession, agglomeration, filtering, renewal, blighting, renovation and decentralization, which have some of their origins in the process of metropolitanisation, will be examined in the next chapter.

CHAPTER 8 - METROPOLITISATION : PROBLEMS OF RESIDENTIAL DEVELOPMENT AND THE HOUSING MARKET : 1960 - 1972

In this chapter attention is drawn to some problems which have emerged in Johannesburg as its metropolitan character has developed. These are chosen because of their influence upon residential growth and the pattern and structure of residential property prices. The problems are identified and analysed within the framework of the process of metropolitanisation. The first task therefore, is to examine the metropolitan concept, and the second is to delimit the metropolitan area of greater Johannesburg. Finally it is necessary to identify the factors which cause metropolitan growth and with it, the metropolitan problems. The problems are examined in the latter part of the chapter.

The Metropolitan Concept

The characteristics of metropolitan areas have been described by Gulick (1970), Gras (1922a, 1922b, 1926), McKenzie (1933), Bogue (1949), Florence (1955), Vance and Smith (1954) and Miles (1970). Certain key features have emerged from these descriptions which can be expressed in economic and spatial terms. Metropolitan areas can therefore be said to have the following characteristics, qualities and activities :-

1. Basic, or 'city-forming' activities (national and international spheres of influence),
2. non-basic, or 'city-serving' activities (local spheres of influence including the hinterland),
3. metropolitan areas at the highest level of the urban hierarchy,
4. a large population size relative to that of cities,

5. an internal structure composed of a dominant centre with subsidiary sub-centres (Patricios, 1973),
6. and urban residential sprawl.

Metropolitan Delimitation

Fair (1975) applies Berry and Horton's (1970) method of metropolitan delimitation to greater Johannesburg, and this procedure is followed here. The outer boundary of the metropolis is determined by the Johannesburg commuting field within which are located all towns sending 50 per cent or more of their resident workers to Johannesburg. Within the area defined in this way are the towns of Roodepoort, Randburg, Sandton, Edenvale and Bedfordview all of which have limited local work opportunities and are known as mainly White dormitory towns to Johannesburg. Fair (1975) notes that this largely White-collar labour force which is employed in commerce, finance and services in Johannesburg's central area, accounts for well over half of the 345,000 vehicles which entered the Johannesburg municipal area daily in 1972. This commuting field is termed the Johannesburg Metropolitan Area or Region since its social boundaries, determined by a unity of commuting behaviour, and its economic boundaries, determined by its economic dependence predominantly upon the core city, are virtually coincident (Fair, 1975).

For purposes of the present analysis of some of the problems of the metropolitan area, the Johannesburg Metropolitan region can be further subdivided into an inner zone, which corresponds largely to the area of the Johannesburg Municipality, which comprises the old *static* residential townships and an outer zone, incorporating the surrounding dormitory towns, comprising the new *dynamic* residential townships. The problems of the

inner and outer zones thus tend to be different and are consequently handled separately (Fig. 8.1).



Fig. 8.1 - Metropolitan Johannesburg : Inner and Outer Zones (Fair,T.J.D., 1975)

Metropolitan Growth

Metropolitan *growth* results from the tendency for basic economic functions to concentrate in one area and to take advantage of large scale production. The increased profits that are expected to accrue stimulate the formation of a permanently growing industrial agglomeration. The consequent multiplying effect on local industry increases the rate of growth of the urban area and the increased demand for tertiary services leads to the development of a technical and social infrastructure. This in turn contributes to the attractiveness of the area for the location of new basic industries. Thus the interplay between *basic* and *non-basic* functions have a cumulative effect upon development (Gorynski and Rybicki, 1970).

Metropolitan Problems

The *problems* associated with metropolitanisation have been identified

by, among others, Forstall and Jones (1970) and are cited in Patricios (1973). These are problems associated with decentralization of selected functions, problems of traffic congestion, a lack of parks and recreational space, financial problems, problems of obsolete housing, problems of local administration and government fragmentation, problems of land shortage, problems of the provision of services, problems of decline at the centre of the urban system and problems of urban residential sprawl.

Johannesburg's Metropolitan Problems :

Inner and Outer Metropolitan Zones

Johannesburg had developed its metropolitan character by 1960 and although many of the problems of the metropolis were evident before this date, most of the attempts to solve them were effected during the metropolitan phase of development. The problems of the inner zone were *firstly*, traffic congestion in the Central Business District which resulted in the construction of a system of motorways; *secondly*, problems of urban renewal in residential townships close to the Central Business District; *thirdly*, problems of housing obsolescence within high status neighbourhoods which manifested themselves in extensive renovation by individuals; *fourthly*, problems of a shortage of residential land in all categories of the housing market which resulted in heavily inflated prices and peripheral development; *fifthly*, problems created by the decentralization of certain functions, especially those of city government, shopping, warehousing and offices and certain types of high density components; *sixthly*, problems of urban residential sprawl, and *finally*, problems associated with the size of the urban system. The problems which faced the outer zone were *firstly*, those created by the rapid growth of population which caused an unusual demand for housing; *secondly*, those associated with the fragmentation

of local government and the creation of new towns whose inhabitants continued to find employment in Johannesburg; *thirdly*, those created by the increasing use of the motor car which, in conjunction with the motorway system encouraged the proclamation of a new generation of peripheral residential townships and *finally*, those problems associated with the size of the metropolitan urban system.

Inner Zone Developments

Invasion and Succession (The case of Braamfontein and Parktown)

Basic to the study of urban forms is the principle that in all forms of growth there are three stages of development : *integration*, or evolution and development; *equilibrium*, a static condition; and *disintegration*, or decline and decay. Urban districts grow in desirability, pass through a static stage, and finally decline in value for the purpose for which they were originally created, only to be replaced by new forms with new functions.

Braamfontein, a township which adjoins Johannesburg's Central Business District, has responded to the pressures of time and passed through the phases of development, decline and rejuvenation. It is an area unique in the city's morphology since it now has many functions of central business without being physically a part of the city centre. This is due to its location relative to the roads which link the Central Business District with the high status residential townships, its historical foundations and the effect of the Town Planning Scheme (1936, as amended).

By 1909 the residential character of Braamfontein was complete and the township fulfilled its function despite the onset of the phase of disintegration and decline after 1940. The turning point in this phase took place in 1936, when the Town Planning Scheme (as amended) (Bowling, Floyd,

of local government and the creation of new towns whose inhabitants continued to find employment in Johannesburg; *thirdly*, those created by the increasing use of the motor car which, in conjunction with the motorway system encouraged the proclamation of a new generation of peripheral residential townships and *finally*, those problems associated with the size of the metropolitan urban system.

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Richardson, 1936) rezoned a large portion of Braamfontein to a new use and so introduced general commercial activities. Although the Scheme was an artificial determinant of change it followed the direction of natural market forces and it simply regularised the existing pattern which was admitting central business functions to the township.

Until 1950 little was done to use Braamfontein's undoubted potential. After this time however, as has been noted elsewhere in this study, the urban growth processes of Johannesburg started to operate in Braamfontein's favour, especially when the scheme to bridge the Railways Reserve became a reality. Inevitably therefore investors and entrepreneurs began to recognise the economies to be gained from locating in Braamfontein which, by now, possessed many of the advantages of the Central Business District.

The initial invasion by offices was confined to Smit Street (Fig.8.2) due to the constraints of the Town Planning Scheme, but later, when the northern area was rezoned, a flood of development followed. So from being a township of detached and semi-detached single-family dwellings before the Second World War, Braamfontein became a commercial, special residential and industrial area by 1965. The use of floor space is shown in Tables 8.1 and 8.2.

Braamfontein's advantages for the decentralization of offices within the context of greater Johannesburg can be couched in terms of the situation obtaining in the Central Business District from 1950 to 1960. The Central Business District was confronted with high land prices, great congestion and concomitant difficulties of access to essential services. So Braamfontein had many advantages. The most conspicuous of these were the lower land costs and consequently the lower rentals, the uncongested streets and the ease of movement, and an abundance of floor space which

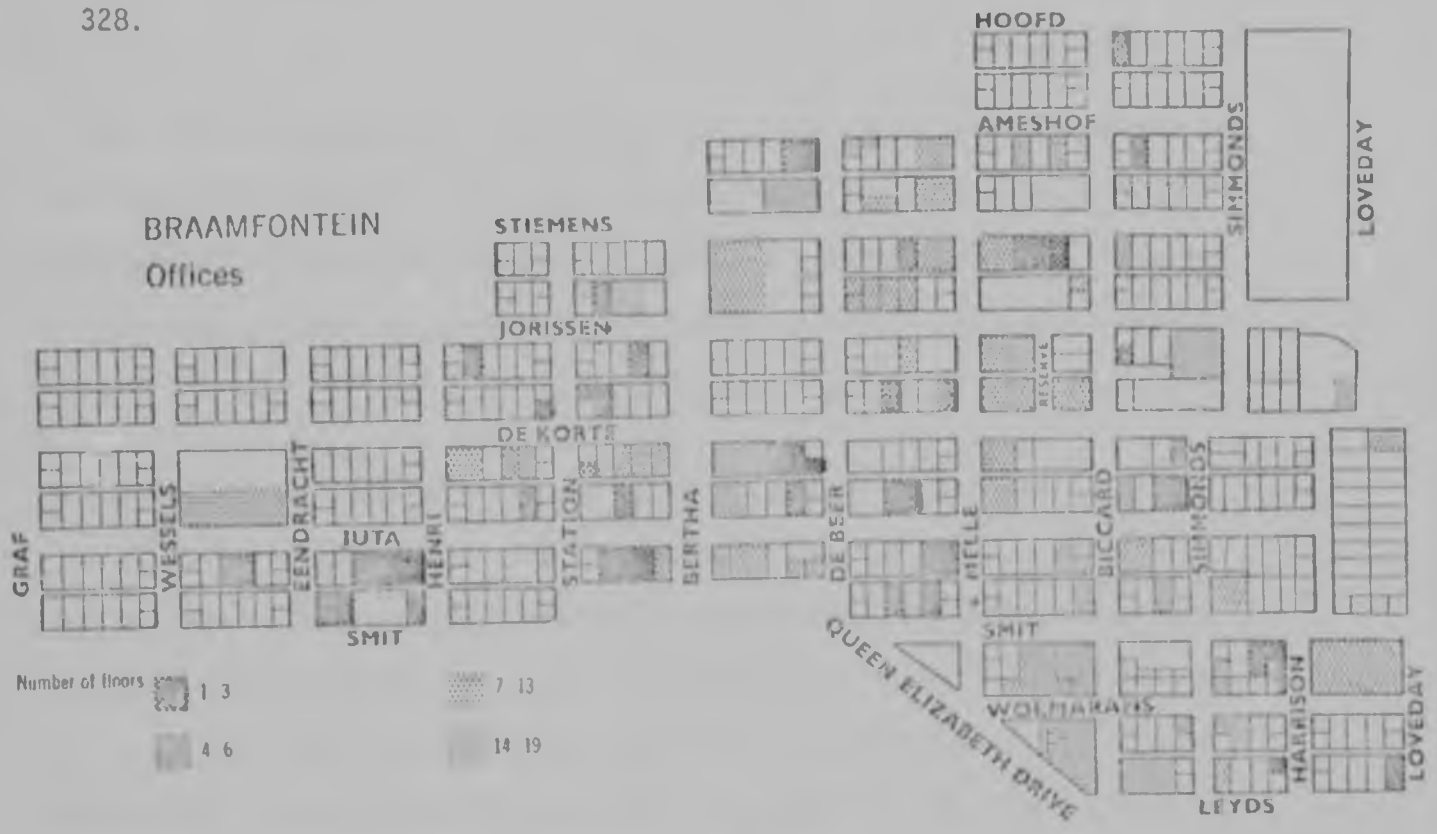


Fig. 8.2 - Braamfontein : Office Space 1968. (Hart, G.H.T., 1969).

Table 8.1 - Braamfontein : Change in Floor Space 1966-1968 (inclusive) in 1000's sq. ft.

Traffic Zone	Congregation	Residential	Retail	Showroom	Office	Wholesale	Warehouse	Industrial	Parking
400	+6	-10	+11	+11	+399	+7	+81	+2	+91
411	+15	+28	+2	-	+344	-	+20	+1	+177
412	+12	+56	+138	+22	+735	-	+51	+82	+215
Braam-fontein Total	+33	+74	+151	+33	+1475	+7	+152	+85	+483

Source : Johannesburg Central Area Report June 1969: Forward Planning Branch, City Engineer's Dept.

Table 8.2 - Braamfontein : Floor Space Use Percentages - 196.

Floor Space Use	Braamfontein Business	
	1000 sq.ft.	%
Congregation	153	4.0
Residential	933	24.5
Retail	362	9.5
Showroom	47	1.3
Office	1756	46.1
Wholesale	11	0.3
Warehouse	300	7.9
Industrial	248	6.5
Total	3810	100.0

Source : Johannesburg Central Area Report Jure 1969 :
Forward Planning Branch, City Engineer's Dept.

allowed enterprises to expand. The office uses which entered Braamfontein during the sixties were those which did not require centrality, and in many instances they served not a local but a national market. A good example of this type of building was that which housed the Electricity Supply Commission of South Africa which, at one time was the largest office block in Johannesburg. Other offices in this category were the vendors of business machines and office equipment, service firms, contractors and allied firms, printers and publishers, investment and insurance brokers, the head offices of large firms and associations,

institutes and societies. Table 8.3 reflects the office structure of Braamfontein in 1967. Other uses are shown in Table 8.2.

Braamfontein's development as a subsidiary of the Central Business District had a dramatic effect upon the price of real property there. By 1968 it could be equated with commercial properties within the frame of the Central Business District and its residential function was irrevocably destroyed.

The pattern of change in nearby Parktown was somewhat different from that in Braamfontein. Benjamin's (1972) *Social History of Parktown* deals with the decline of the suburb's residential character and this source is used here. He notes that as early as 1912, *Sunnyside* (Lord Milner's home) became a student residence for the South African School of Mines and Technology, the forerunner of the Witwatersrand University. In 1922 the *Villa Arcadia* (the second of the Phillips' homes) was sold to the Jewish Orphanage in the face of a protest petition from citizens who wanted the Town Council to take it over as a residence for distinguished visitors. In 1923 the first block of apartments was constructed at the eastern end of Empire Road and called Park Lane Mansions. Perhaps the best index of impending change in Parktown however, is reflected in the land values. The municipal values in 1940 totalled a little over £2,000,000 - only twice what they had been in 1906. Ten years later, by 1950, the value had more than doubled to £5,000,000. In nearby Hillbrow and Braamfontein the high-rise apartment and office blocks revealed an intensity of development which made the rural tranquility of Parktown appear as an anachronism. Benjamin (1972) notes that a square mile of real estate so close to the thrusting city was simply too valuable, too tempting to be left to stay as it was. Most of the early invasion of Parktown took place from the direction of Hillbrow. In 1936 for example, when the Johannesburg Diocesan Trustees applied for permission to build apartments on

Table 8.3 - Braamfontein Office Survey - 1968

0.Large Headquarter Firms	Shipping	Petrol	Building	Office Equipment	Industry	Banks	Retail	Total No.of Firms
No.of Firms	2	3	3	3	6	1	1	19
1.Insurance Companies, Brokers,etc.	Insurance Companies	Brokers	Agents	Consult-ants	Training	Banking		
No.of Firms	6	8	1	2	1	7	-	25
2.Investment Companies	Investment Companies							
No.of Firms	25	-	-	-	-	-	-	25
3.Professions	Accountants	Architects Quantity Surveyors Town Planning	Attorneys	Engineers	Surveyors	Drawing Services	Others	
No.of Firms	12	29	3	48	2	4	16	114
4.Offices of Firms, Industrial & Service Firms	Industrial	Instrument and Commu-nications		Others				
No.of Firms	98	13	-	17	-	-	-	128
5.Office Services	Computer Calculator Services	Office Machine Furniture	Sundry Services	Others				
No.of Firms	18	9	9	5	-	-	-	41
6. Agents Advertising Representa-tives	Manufactu-ring Repre-sentatives	Agents	Adverti-sing and Marketing	Others				
No.of Firms	36	24	22	12	-	-	-	94
7.Contractors Allied Trades Materials	Contractors	Allied Trades	Building Materials	Others				
No. of Firms	20	20	21	6	1	-	-	49
8.Newspapers Publishers Printers	Newspapers Magazines	Publishers						
No.of Firms	4	10	4	-	-	-	-	18
9.Associations Societies	Associations	Councils	Institutes	Societies	Colleges	Others		
No. of Firms	6	3	5	3	3	7	-	27

the site of their Deanery off Clarendon Circle, Mr. Justice Tindall noted : 'A portion of the township in this neighbourhood, consisting of approximately 26 lots, has undergone such a change in character that it is unlikely that any person would desire to erect a modern private house thereon.' In the course of the next two decades Princess Place changed from a quiet backwater of houses and gardens into an affluent adjunct of Hillbrow's flatland (Benjamin, 1972). In 1951 Sir George Albu's *Northwards* was sold to the South African Broadcasting Corporation for £130,000. In 1960 it was sold again, this time to the Transvaal Education Department as a student residence. In 1957 five large properties once comprising the estate of *Bornstead* were expropriated for an Afrikaans commercial school. In 1958 the City Council commissioned a firm of town planning consultants, Bowling, Floyd and Richardson to report on the rezoning question. They came out strongly against it : 'In the interest of the city as a whole and the area locally ... its character as a good, quiet residential area should be protected.' They recommended that no more licences be given for boarding houses; Parktown should be retained as a low-density area for dwellings and selected institutions that would use large old houses without changing their outward appearance. Unfortunately however, Parktown's decline was beyond redemption. In their survey the town planning consultants unearthed many illegal boarding houses, hostels and flats, and a number of buildings being used for other illegal purposes. When in 1961 twenty-five acres were expropriated off Empire Road for a park, and in 1963 sixty-seven acres in the centre of the suburb were expropriated for a new teachers' training college, Parktown's institutional component became dominant. Shortly after this the Witwatersrand University acquired property for a new business school and a students' residence and at about

the same time two more private hospitals, an aged women's home and a centre for cripple care were built. These were followed by further expropriations for a school of ballet, arts and music in Victoria Road, and the use of the *Hohenheim* (Sir Lionel and Lady Phillips' first home) site for the new general hospital. Finally in 1970 the City Valuer acknowledged Parktown's changed function by increasing the municipal assessment rates three and four-fold from R1350 to R1900 a year in rates which, at the time, was approximately three [illegible] the figure ruling in the best residential townships in Johannesburg and was certainly the most highly rated residential property in the country. The pattern of prices and the volume of sales are shown in Appendix B and C.

The future of Parktown seems clear. Within the next two decades it will further develop its institutional function with important off-centre office buildings, high-rise hotel complexes and apartments. All these will generate a considerable quantity of vehicular traffic, and development will proceed only when the problem of gaining access to, and egress from Parktown is solved.

Decentralization - The Case of Rosebank

The Rosebank shopping centre acquired its initial importance soon after 1906, when it became the terminus for the Johannesburg tramway system. Being favourably located with regard to the high status sector, to the major axis of residential growth, and between two important arteries (Jan Smuts Avenue and Oxford Road) it has become the most important regional shopping centre in Johannesburg. As its centrality has increased and as the population has grown so has its retail and service function, and it now serves the whole of the northern region as a shopping centre. Many

of the functions represent branches of firms and professional organizations which practice in the Central Business District.

Insofar as residential property development and residential property prices are concerned the growth of Rosebank is likely to have some important consequences. A good analogy of these consequences can be drawn from Dunn's (1964) agricultural location model in which the price of a commodity is shown to be determined by the prices of commodities in competition with it. Using this analogy one notes that the amount of residential property at the inner margin of the high status sector has been systematically reduced by the advancing commercial and institutional uses in Parktown, on the one hand, and the expansion of commercial activities in Rosebank, on the other. At the same time demand has increased for residential properties close to the Central Business District and on roads which provide quick and easy access to the city centre. These demands are reflected in both the rapid increase in prices of properties in Parkview, Parkwood, Forest Town,Saxonwold and Houghton, and in the increased volume of sales in these townships. An overall compounded growth rate of 19.88 per cent per annum was realised in the sale of residences in these townships between 1966 and 1968.

Renovation Processes - The Case of Parkhurst

Another process which became evident in the late sixties was the process of residential renovation. It occurred conspicuously in a zone detailed in Fig. 8.3 in response to the social and economic forces which were prevalent at the time. A model illustrating the principal elements of the process appears in Fig. 8.4. Time periods (T_1, T_2 ....T_n) are plotted on the X-axis of the model while the value of each unit of real estate is shown on the Y-axis, (R_1, R_2....R_n). If one assumes that the value components of any property are the building (AB) and the land (V_1) then it

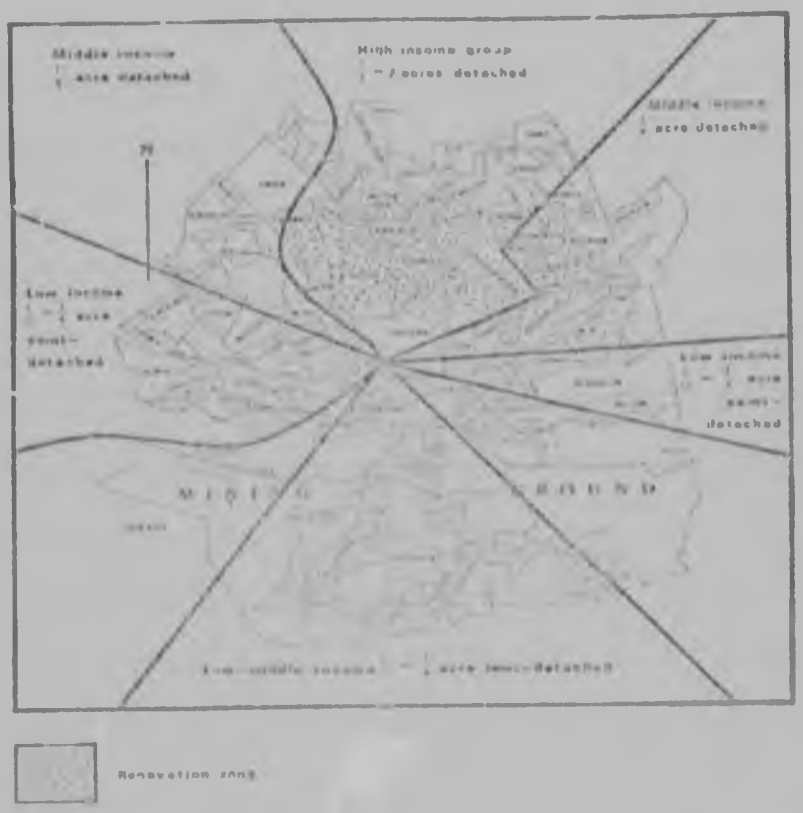


Fig. 8.3 - Socio-economic Sectors for Johannesburg and the Zones of Renovation

(Thorsen, J. and Hart, G.H.T., 1971)

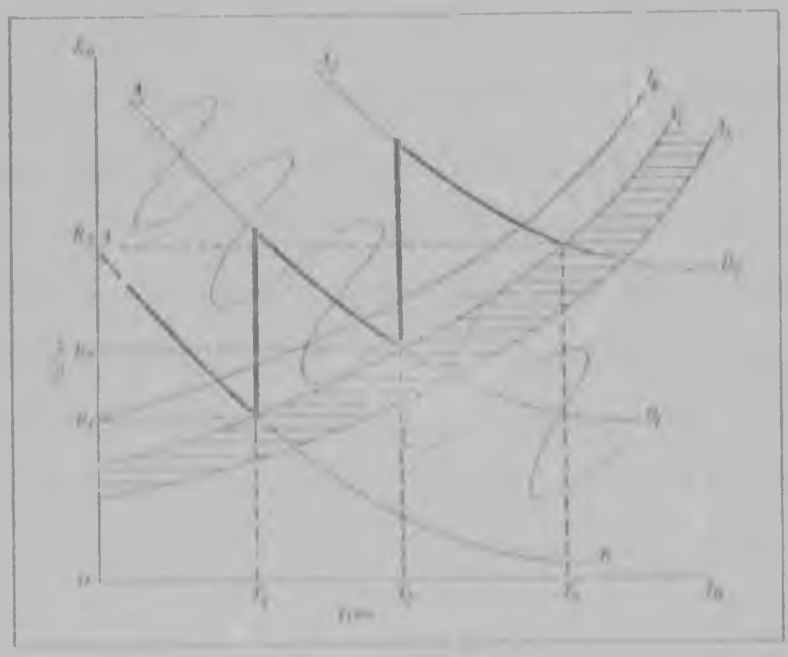


Fig.8.4 - A Graphical Model of the Renovation Process.

(Thorsen, J., and Hart, G.H.T., 1971)

follows that with the passage of time the deterioration of the building will gradually reduce its value and, during the same period the land on which it stands will appreciate in value. The model shows this situation. Inevitably the time arrives when the value of the land will exceed that of the structure on it (i.e. when $T_1 = R_1$) and disequilibrium between the factors of production will ensue. This can be corrected by renovating the building and eradicating the economic and functional obsolescence and decay which exists. This injection of capital raises the value of the structure to A_1B_1 and the procedure is repeated until such time as a different use can be applied to the site. Thus far the assumption has been made that the model reflects the behaviour of a site in a good locality, since this would ensure the logical changes described. If, however, the property is poorly located, it would be unable to assemble sufficient economic strength to improve its function within the system, and it would pass into the category of blighted districts. This phase is shown in the model by the hatched area between the curves V_1 and A_b. The curve A_b represents *actual blight*. This is a well-known condition which has been described in many ways but which usually presents a picture of physical, functional, social and economic dislocation and decay. The logic employed in defining the blighting phase may also be applied to the period which precedes a renovation. The pre-change stage is built into the model by the constraint l_b (*incipient blight*). When a district passes into the area bounded by this curve it becomes ripe for renovation. This renovatory phase is the period of greatest significance for the zone described in Fig. 8.3 where the process operates most effectively. The oscillatory curve about A_1B_1 is a diagrammatic representation of the business cycle.

The renovation model was applicable to certain parts of the Johannesburg

housing market in the late sixties when the prices of properties increased abnormally. However price escalation was not the only factor. Other influences were the introduction of limits to the size of mortgages, initially at R15,000, but later raised to R20,000 in the seventies, (these limits are represented by B_b1 and B_b2 in Fig. 8.5. When these restrictions on the size of mortgage loans are seen against the income distribution (Fig. 8.5) of the population ($I_,,I_1$) the number of stands of different sizes in the system (S,S_1) and the changing demand (P_d and A_d) representing potential demand *without* inflation and actual demand *with* inflation over time (T_1,T_2) one appreciates that the potential consumers were compelled to limit their aspirations insofar as property was concerned. In effect it produced a filtering down the property scale so that individuals began participating in categories of the market which they previously would have regarded as inferior. One other contributing factor must be noted. At about the time of the escalation of property prices the central government began restricting domestic labour, a move which clearly militated against large stands. The combination of factors presented in these models inevitably directed the attention of potential consumers to those townships having good accessibility characteristics (to the Central Business District) with small stands and in the older areas. Although these conditions are found in the inner parts of the sectors 1,2W and 2E (Fig.7.8) nowhere were they so apparent as in Parkhurst, situated in sector 1 at the western extremity of Zone B. It is therefore appropriate to illustrate the process with reference to this township. However, before proceeding to examine the process one other graphical model must be described.

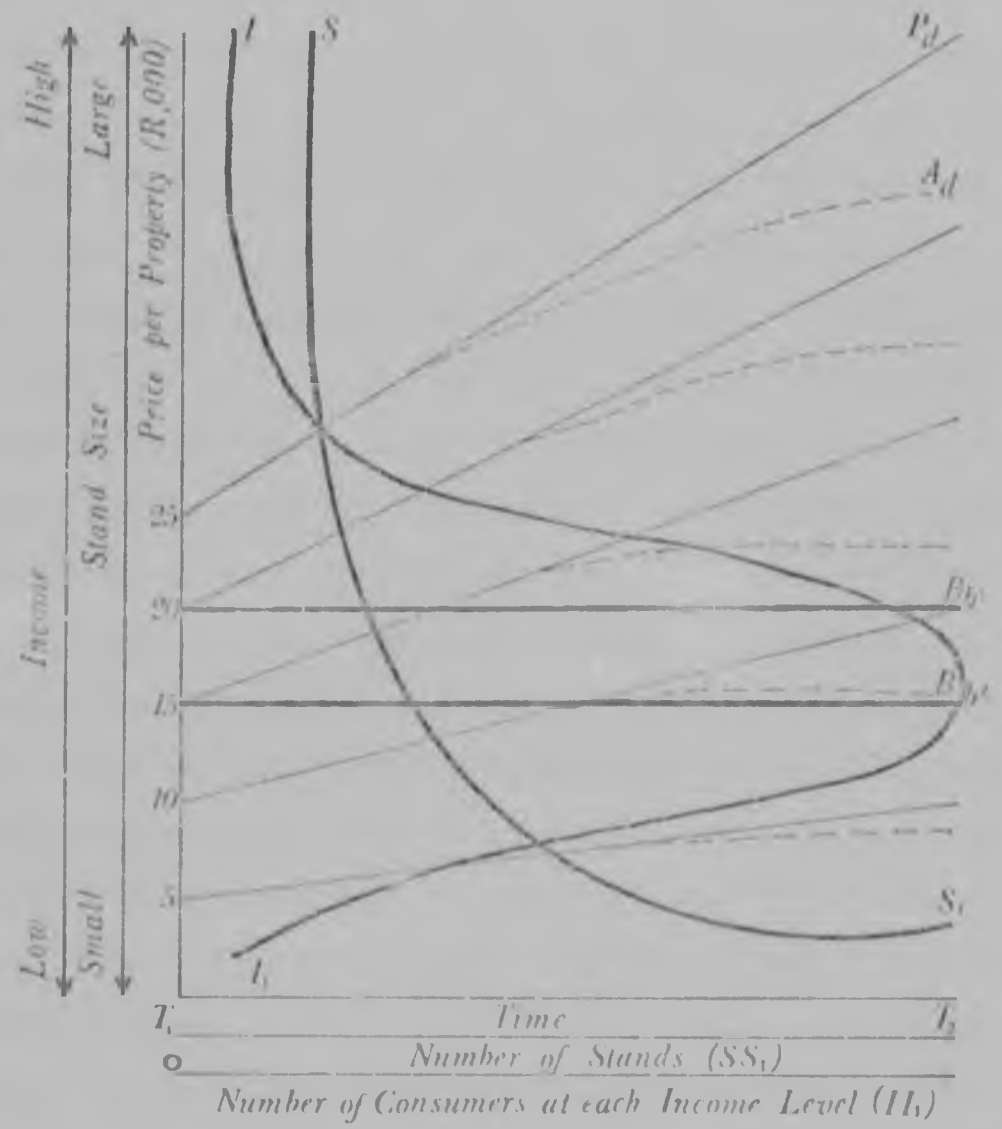


Fig.8.5 - A Diagrammatic Representation of the Process of Filtering in the Housing market Precipitated by Mortgage Restrictions (Hart, G.H.T., 1974).

In Fig. 8.6 an idealised hierarchy of townships is shown (1-6) as also the relationships between the number of stands, the range of prices and the distance of the townships from the centre of the city. It follows from these relationships that the larger, expensive, peripheral townships have a wide range of prices (a fact attested to by statistics contained in Appendix C) while the inexpensive townships with small stands near the centre of the system have a small range of prices. Parkhurst would be placed near the middle of this hierarchy.

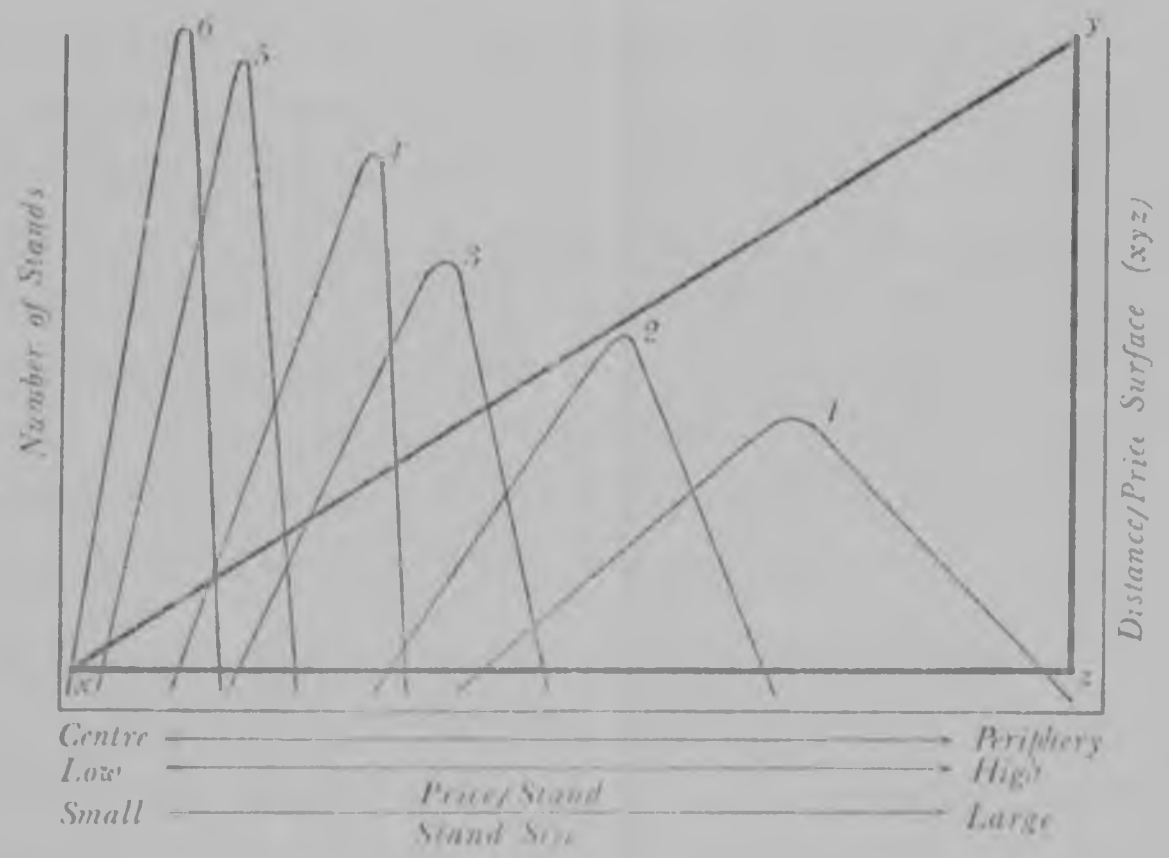


Fig. 8.6 - A Diagrammatic Representation of the Range of Prices and the Number of Stands in Different Categories of the Hierarchy of Residential Townships in Johannesburg.

The settlement history of Parkhurst and its essential anatomical features are easily described. It is situated four miles (6.4 km.) from the city centre and approximately on the seventeen minute isochrone from the peak-land-value intersection. It is a mile west of the Rosebank shopping centre and is relatively small. It has only six avenues, numbered from east to west, and twenty-one streets numbered from south to north. It is well placed both with regard to municipal transport and to the major arterial roads. Parkhurst was proclaimed in 1904 and grew in three phases (Fig.8.7). The first phase terminated temporally in 1940, and spatially at Tenth Street, the second phase lasted only a decade when settlement advanced to Seventeenth Street, while the final phase witnessed the completion of the pattern.

When renovation began in Johannesburg in response to the economic and other conditions described above, the attention of individuals was directed towards the oldest and most decayed parts of Parkhurst. Here because of the deterioration caused by age and neglect, properties could be acquired at modest prices particularly in view of their small size (one-eighth of an acre (454 square metres)). Consequently the process is most evident in the southern parts and decreases northwards (Fig. 8.8). The general effect of this process has been to change the socio-economic structure of the community as is evident from the changed price structure of the housing. The growth rate of the suburb as a whole between 1966 and 1972, this being the major renovatory period, was 13.8 per cent, a most favourable figure when compared with other townships in the sector (Table 7.1). Also of significance is the manner in which the *range* of prices increased as renovation changed relatively ordinary dwellings into distinguished homes (Appendix C).

Although this process has been shown to operate intensively in Parkhurst the indications are that intensive renovation is occurring

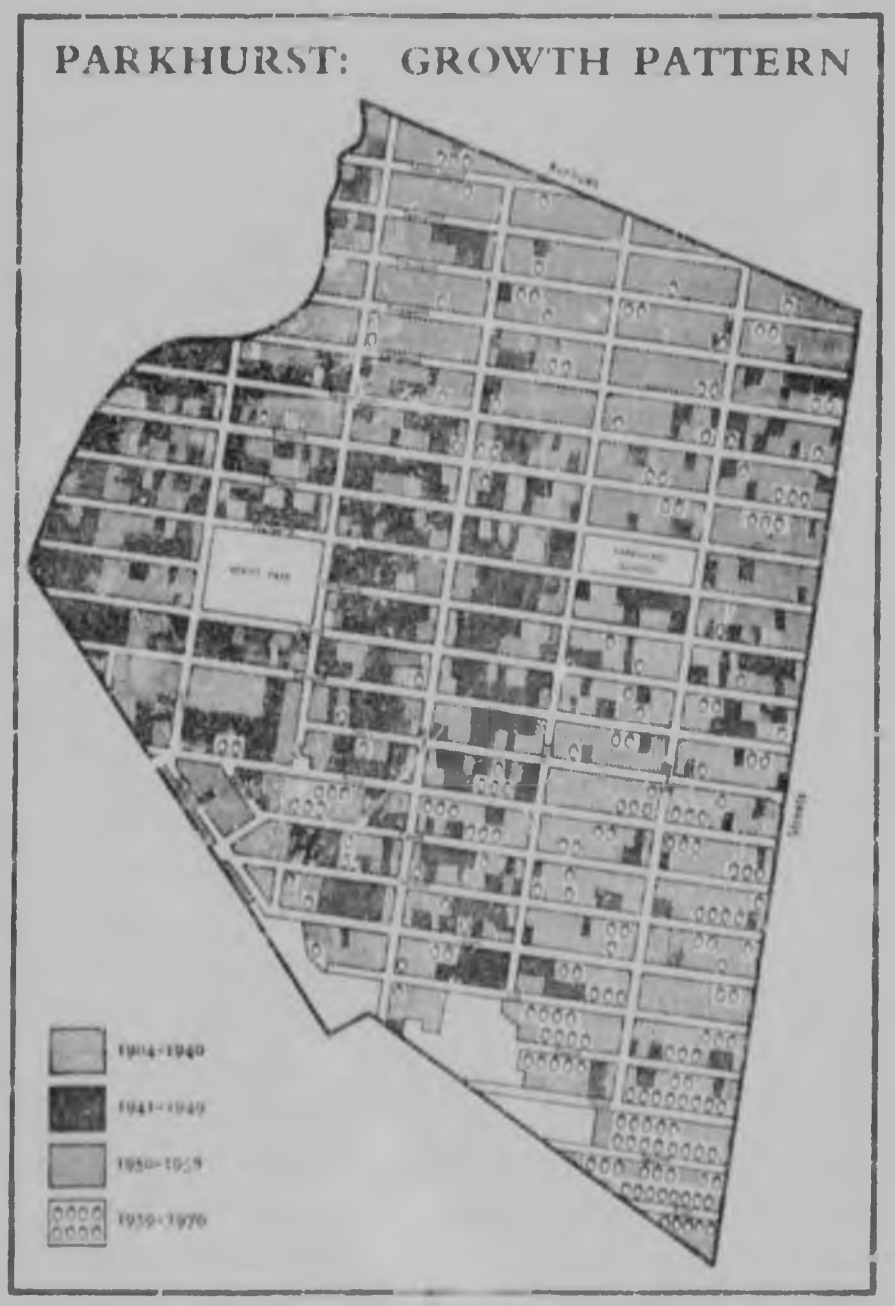


Fig. 8.7 - Parkhurst, Johannesburg : The Phases of Growth, 1904-1970

in other well-located townships with similar characteristics such as Melville and Norwood. Elsewhere renovation is extensively practised as is indicated by Table 8.4 in which one notes that alterations and additions to private dwellings increased by 600 per cent between 1960 and 1970.



Fig. 8.8 - Parkhurst, Johannesburg : The Renovation of Properties (expressed as a percentage of properties in each street) From First Street to Twenty-Second Street.

(Thorsen, J. and Hart, G.H.T., 1971).

Table 8.4 - Johannesburg : Plans for Alterations and Additions to Buildings, 1959/60 - 1969/70

(City Engineer's Reports, 1959/60 - 1969/70)

Year	Private Dwellings		All Other Buildings		All Non-Residential Buildings	
	No.	Value	No.	Value	No.	Value
1959/60	2022	1,436,230	78	277,760	1186	1,849,750
1960/61	3087	1,990,770	102	299,490	1295	2,292,060
1961/62	1864	1,179,745	70	162,560	1101	1,361,960
1962/63	1998	1,366,825	39	243,690	1169	1,419,575
1963/64	2222	1,274,035	80	284,050	1050	1,971,470
1964/65	2145	1,979.400	93	286,095	924	3,535,040
1965/66	2215	2,383,433	206	1,581,417	1026	9,736,470
1966/67	2231	2,730,513	145	1,134,679	1074	10,243,580
1967/68	2990	4,333,208	143	1,053,335	1069	8,288,247
1968/69	3198	4,787,061	176	2,575,670	911	9,834,958
1969/70	3519	7,300,713	70	722,735	761	7,660,325

In the eastern sector and in the Southern Suburbs the presence of substantial numbers of Portuguese immigrants in the late sixties led to a degree of renovation particularly in view of the preponderance of artisans among them (Table 8.7). However this type of renovation cannot be equated with that occurring in Parkhurst since it was, in a sense, a special case.

Urban Renewal by Institutional Investment

Soon after 1965 the authorities of both central and provincial government chose sites in the western sector on which to erect a new hospital, an administrative centre for the national broadcasting network, an extension to a teachers' training college, a regional headquarters building for the police force, an opera house and a new university. A number of important considerations emerge from these decisions. The first is that the institutions enumerated above are almost without exception either directly associated with the Afrikaans cultural group or are quasi-cultural Afrikaans establishments. It is reasonable to assume therefore, that when the decisions became generally known a demand for residential accommodation by people of Afrikaans background would increase sharply in the inner reaches of the western sector. The second consideration bears upon the effect of intensive capital investment and large-scale expropriation of land upon the prices of residential property in the area.

The townships which have been most affected are Westdene, Melville, Auckland Park and Rossmore. Of these the first two have small stands (one-eighth acre, (454 sq. metres)) and the others, large stands (half-acres and acres (.2 ha., and .4 ha.)). Consequently the higher income groups who have sought residence in the area have participated more fully in the suburbs with larger properties. In Auckland Park the average monthly price of residential properties prior to 1966 was less than R10,000, and the compound interest growth rate from 1960 to 1966 was 5.4 per cent (Table 7.1). The average price in 1967 increased by 20 per cent to R12,000 and the growth rate between 1966 and 1968 to 17.8 per cent. When compared with townships elsewhere in this sector, these statistics reveal the

unusual interest shown in Auckland Park at this time. Another township whose properties were materially affected by developments in the western sector was Rossmore. Its location next to the new university site assured it of considerable interest from property buyers and speculators. Whereas mean monthly prices prior to 1966 were, in general, below R15,000, after this, they rose above R20,000 and even as high as R41,500 in October 1968. The growth rates also reflect this pattern. Between 1960 and 1966 the compound interest growth rate of property prices in Rossmore was 5.2 per cent per annum. From 1966 to 1968 this increased to 30.9 per cent (Table 7.1). The range of residential property prices in both Auckland Park and Rossmore also increased considerably after 1966 (Appendix C), a fact which reflects the broadening socio-economic spectrum in these areas.

In both Melville and Westdene the pattern of property appreciation has been similar to that in the more salubrious parts of the sector. Interest in Westdene was delayed however by its relatively poorer qualities, especially with regard to its stand size and its location near the non-White townships. Consequently mean monthly prices of properties in Westdene were below R7,000 from 1960 to about the middle of 1968, after which they were always above this figure, and rose as high as R18,500 in July 1972. The compound interest growth rate from 1960 to 1966 was -2.9 per cent, whereas that between 1968 and 1972 was 33.4 per cent. This reflects quite clearly the great stimulus given to residential property prices as a result of the institutional changes in the sector. In Melville an average monthly price of over R9,000 was achieved for the first time in 1965 (Appendix B). Thereafter the popularity of the suburb increased rapidly so that by 1969 average monthly prices of over R10,000 could be expected. The compound interest growth rate in Melville from 1960 to 1966 was only 2.6 per cent, while that from 1968 to 1972 was 11.5 per cent, and that from 1966 to 1972

was 10.1 per cent (Table 7.1). The overall pattern of change in the inner areas of the western sector are shown in the SYMVU maps (Fig. 7.4). Although residential property prices elsewhere in the sector reflected the buoyant conditions of the economy after 1968 there were few areas which experienced changes as great as those described here.

Other Urban Renewal Schemes

In the climate of optimism and prosperity of the period 1963 to 1965 the City Council was able to turn its attention to the problems facing the blighted areas. Housing obsolescence is a feature of all metropolitan areas and in Johannesburg the townships which were settled during the Formative Phase of development possessed, in 1963, all the physical and social characteristics associated with urban blight. These areas were to the east and west of the Central Business District.

At the time, the process of urban renewal was viewed very much as a surgical one. The City Engineer described it as one of 'treating or removing decayed and malignant patches and grafting in new component parts. He noted that once begun, it becomes a never ending operation and can remould whole communities in the course of time. Its most important function he said, was to provide an opportunity to apply the latest techniques and principles of town planning' (City Engineer's Report, 1963) Urban renewal schemes produce a number of problems for both residential development and residential property prices. The first problem is the effect which it has upon the general level of property prices in the area of renewal These usually rise in sympathy with improvements since it is clearly difficult to curb the sale of residential properties in an entire township without severely detracting from the liberties of individual

owners. Property transactions are usually restricted only in the *immediate neighbourhood* of the urban renewal scheme. As a result those homes not involved, rise in price (as the locality becomes more favourable and more desirable) and the original inhabitants find themselves unable to afford the increasing rents. Another problem concerns the life-style of those occupying the houses prior to renewal. The blighted areas are usually the 'grey' zones described by Burgess so that irrespective of the changes in the physical fabric which urban renewal effects, the people living there remain the same socially dislocated poverty-ridden individuals they have always been. So they treat their new homes with much the same disrespect as they did the former. A final problem is that an urban renewal scheme must always try to improve the physical and social environment of a locality for its inhabitants, and any move which persuades them to leave the area, however unintended this persuasion might be, condemns the scheme to failure. This pattern of problem, is a common one in Johannesburg and because of the influence which the renewal process has had upon residential development and upon changing property values it merits some attention. It remains to describe the means by which renewal has been effected in Johannesburg and its consequences for the housing market.

Early in 1963 a technical sub-committee was appointed to consider the problem of urban renewal within the Municipality. The particular areas which came under review were those where pockets of slums already existed and which were blighting adjacent areas. The examination and analysis of the surveys revealed a number of different causes for the deterioration. In general, they were the age of the buildings, the close proximity of undesirable elements, inadequate or out-dated road patterns, the types of occupiers and the lack of suitable social and educational facilities. From these general surveys an area for a pilot scheme was delimited in the Doppestown-Fairview-Troyeville suburbs. It was bounded by Commissioner and Railway Streets (to north and south respectively)

and Berg and Jules Streets (to east and west). Additional surveys of inhabitants (family structure, income, housing, schooling and recreational needs and shopping requirements) were made, as also were building surveys, to determine the condition of buildings. As a result 41 per cent of the buildings were demolished. A variety of living units comprising two and three bedroomed flats, duplex flats, single storey row and semi-detached houses were built, and a number of the existing homes were rehabilitated. Despite these improvements the success of the scheme and others like it will depend upon teaching the inhabitants to care for themselves, for until they can do so, external improvements will be of little value. Allied to this consideration is that which envisages retention of the socio-economic structure of a slum area to prevent property speculation, rising prices and the expulsion of the people the scheme is designed to help.

Other areas in the municipality where similar renewal and rehabilitation schemes were anticipated, were Vrededorp, Bertrams, Lorentzville, Judith Paarl and Doornfontein (north of the railway line). Schemes of a slightly different type were those involving Martindale and Sophiatown, already alluded to, and Albertville. These were formerly slum areas occupied mainly by Africans which were to be redesigned for the sole use of Europeans. Consequently, in the late sixties freehold tenure was granted and whites moved into areas close to the Coloured townships of the western sector (Appendix B and C). At the same time a redevelopment survey was conducted in Fordsburg with the object of finding a suitable site for an oriental bazaar or shopping complex for the Asian community.

The schemes outlined above were without exception in the inner eastern and western sectors of Johannesburg and some of the effects of this new-found interest are evident in the compound interest growth rates 1962-1966 in these townships (Table 7.1). Fairview, Jeppestown and

Troyeville for example had growth rates of 11.3, 14.4 and 17.0 per cent respectively, while Bertrams showed a remarkable increase of 45.6 per cent. It is apparent from the records of individual sales in these areas that property speculators took advantage of the urban renewal schemes on the one hand, and the favourable economic climate on the other, to invest in what was regarded as the poorest quality White housing.

White Housing Schemes 1963

Whereas the period of the fifties had been dominated by the problem of housing the non-White members of the community, that of the sixties saw the White section in need of accommodation. Funds were made available by the National Housing Fund for this purpose and a special housing section was established. Its function was the co-ordination, planning and construction of housing schemes, the investigation of the various forms of industrialised housing, and establishing the demand and acquiring land for the White and Coloured communities. The socio economic groups requiring the assistance of this section were those with incomes of less than R250 per month. By 1966 the section had reached its initial target of 4000 dwelling units. Surveys established that suitable vacant land for mass housing in the municipal area was to all intents and purposes, non-existent. That available was very costly and took considerable time to transfer. Added to these difficulties were the sharp increase in building costs between 1963 and 1966 (Fig. 7.3) and the universal shortage of skilled White labour. The section established the demand for the next phase, that from 1965 to 1970,at 4000 units and a draft programme with expenditure of R4,000,000 per annum was approved.

The shortage of building land in Johannesburg at this time is another indication of its metropolitan status. Land shortages arise in metropolitan systems simply because of their economic orientation, their dynamic character and their rate of growth. Residential development is therefore confined almost exclusively to the perinhery, a fact which is not always compatible with the development of residential areas for the lower socio-economic sections of the community.

In what was probably the most ambitious scheme in West Turffontein and Haddon (Southern Suburbs), 400 dwelling units were planned in a community with its own sports fields and recreational facilities, administrative offices and clinics. In detail it comprised 14 detached houses,34 single-bedroomed flats, 195 double-bedroomed flats and 30 single old-age flats. The scheme therefore catered for the full life cycle of the community. This was the first garden-setting scheme in Johannesburg, and was completed at a cost of R2,000,000. Nearby in Reserve D of West Turffontein a similar scheme of 54 dwelling units and 18 old-age flats, designed as an ancilliary to the larger scheme was laid out at an estimated cost of R364,449. In Bezuidenhout Valley in the eastern suburbs, a small scheme of duplex flats was located on the stream flowing through the area in a picturesque setting. It comprised 70 units and cost R410,061. At Claremont a scheme was planned in two stages to house (eventually) 450 families mostly in detached houses with blocks set aside for multi-storey development in garden settings. The estimated cost of the first stage was R981,524 and its capacity was 185 families. The Elandsfontein scheme was planned for 1300 units, mostly detached, with its own shopping centre and hotel site. When finally complete the design called for three primary schools and one secondary school and would cost approximately R7,500,000. In Vrededorp a pilot heme on the old Vrededorp

Compound site was specifically designed to decant the population from Vrededorp when urban renewal of the Vrededorp-Pageview area was undertaken. The plan, with an estimated cost of R1,750,000 would house 277 families and 66 aged members of the community. Adjoining the municipal housing scheme at South Hills a further extension on the Kliprivіersberg Estate Small Holdings was planned to accommodate about 500 family units at a cost of R2,750,000 (City Engineer's Reports).

Coloured Housing Schemes

Further building took place in the realm of Coloured residential development in 1964 when 3,000 units were constructed within the municipal area and in the western sector. As with White housing schemes a five year development plan was followed, the cost of which was R10,000,000. Four schemes were designed. The first, the Newclare Expropriation Area was a high density multi-storey plan for economic and sub-economic classes. It was designed to house 900 families at a cost of R2,400,000. The buildings were of industrialised construction and placed in a garden setting. Nearby at Westlea Extension 1, were 174 multi-storey units and 146 single storey units and 146 single storey row houses on an austere sub-economic basis. This was also in a garden setting on a portion of the old Western Native Township. The cost was estimated at R665,000. Another area in Westlea Township was allocated to owners to build homes to their own designs. Incorporated in this scheme were two and three storey flats and duplex flats. The area will ultimately have 1500 houses and will cost R4,000,000. Finally, the Riverlea Flats Scheme comprises 122 multi-storey two, three and four bedroomed flats and 12 duplex flats all in garden surroundings and costing R400,000.

The primary significance of the Coloured residential development of the period from 1962 to 1966 lies in its entrenchment of a particular ethnic, socio-economic and socio-cultural unit in the western residential sector. It reveals the policy of the City Council to reinforce the cultural traditions of different population groups in different localities.

Impact of Freeways and Major Roads on Residential Property Prices

One of the most important problems emanating from the process of metropolitanisation in Johannesburg during the sixties was automotive congestion. A system of freeways was devised to ameliorate this, together with a programme of road-widening . It was largely complete by 1972. The effects of the traffic plan upon the Johannesburg residential environment are not easy to measure since the sales of residential properties on freeways and major roads are seldom sufficient in number to allow valid conclusions to be drawn.

In their studies on the geographic impact of highway development (1958a, 1958b) Garrison and Marts distinguish between effects which influence specific urban sites and effects which influence larger areas. The first are termed 'site effects' and include irritants such as noise, pollution, visual intrusion and their economic consequences, while the second are termed 'location effects' which influence travel patterns, place location and land values. The location effects of major roads and freeways seem, on balance, to have a beneficial effect upon the urban environment. The findings of the Highway Research Board of the United States indicate that an improvement in the road system leads ultimately to higher land values and more intensive land uses. Similar results were produced by Garrison and Marts in their summary of 35 highway studies for the Washington State Highway Commission. They found that general land

values increase as a result of freeway location. In 1959 Berry and Garrison published their *Studies of Highway Development and Geographic Change* in which an empirical space-price equilibrium model of the utilization of a service (in this instance, physician care) was formulated. They concluded that freeway improvement affects all areas that are interrelated in trade; the accessibility improvement leads to higher benefits for producers than for consumers; new freeways cause larger flows of interaction at a lower cost; and finally, that freeways contribute to increases in land prices (Edwards, 1973).

The most comprehensive transportation study in Britain is the Buchanan Report produced by Professor Colin Buchanan for the British Ministry of Transport (1960). His findings were primarily directed towards problems associated with traffic but some of his conclusions are relevant in the present context. *Firstly*, he asked for the enforcement of the '... much needed integration of land use planning with traffic and transportation planning.' This acknowledges the significance of transport networks upon land uses and indirectly therefore, upon land values. *Secondly*, he advocates the control of the demand for the private vehicle. This is an acknowledgement of the view that the environment is an inseparable part of the transport problem (Edwards, 1973). Buchanan notes the need to identify 'environmental areas' which cater for man and not machine. *Thirdly*, he says, the basic method of traffic planning should determine initially the required environmental standard in a given urban area, and make this dictate the maximum traffic allowable in the area. Any increase in traffic capacity must not be achieved at the expense of environmental quality. *Finally*, Buchanan notes that freeways are the logical attempt to lace together urban sprawl, and he sees no other more logical device for this purpose.

This brief review of studies dealing with the impact of freeways

upon urban systems suffices as a foundation for the present study. Viewing highway development from the standpoint of residential development and residential property prices one must be concerned with 'location effects' on the one hand, and 'site effects' on the other. The motorway system of Johannesburg has been found by Edwards (1973) to be a primary determinant of residential growth northwards from the Central Business District. The townships of Bryanston and the more peripheral settlements, Rivonia, Halfway House and Kyalami have all responded to the extension of the M1 motorway. Its impact can be couched in quite simple terms. These townships, previously considered quite remote from the centre of Johannesburg have been brought by the M1 motorway, to within the thirty minute isochrone, centred upon the City Hall. Inevitably therefore, the lower land price, the lower taxes and the semi-rural environment have encouraged individuals and families to migrate outwards. The motorway has also improved the connectivity between Johannesburg and Pretoria such that daily commuting between these cities is not an uncommon phenomenon.

Turning to the question of 'site effects' one is confronted with much that is both negative and deleterious in freeways,especially insofar as they affect residential areas. At the micro-scale, where the individual site is affected, the evidence from Johannesburg suggests that high status and low status people present different reactions to freeway intrusion. This is illustrated in the present study with examples of prices from both the northern high status sector and the western low status sector of Johannesburg. In the sixties as the motorway progressed northwards from the Parktown Ridge along the southern margins of Forest Town, Saxonwold and through Houghton Estate and Waverley, its deleterious influences became apparent in a reduction in the values of those residential properties

adjoining it. The question of establishing the precise impact of major roads upon Johannesburg's residential property prices is complicated by two factors. The first is that varying sized stands make comparisons difficult, particularly as many of the older suburbs were bounded by stands of larger than average size. The second is the degree of comparability between different time periods. The present study has, for example, illustrated that residential property prices can change quite substantially within the space of a few months. In this analysis, sales of residential properties adjoining the motorways and major roads are compared with average sales for the townships in question. These statistics appear in Table 8.5. At first sight there would seem to be little evidence to suggest that major roads have a depressing effect upon the values of residential properties adjoining them, considering that as many properties are above the mean as there are below it. This however, does not completely negate the hypothesis. A closer examination of the township plans reveals that property size is a crucial factor. In the case of Forest Town for example, the stands adjoining the motorway are 40,000 square feet (4,000 square metres) compared with an average for the township as a whole of less than 20,000 square feet (2,000 square metres). Consequently the prices paid for these stands should be seen both in relation to the average township price and the size of the stand which that average represents. In the case of Bramley where the inhibiting influence is Corlett Drive (a major link-road from east to west) the pattern is much clearer (Table 8.5). Here the prices paid for stands along the route are *substantially* lower than those for Bramley as a whole. Because of the relationship which exists between income and residential property preferences, one would expect the high and low status communities to react differently to the influence of motorways. This is readily borne out by an inspection of the prices paid for Westdene properties (a relatively low status area) situated in Perth

Table 8.5 - The Prices of Properties in the High Status Sector Adjoining Motorways and Major Roads Compared to the Average Prices of Townships Concerned

(Record of Transfers)

Township	Stand No.	Price (R)	Date of Sale	Township Average
Forest Town	726	32,000	Feb. 1969	36,000
Forest Town	729	55,000	Apr. 1969	51,000
Forest Town	730	45,000	Apr. 1969	51,000
Forest Town	688	30,000	Jan. 1971	26,000
Forest Town	696	36,000	Dec. 1968	27,000
Saxonwold	176	39,400	Feb. 1972	42,200
Saxonwold	324	33,000	Feb. 1971	50,100
Saxonwold	382	19,000	Oct. 1971	38,000
Houghton Estate	1884	46,000	Oct. 1970	44,700
Houghton Estate	1806	42,500	Jul. 1970	42,000
Bramley	Re.94	14,500	Jan. 1969	22,000
Bramley	Pl.,86	24,000	Feb. 1969	24,700
Bramley	Pl,66	20,300	Feb. 1969	27,200
Bramley	Re.58	28,000	Mar. 1969	27,200
Bramley	[illegible]95	19,000	Mar. 1969	27,[illegible]00
Bramley	61(2 stands)	37,000	Mar. 1969	27,200
Bramley	Re.97	18,000	Aug. 1969	22,700
Bramley	Pl,83	20,000	Sept. 1969	31,000
Bramley	Pl,81	20,500	Jan. 1970	26,000
Bramley	Re.94	19,000	May 1970	22,200
Bramley	Re.65	24,000	June 1970	26,000

Road East, a major link road between the Central Business District and the Coloured suburbs (Table 8.6). Here there is no significant devaluation, and the comparison is made clear since all stands in the township are of the same size. In fact it is not unusual for properties on the highway to fetch prices above the township mean.

Table 8.6 - A Comparison of Prices Paid for Properties in Perth Road East, Westdene, With Those for the Township as a Whole

(Record of Transfers)

Year	Month	Stand No.	Price (R)	Township Mean
1970	Jan.	810	9,600	8,500
"	Jan.	846	4,500	8,500
"	Feb.	808	13,900	10,500
"	Feb.	890	8,000	10,500
"	Feb.	899, 901	16,000	10,500
"	March	746	9,500	10,000
"	May	723	13,000	9,600
"	May	730	14,000	9,600
"	July	824	10,000	9,600
"	Aug	896	9,850	10,600
"	Sept.	862	15,000	13,500
"	Sept.	895	12,500	13,500
"	Nov.	re.716	10,500	12,300
"	Nov.	747	13,000	12,300
"	Nov.	872	13,000	12,300
1971	Feb.	843	17,500	13,600
"	June	803	7,000	8,500
"	Sept.	817	12,000	12,200
"	Sept.	755	9,000	12,200
"	Nov.	774	11,750	11,200
"	Dec.	775	13,500	12,100
1972	Feb.	898	16,500	11,100
"	July	881	16,000	18,600
"	Aug.	836	7,000	9,500

Another example of the deleterious consequences of major roads on residential properties emerged when a plan based upon the Transportation Corridor Concept was presented to the Management Committee of the Johannesburg City Council in 1970. This plan comprised motorway and major road proposals and a rapid rail transit system together with an extensive bus feeder system, park and ride facilities and further parking garages. The public were invited to

ascertain how the scheme would affect their properties and no fewer than 3,800 queries were received. The surface road system, as advocated in the plan, comprised a series of east-west arteries, approximately 600 feet in width (200 m.), with a number of north-south roads of similar dimensions. This would have turned the city into a series of rectangular boxes. While the feasibility of the plan was under consideration the affected properties became unsaleable. Some townships which because of their configuration were more seriously affected than others, suffered real declines in the volume of sales. The scheme was rejected by the Management Committee in July 1970. One of the major consequences of the publication of the Transportation Plan was its general effect upon the public who became very conscious of road schemes and their consequences. It led the City Engineer in his report of 1971, to complain that a 'constant stream of enquiries has been directed at my department by estate agents and their clients.' Following the expropriation of property affecting 57 owners in Corlett Drive in 1970, a further 67 were affected in the Old Pretoria Road between Craighall and Craighall Park, and 100 in the Johannesburg Road in Lyndhurst and Kew.

Minority Groups and Residential Location

A feature of the process of metropolitanisation is the emergence within the residential mosaic of clusters of culturally and ethnically alien groups. These congregate in discrete areas for a variety of reasons which have been detailed in earlier chapters of this thesis. The cluster syndrome inevitably influences both residential development and residential property prices, and in the present study two such culturally alien groups are briefly examined. In the Southern Suburbs of Johannesburg a Portuguese cluster has been investigated by Cohen and Hart (1973), while in Linksfield, to the north of the Witwatersrand ridge, Michaelson's (1973) study of the Jewish cluster provides adequate evidence of the influence of this process.

Although the Portuguese community has been represented in South Africa in general and in Johannesburg in particular for many years, their numbers increased quite dramatically in the late sixties (Fig. 8.9). Their area of origin was predominantly the district of Porto in Portugal where economic vissicitudes precipitated the movement. The initial migrants were married males (Cohen and Hart, 1972) who, having established themselves financially in Johannesburg subsequently introduced their wives and children. Their choice of La Rochelle as an area of settlement is consistent with much of the theory on the residential location of minority groups. Because of their ineffectual financial condition and low socio-economic status they chose a township of small stands, low prices and, while having a poor location environmentally, was close to the city centre. The influx of Portuguese precipitated an outward movement of the host community (English and Afrikaans speakers) (Fig. 8.9), and after 1970 La Rochelle developed into a cluster, when over 30 per cent of the houses were owned by migrants (Fig.8.10). They were predominantly artisans (Table 8.7) so structural renovation of buildings has been extensive, and inevitably the value of the houses has increased remarkably. The increasing range of prices reflecting this situation is shown in Appendix C. In view of the pervading Portuguese spirit represented by the language, cultural institutions and religion, the familial connections and the social bonds, it seems likely that the cluster will strengthen, and inevitably the rising prices and the expanding range of prices will continue to be a feature of the area.

At the other end of the socio-economic scale, the suburb of Linksfield and its extensions, situated to the north of the Witwatersrand ridge and at its eastern end, presents a different pattern of a minority group.

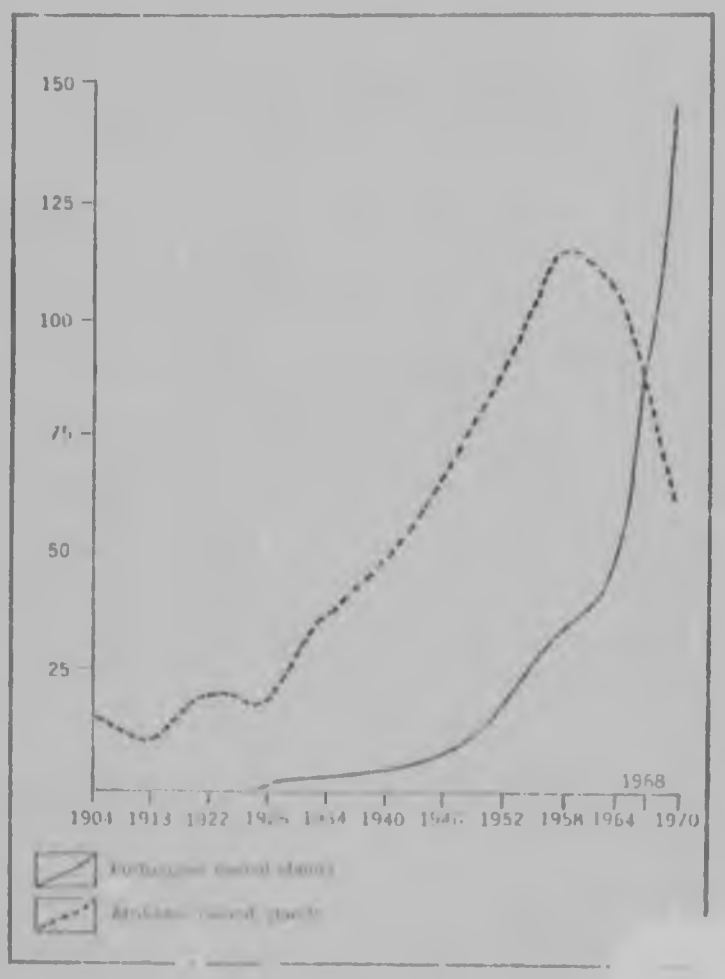


Fig. 8.9 - Portuguese Community, La Rochelle, Johannesburg : Settlement data of Host and Migrant.
(Cohen, S., and Hart, G.H.T., 1972)

Michaelson's(1973) study of the neighbourhood and networks in Linksfield reveals strong contrasts in almost all regards with La Rochelle. Linksfield is a township of large stands (over 2,000 square metres), the population density is low (Fig. 7.12) and the incomes are high (Fig. 7.13), the spatial preferences are illustrated by numerous tennis courts, swimming pools and an abundance of large trees and shrubs. The environmental quality is further preserved and protected by the high ridge which forms the southern boundary of the locality. The growth of Linksfield has been closely associated with the Jewish community since 1948 when the

Table 8.7 - Portuguese Community, La Rochelle, Johannesburg : Cultural Traits, Occupations and Work Locations.

(Cohen, S. and Hart, G.H.T., 1972)

Facet	Category	% of Sample	Category	% of Sample
Religion	Roman Catholic	94		
	Portuguese Evangelical	4		
	Other	2		
Occupation	Males' Type		Work Location	
	Builder	30	All over	36
	Carpenter	25	City	27
	Welder	10	Alberton/Germiston	18
	Fitter	10	La Rochelle	4
	Mechanic	10	Other S. Suburbs	6
	Electrician	5	Other	9
	Clerk	5		
	Other	5		
	Females' Type		Children's Type (18)	
	Housewife	87	Mechanic	33
	Clerk	7	Clerk	22
	Dressmaker	3	Shop Assistant	17
	Shop Assistant	2	Printer	17
	Music Teacher	1	Housewife	11
Language	Whole family speaking English	10		
	Parents only	5		
	Children only	38		
	Father and children	27		
	Father only	17		
	No-one	3		
Schools and Clubs	Children not at school	42	None	63
	At English medium	45	Portuguese	36
	Religious	13	Open	1
Family Structure	1-5 children (under 20)	88		
	Children over 20	12		
	No children	12		
	1 married couple	75		
	2 married couples	5		
	Single, over 20	3		
	1 or 2 people over 65	5		

King David Primary School moved to a corner of its present site in [illegible] township.

In 1956 a further twenty acres surrounding this site was purchased by the South



Fig.8.10 - Portuguese Settlement Pattern in La Rochelle, Jonannesburg 1972.
(Cohen, S. and Hart, G.H.T., 1972)

African Jewish Board of Education. and by mid-1957 both a nursery school and a high school had been established. The influx of Jews into Linksfield is well illustrated by Table 8.8 which reflects the pattern.

Table 8.8 - The Influx of Jews into Linksfield (Michaelson, 1973)

Year	No. of Private Homes	No. of Jews	Jews %
1949	84	19	22.6
1955	129	44	34.2
1964	182	110	60.4
1970	182	135	74.7

The desire to form a cluster in Linksfield reflects a similar syndrome to that found in La Rochelle. The overwhelming consideration is a cultural one. In Linksfield the Jews have provided a strong set of cultural institutions which, to use the terms of H.J. Gans, (1967 and 1969) gives them an ethnic cohesion which is highly prized. He noted that Jews particularly desire Jewish neighbours and that their main concern was to be together. The primary focus which has created the cohesian in Linksfield are the institutions, while secondary factors are the excellent environment which is summed up by Michaelson with terms such as *peace and privacy, the country atmosphere, spaciousness, scenery and climate* and finally the *accessibility* to the city. These qualities have produced a price response (Appendix B) which places Linksfield in the highest status rankings and further confirms the view that in general,minority groups influence the behaviour of housing markets.

The urban processes which are described here are some of the more important which have emerged in the inner zones of Johannesburg as its character has changed from that of a city to that of a metropolitan area. These internal changes have been accompanied by changes in the outer zone, that which embodies the ring of commuter towns described by Fair (1975). These changes are equally important as determinants of residential growth and residential property prices.

Outer Zone Developments

Suburbanization (Residence) and Decentralization (Employment)

Some of the important developments occurring in the outer metropolitan zone of Johannesburg are couched here in terms of macro- and micro-scale changes in the distribution of the White population. At the

macro-scale, that of the nation or of the region there has been an increasing tendency towards ever greater concentration, while at the micro-scale there is an intra-metropolitan trend towards ever greater dispersal (Clark, 1970). Abler, Adams and Gould (1971) describe the process as one characterized by 'dispersion ... occurring within a general context of agglomeration'. In metropolitan Johannesburg these trends are clearly associated with the differential development of the secondary and tertiary sectors of the city economy, with the consequent differential development of its secondary- and tertiary-sector work centres, and with the location of land available for the residential expansion needed to serve such centres. The second Witwatersrand report (Part 2) of the Witwatersrand University Urban and Regional Research Unit (1972-73) examines in some detail the re-distribution of the White population (and concomitantly White residential development) from 1951 to 1970, and this source is used here. The differential sectoral development led to an increase in the number of White residents in Roodepoort, Randburg, Sandton, Edenvale and Alberton from 57,300 to 170,600. This represented an increase of 198 per cent at an average annual rate of 5.9 per cent. Between 1954 and 1972 the number of developed residential erven in the same area increased from 13,600 to 38,000, and the consumption of residential land from 3,800 hectares to 11,700 hectares or by 208 per cent or an average rate of 6.4 per cent per annum. These growth rates were two and three times higher than the averages for the inner zone as a whole, and were accompanied by population increases (Whites) ranging from 50 per cent to 100 per cent between 1960 and 1970 (Fig. 8.10). The densities of residential population showed increases of up to 20 persons per hectare during the same period (Fig. 8.11). There exists a strong relationship between the fringe development described here and the work opportunities in Johannesburg city where from 30 per cent to 70 per cent of the White municipal work forces concerned were employed in 1965.



Fig.8.11 - Metropolitan Johannesburg : White Population Percentage Change 1960 - 1970.

(P.M.R. Morris, Witwatersrand University, Urban and Regional Research Unit, 1973).

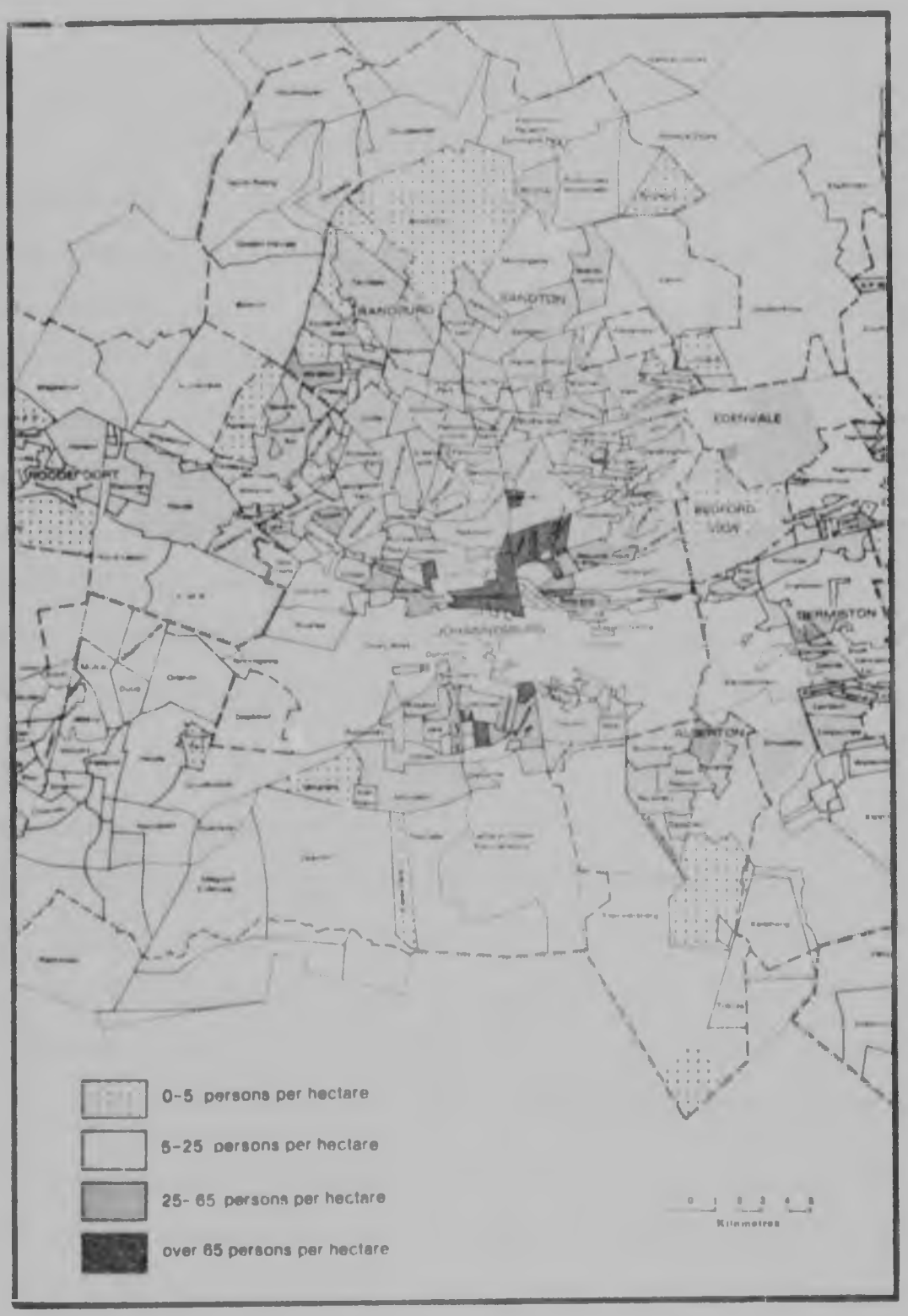


Fig. 8.12 - Metropolitan Johannesburg : White Population Density, 1970.

(P.M.R. Morris, Witwatersrand University, Urban and Regional Research Unit, 1973).

In reviewing the residential development and the growth of population during the phase of metropolitan development one notes that the most spectacular changes took place in the outer zone. The White population in the central city increased by no more than 1.1 per cent per annum between 1951 and 1970 to a total of 482,589 persons, and the number of developed erven grew by only 2.0 per cent per annum between 1954 and 1972 to a total of 90,000. During the same period the amount of residential land in the inner zone that was more than 25 per cent built-up rose by 1.0 per cent per annum to 13,545 hectares. These growth rates are two and three times lower than those of the suburban fringe; but they reflect an increasing intensity of use of residential land, especially in and around the city's heart, where, from the 1950's onwards, large numbers of residential erven were changed from 'special' to 'general' use in order to permit the construction of flats.

One other important feature of the outer zone must be dealt with. In order that such spectacular residential development could be effected an equally spectacular technological development was necessary to support this growth. One has noted at other stages of the city's growth that the technologies of sewage disposal, electricity and water reticulation and road making have all played an important rôle in residential development.

Steps were taken in 1961 to develop substantial sewage purification works at a site south-east of Alberton, another at Olifantsvlei, near the Bantu Townships, and a new northern purification works some twenty miles (33 km) from the centre of Johannesburg. The first was built to handle an initial 16 million gallons of sewage per day (68,2 m. litres) at a cost of R800,000, on the farm Liefde en Vrede. The main object of the scheme was to facilitate

he south-eastern development of the City (City Engineer's Report, 1962). The Olifantsvlei works were developed at a cost of R2,750,000 and had an initial capacity of 10 million gallons (45.5 m. litres). The northern works had the same initial capacity and were designed to take all the effluent north of the Parktown Ridge. The opening of this new system permitted the closure of the Cydna works at Melrose, and the Bruma works at Sandringham (both in 1961) and permitted the partial closure of the Delta works which continued to operate at a capacity of 4 million gallons per day (18.2 m. litres). This development of new sewage works north and south of the city enabled the south-western native townships to expand with a semblance of orderliness, it allowed the remarkable physical expansion of the northern, north-eastern and north-western townships as far as Witkoppen, Modderfontein and North Riding respectively, and it allowed Alberton to develop into a major manufacturing town during the sixties. Technological innovations and structural works of this period are clearly inseparable from the growth of the built environment.

In reviewing this phase during which the process of metropolisation was the dominant process one notes that both centrifugal and centripetal forces were at work in metropolitan Johannesburg. These did not operate against one another but were mutu lly compatible and in a sense two parts of the same process. On the on. hand as the agglomerating tendencies grew, the Johannesburg Central Business District increased its dominance and attracted activities for which centrality was important. On the other hand, dispersion, especially of residences, and with them the White population and their supporting sub-regional shopping centres took settlement far beyond the Municipality and into neighbouring towns and villages. In the inner zone the processes of renewal, invasion and succession, clustering and renovation preponderated, while in the outer zone suburbanization and decentralization influenced residential growth and the housing market.

CHAPTER 9 - CONCLUSIONS

The conclusions drawn from this study are classified according to the insights which they yield to one's understanding of the development of Johannesburg's residential property patterns and of its residential property market from 1886 to 1972.

In the first instance it is necessary to bring to light those processes and determinants which have been present throughout Johannesburg's development. These may be termed the *pervasive* elements which, because of their dominance, are likely to be perpetuated and will remain the major determinants of growth and housing prices in the future.

The pervasive processes are the materials from which urban concepts and urban models are derived. Relating each to the other reveals the extent to which existing models reflect Johannesburg's residential structure. While the pervasive elements are of most importance, the secondary factors must not be neglected. These are those which have influenced the city's development over shorter periods of time. These secondary processes are also related to concepts and models of lesser significance.

Secondly, it is necessary to establish the validity of the hypothesis upon which this thesis is based. At the outset the view was expressed that urban residential development and urban residential property prices could not be explained purely in terms of either the social models of urban growth or the economic models of land values. By combining the theories of these two schools of thought however, an hypothetical statement was produced which claimed a much wider ranging set of determinants of growth and house prices.

This statement can now be viewed against the study as a whole.

Finally, it is necessary, in the light of the evolution of Johannesburg's housing market, to develop a prognosis for its future development. This prognosis is based upon the dominant or prevasive processes of the past and upon the insights afforded by the use of various concepts and models of urban development and urban residential property prices.

Pervasive Processes and Determinants and the Generality of Concepts and Models

Undoubtedly the most important determinant of residential development and the general level of residential property prices in Johannesburg since its inception has been the business cycle. This is a device which gives a relatively imperfect measure of the general level of economic activity within a community, and it is commonly derived from a number of indices of socio-economic conditions. Some such indicators are imports and exports, new companies registered, share prices, gold and foreign exchange reserves, unemployment, building plans passed, real estate transactions, bank debits, and the number of insolvencies. The South African Reserve Bank, which constantly monitors the economy, uses no less than 200 such time series in this regard. The significance of the building cycle with regard to residential development and housing prices derives from the fact that both consumer and entrepreneurial behaviour is either consciously or sub-consciously influenced by the business cycle and most decisions in the real estate and construction industries reflect its pervasive effect. It is not surprising therefore to find that just as the business cycle influences the housing market, so the housing market (through such measures as plans passed, real estate transactions,

construction etc.) is commonly one of the indices of the business cycle.

During the Formative Phase (1886-1902) of Johannesburg's development the discovery of gold on the Witwatersrand was the single most important factor which affected economic conditions in South Africa. In initiating the embryo settlement of Johannesburg it set in motion forces which have accelerated with each passing decade. The demand for housing which the gold discovery precipitated manifested itself in the first flush of residential townships between the mining outcrop and the Witwatersrand ridge, and in the Southern Suburbs. When the first phase of Consolidation (1902-1913) began business conditions were initially depressed by the Anglo Boer War but recovered dramatically after 1902 with an inflow of foreign capital and immigrants, an undue increase in imports, the inflation of credit and the enhancement of revenue. In this wave of speculative optimism new townships proliferated and the prices of houses rose dramatically. However the boom could not be maintained and when the gold mining industry was severely affected by a labour shortage in 1904 a recession followed and the market for residential property declined in sympathy. Despite the termination of the cyclical recession in 1909 the prices of residential properties remained depressed for the following two decades due to the extensive developments which had occurred during the Formative Phase. So, despite fluctuations in economic conditions caused by the First World War, the strikes of 1913 and 1922 and the South African Rebellion, the market for residential property remained depressed. The gold mining industry continued to attract both Black and White migrants to Johannesburg in large numbers and in doing so it generated the purchasing power which encouraged the construction of new houses in the suburbs. Despite the severity of the depression from 1929 to 1932, the Johannesburg housing market, because of the strength of the city's economic base, was relatively unaffected. After 1932 the abandonment of the gold

standard materially influenced the business cycle and in the bouyant conditions which obtained until the Second World War new townships with excellent environmental qualities proliferated. Conditions during the Second World War were depressed by shortages of materials and labour which artificially stimulated the price of housing but militated against new township development. Consequently during this period residential land was developed in relatively small parcels and in areas of low socio-economic status. By 1945 Johannesburg had moved out of the mining phase and into the industrial phase of its development and had created a market large and concentrated enough for local market manufacturing-thresholds to be attained Although the crisis of confidence in South Africa in 1960 adversely affected both the business cycle and with it the housing market the phase of Metropolitanisation (1960-1972) caused extensive thrusts of residential development in all directions. New towns proliferated around Johannesburg and the population increased dramatically. The close accordance between the oscillations of the business cycle on the one hand, and the development of residences and their prices on the other, which has been a feature of Johannesburg's development, finds no parallel in the large body of theory on urban growth and the market for urban land. Only Wendt's *Theory of City Land Values* employs economic parameters relating to the money market and to other cyclical indices. In reviewing the importance of the business cycle as a factor in determining levels of residential property prices and residential growth one can note that more townships are laid out and proclaimed in prosperous than in recessive times, that such townships are located in surroundings of good environmental quality and in keeping with the tastes of the higher status community, and that during recessions the opposite is true. The prices of houses and the volume of sales increase more rapidly when the economy is expanding than during periods of stagnation.

The second determinant which has been closely associated with the urban growth process, particularly as it has affected residential growth in Johannesburg is reflected in business and technological innovations. During the Formative Phase the spread of settlement in Johannesburg was confined by the levels of transport technology which then existed. The horse tram and the horse buggy and bicycle were the principal modes of transport so that township development much beyond the Parktown ridge could not be economically sustained. Much the same could be said of water reticulation, the sewage system, the development of the road network and the postal services. All operated within the confines of a limited spatial environment in which the mining outcrop on the one hand, and the Parktown ridge on the other, limited growth and development. The topographic bonds were broken by technological innovations introduced during the phases of Consolidation. The first of these, and perhaps the most important, was the introduction of the electric tramcar in 1906. It had a significant influence upon residential development near the outcrop of the reef and especially in those townships of lower socio-economic status which were located along this axis. It also influenced the north-eastern quadrant and for the first time introduced settlement by middle class people above the quartzites which overlook the city in Hillbrow, Berea and Yeoville. Other technolcgical developments involved the construction of a new sewage scheme for the whole city in 1927, a move which had an important effect on the growth of the Northern Suburbs. Prior to this, sewage and night soil had been removed through sanitary lanes and was introduced into special intakes in the central city system for transmission to the Klipspruit Sewage Farm which was opened in 1905. Electricity and water reticulation, road-making and the spread of services supported the substantial residential developments during the

industrial transformation. Another important innovation of a non-technical nature at this time was the multiplier effect of the new industries which proliferated in Johannesburg after 1932. Rogerson (1974) and others have noted how large injections of new industry amplify the initial multiplier by encouraging the establishment of linked industries that either provide inputs for newly arrived factories (backward linkages) or utilize the processed outputs of the same growth sectors (forward linkages). In this way the initial advantage of industrialization gains the derived advantage of industrial linkage . The combined effects of new manufacturing employment and the initial multiplier increased the urban population of Johannesburg. This in turn inevitably spawned a multiplication of contacts among the expanding numbers of persons engaged in manufacturing and tertiary functions intensifying the likelihood of technological improvement and invention, heightening the probabilities of the adoption of more efficient managerial and financial techniques and institutions, and speeding the skills of new ideas (Pred, 1966). Rogerson (1974) notes that evidence of this circular and cumulative growth process in Johannesburg was the rapidity with which industrial sites in the city were sold. As has been noted this industrial transportation and the technological innovation which accompanied it accelerated the development of the urban population and with it the concomitant residential component. By the end of the phase of Acceleration the Southern Transvaal complex, as a result of its high market access and the operations of the invention-innovation and manufacturing-threshold mechanisms, possessed 45.2 per cent of the country's industrial workforce and a substantial proportion of this was domiciled in Johannesburg.

During the Metropolitan Phase (1960-1972) tertiary functions

supplanted manufacturing as the principal component of urban growth in Johannesburg. Manufacturing became subordinated, although not replaced by business, service and professional activities, and these became the major agents of metropolitan growth. Whereas in 1951 manufacturing accounted for 28 per cent of Metropolitan Johannesburg's work opportunities and 37 per cent of its net external earning capacity by 1970 commerce (including finance and transport) had overtaken secondary industry both in terms of employment and contribution to net external earnings (Urban and Regional Research Unit, 1973b). The shift to services and the transition from city to metropolitan status was accompanied in Johannesburg by further increases in the urban population although, as has been demonstrated, these occurred in the outer metropolitan zone. Such peripheral development could not have been effected had further technological developments not been undertaken at this time. These followed trends similar to those at the turn of the century and again in the twenties. A motorway system was designed and implemented, major roads were widened and a new sewage system was commissioned some 20 miles (34 km) north of Johannesburg. At the same time the Rand Water Board increased its capacity and extended its reticulation system to the periphery of the Metropolitan area.

In reviewing the influence of this second pervasive determinant of the process of residential growth and concomitantly, real property prices, one must note that while the business cycle largely influences economic behaviour in the urban system, development and expansion proceeds only when strongly supported by a sophisticated technology and inventive-innovative faculty. While these pervasive factors have materially influenced residential development in Johannesburg in a general way they give relatively few insights into the spatial configurations of the residential mosaic.

The most pervasive spatial processes were those which produced sectors

of different socio-economic status and concomitantly sectors of differing residential property values. The pattern is one which has been described by Hoyt. Within this pattern the importance of accessibility to the Central Business District is manifested in the price individuals are prepared to pay for accessible positions. This is a factor which has always been important and it lends credence to those theories of the urban land market which have accessibility as their main characteristic. Within the sectoral framework of the residential mosaic, income, the size of stands and the density of settlement reflect the views of Beckman (1957), Clark (1951) and Muth (1960). The high status community have, throughout Johannesburg's growth revealed a predeliction for large stands with high environmental standards. Hence those localities with good views, good amenities of space, a fine aspect and freedom from the polluting odours and noises of industry have always commanded high prices. The opposite is generally true of areas of low socio-economic status. In such sectors the stand sizes are small, yielding a fine texture in dwelling patterns and high density living, space is an amenity which none can afford, environmental standard is of a low order with, in general, a lack of open spaces, proximity to mining industry, commerce and transportation routes, and low-lying land with southerly aspect and an outlook of poor quality. This pattern comes close to conforming to Davie's (1938) model of the urban system.

Another element of the spatial pattern of residential development which has persisted throughout Johannesburg's history is the separation of people, not only socio-economically, but also ethnically. It confirms the patterns of Shevky and Bell (1955), Berry (1973) and Hart (1973). The western sector has persisted as a non-White sector since 1886 and it has materially affected the general level of prices in the area. More recently

the maturity of the settlement and the broadening of its socio-economic spectrum has introduced other ethnic elements, so that separation along lines of race, religion and language are all influences upon residential development and especially residential property prices in discrete areas.

Some factors have not been pervasive in the sense that they have persisted through time. These are those processes which have presented themselves at critical points in the evolution of the urban system. In the Formative Phase the land holdings by large companies such as the Johannesburg Consolidated Investment Company (Barnato Bros.,) and the Braamfontein Company (Ecksteins) materially influenced the nature and direction of residential development. The original survey of Johannesburg by Jos de Villiers (1886) and his four squares which bounded the commercial district had a similar effect. The location of the homes of the leaders of society was perhaps more important in the early development phases than in later ones. The *garden city concept* of Ebenezer Howard (1946) which was encompassed in the phrase *rus in urbe* introduced a new dimension to urban living which in recent years has declined in importance as space as an amenity has been priced beyond the reach of all but the very wealthy. The introduction of a formal town planning scheme in 1931 materially influenced the development of discrete areas, most notably perhaps in Berea, Hillbrow, Argyle, Wanderers View and Braamfontein, where land use changes were formalised by the scheme. The location of major social and sporting institutions such as the Wanderers Club, initially near the Central Business District, and more recently in the suburbs, affected both the direction and the nature of residential growth. Finally, during the most recent phase of Metropolitanisation one has witnessed the processes associated with this phenomenon. Decentralization, invasion and succession, renovation, and agglomeration are currently moulding the environment for the future.

The Validity of the Hypothesis

The hypothesis can be restated in the following terms :

Residential development and the value of residential property is determined by :

(a) the historical evolution of the settlement pattern of the city, including the evolution of the city's technology

(b) the physical characteristics of residential areas and their neighbourhoods, including their accessibility to the city centre,

(c) the state of the international, the national and the local economies from time to time, and especially that of the money market,

(d) the cultural overlay of the individuals who occupy the sites and of those who reside elsewhere in the system. (The term embodies the religion, the ethnic origin, the language, the intellectual, professional and educational status, the socio-economic status and the stage in the life cycle of the individual or group concerned.)

A comparison of the determinants of residential growth and those of residential property prices, both pervasive and transitory, reveals that the hypothesis as stated in these general terms is true. Clearly the question of scale is important. The scale of observation in the present study, seeking as it does, general trends and patterns of urban development, must inevitably fail to uncover processes which operate at the micro-scale. Only in a few instances has the present study been able to pursue micro-scale observations. Future research will clearly be in this direction.

Prognosis

A satisfactory prognosis is complicated by developments of a relatively unexpected nature. Throughout the present study examples have been cited of decisions and events which have substantially influenced both residential growth and residential property prices. This phenomenon was adequately illustrated by the varying response to the incursions of the freeway system into select residential areas. If one is permitted to limit one's prognosis to the macro-scale of observation some useful comments on the future can be offered as follows :

1. The rate of urban residential development and the general level of residential property prices in Johannesburg will continue to be influenced primarily by the general level of business activity, locally, nationally and internationally.

2. Technological and business innovations and the economics of metropolitanisation will ensure that the population of Greater Johannesburg will continue to grow at a high rate relative to the rest of the country so that the demand for residential accommodation will increase in the future. The development of a new system of freeways and the possible development of an underground railway will cause a further proliferation of peripheral townships and predictable changes in the structure of the inner residential areas.

3. Those processes responsible for sectoral development will continue to be the dominant processes in metropolitan Johannesburg. Consequently such factors as the leaders of society, the quality of the environment, the location of industry and commerce,

the proximity of other important towns, - these will all influence the spatial pattern of development in the future.

4. Internal reorganization will be an important feature of residential development before the turn of the century. The changes which have occurred in Braamfontein and Parktown will inevitably spread eastw rds and westwards along the Parkcown Ridge. This physical feature will continue, for the forseeable future, to be the final barrier to the expansion of commercial and institutional functions to the north. However the record of the Johannesburg City Council and of the Transvaal Provincial Administration in the past does not preclude the possibility of rezonings in Forest Town, Saxonwold and lower Houghton from 'special' to 'general' residential.

5. The pattern of new township development will, in the future, change insofar as stand size is concerned. The dis-economies introduced by large stands in the past will not be tolerated by local and provincial authorities. This will make the existing large stands relatively more valuable and will inflate prices in certain localities.

6. Ethnic differentiation will continue to be a feature of the residential mosaic. This is a particularly important determinant of residential property prices and future research should be directed towards establishing the movements of individuals and groups within the city and the effects of these movements upon houseprices.

7. Renovation of old residences in the zone of renovation will be a feature of residential development in the next score of years. This will be accompanied by changes in life style and the socio-

economic status of the individuals who participate in this process. It will also be accompanied by extensive subdivision of residential properties in the zone.

8. Suburbanization and urban residential sprawl will continue unabated, assisted by new developments in freeway technology and other forms of mass movement.

9. Although sub-centres on a variety of scales will proliferate, none will usurp the Central Business District as the major financial commercial and general business centre of the national economy, since it has both national and metropolitan significance. As such it will continue to be the main employment centre, a fact which will continue to make residential land near the Central Business District more valuable than that remote from it.

10. Despite the presence of a very substantial parcel of land near the Central Business District which will shortly move out of mining and into other uses, the dichotomy of Johannesburg's antecedants are likely to persist. As Mallows (1961) noted 'Everything nature and man could do ... conspired to make settlement love the north and shun the south'. Consequently the attempts by entrepreneurs to attract a high status community to settle on former mining land is likely to be either unsuccessful or very expensive. In any event the stigma attached to the Southern Suburbs will probably persist and this attitude will continue to be reflected in the prices paid for housing there.

APPENDIX A

Johannesburg : Mean Municipal Valuations per Suburb, 1904 - 1967
(City Council of Johannesburg, Valuation Roll)

APPENDIX A - Johannesburg : Mean Municipal Valuations per Stand per Township (£) 1904-1957
(Municipal Valuation Roll)

Note : Residential Property Only. X - Extension

Township	Year									
	1904	1913	1922	1928	1934	1940	1946	1952	1958	1967
Abbotsford	125	40	25	15	25	425	650	1650	2000	2900
Albertskroon		145	5	5	5	30	40	100	150	225
Albertville	8	105	1	2	3	12.10	55	80	100	125
Argyle	900	320	284	235	300	1370	2000	Commercial		
Auckland Park	300	145	100	110	120	225	375	750	800	1000
Bagleyston								1150	1300	1650
Bellevue	150	112	105	140	150	275	400	800	1000	1100
Bellevue Central			160	160	180	225	300	Commercial		
Bellevue East	80	43	30	78	85	275	350	800	1000	1100
Berea	400	205	190	200	300	475	555	1000	1200	1350
Bertrams	300	97	78	85	90	225	250	500	500	550
Bezuidenhout Valley	250	65	52	65	75	185	250	450	500	550
Birdhaven								1200	2600	4000
Booysens	200	70	56	60	70	100	150	350	400	400
Booysens Reserve	50	10	6	16	20	40	175	350	Industrial	
Braamfontein	2000	1200	2500	1740	2000	3500	5500	Commercial		
Braamfontein Water Erven	600	330	Ceased to be a separate township							
Birnam			5	9	7	110	300	750	1000	1400
Blairgowrie							250	400	600	875
Bramley and Reserve		25	16	16	17.10	180	450	1000	1100	2100
Brixton	100	45	35	52	65	150	250	350	450	600
Burgersdorp	300	170	140	150	150	300	Commercial			
City and Suburban	6001	230	257	270	400	Industrial				
Cheltondale									1100	1600
Cheltondale X										1900
Chrisville								475	500	700
Claremont	30	15	10	10	5	10	80	140	150	175
Cleveden					45	200	300	475	475	450
Cleveland		110	57	20	45	200	350	450	450	425
Cottesloe		66	55	55	120	175	250	350	500	30
Crosby						125	250	450	500	725
Craighall							400	1300	1600	1900
Craighall X 2						180	No Data			1350
Craighall Park						120	300	800	1000	1450
Crown Gardens										400
Cyrildene						225	540	1100	1250	1500
Delamere's Lease	400	Ceased to be a Separate Township								
Denver	130	48	50	35	40	200	200	Industrial		
Dewetshof										1670
Dewetshof X										1700
Doornfontein (New)	300	125	112	195	420	600	Commercial			
Doornfontein Charlton Terrace	450	No data	310	300	300	750	1250	Commercial		
Doornfontein		195	189	210	220	600	650	750	Commercial	
Doornfontein Gardens	500	Commercial								

Township	Year									
	1904	1913	1922	1928	1934	1940	1946	1952	1958	1967
Doornfontein North	350	40	78	83	90	400	2000	2500	Commercial	
Dunkeld		60	60	240	520	900	1400	3500	3600	4000
Dunkeld West					156	600	800	2600	2600	3600
East Town		305	2	2	3	40	56	50	100	175
Elton Hill								1150	1500	2600
Elton Hill X 1									1400	2300
Elton Hill X 2									1500	2600
Elton Hill X 3									1500	2600
Elton Hill X 4									1500	2500
Emmarentia						375	700	1350	1500	2150
Emmarentia X 1							600	1100	1600	2250
Evans Park										700
Fairmount						250	400	950	1200	1500
Fairview	400	170	170	210	215	370	350	450	500	620
Fairwood		30	30	40	45	225	400	650	700	925
Fellside		70	No data	175	200	350	400	650	700	850
Ferndale	160	417	390	410	400	2250	Commercial			
Forest Hill	60	15	12	29		180	280	400	500	600
Forest Town		80	165			700	1000	1900	2000	2600
Fordsburg	400	150	140	156		70	Commercial			
Fox's Reserve	2000	Ceased to be separat								
Franklin Roosevelt Park							350			950
Franklin Roosevelt Park X 1										600
Gardens	60	30	32	32	30	60	275	650	900	1525
Gillview										850
Glenesk					100	250	375	650	700	600
Greenside					120	300	550	1000	1100	1500
Greenside X 1						350	650	1050	1200	1725
Greenside X 2						325	600	1050	1230	1725
Greenside X 4								1050	1200	1650
Greenside X 5							550	1050	1200	1650
Greenside East					120	300	575	1050	1200	2150
Gresswold									1350	2000
Greymont						30	40	90	150	175
Greymont X 1										225
Haddon			30	25	33	130	275	600	700	775
Hawkins Estate								1000	1250	1500
Highlands Nort	700	115	115	115	90	400	400	900	1000	1000
Highlands North		8	5	12	17	150	250	550	1200	750
Highlands North X 1						150	225	650	1200	1200
Highlands North X 2							375	1150	1200	1700
Highlands North X								1050	1200	1600
Hillside	100	Ceased to be a separate township								
The Hill			34	41	55	200	350	650	800	950
The Hill X 1							400	750	800	1000
The Hill X 2										
The Hill X 3										

Township	Year									
	1904	1913	1922	1928	1934	1940	1946	1952	1958	1967
ne Hill X 4										1000
Th. Hill X 5										1200
The Hill X 6										.250
The Hill X 7										1200
Homestead Park							325	450	600	650
Houghton Estate	800	245	250	275	550	1150	1800	4000	4000	5000
Hurst Hill			12	15	30	110	140	250	350	400
Illovo						625	1200	2500	2750	3000
Illovo X 1								1750	2000	2750
Illovo X 3										3000
Jeppestown	450	120	103	90	230	250	450	500	500	475
Judiths Paarl	150	105	73	77	95	175	250	400	750	475
Kenilworth		40	44	75	100	200	350	500	600	700
Kensington	200	50	45	54	90	180	350	500	550	675
Klipriviersberg										675
Killarney			25	40	90	Commercial				
Lake View	100	10	8	10	10	100	150	Commercial		
Langlaagte North						120	200	400	500	600
La Rochell	110	55	57	71	70	180	225	350	450	525
Linaberg Park									650	87
Linden	30	35	50	55	105	400	450	850	1100	13
Linden X 3									1100	1500
Linksfield and X 1, X 2, X 3			65	70	175	600	750	1300	1500	3000
Linksfield North								1800	2400	3750
Linksfield Ridge							900	1750	2000	2500
Linksfield Ridge X 1									2000	2150
Lorentzville	200	140	126	126	150	210	300	700	750	550
Malvern			55	70	110	225	350	500	600	625
Marshalls	500	400	375	500	850	Commercial				
Martindale		30	35	40	45	125	200	200	250	250
Maryvale			20	25	30	250	250	850	900	1100
Mayfair	350	115	80	90	140	250	350	550	500	550
Mayfair West					40	140	225	550	500	600
Melrose	150	55	70	135	450	500	1100	2900	3100	3650
Melrose X 1								2200	2600	4000
Melrose X 2									2000	2700
Melrose Estate					400	600	1000	2800	2800	4000
Melrose North						470	700	2200	2900	3700
Melrose North X 1							900	2000	2900	4150
Melrose North X 2								1800	2000	2600
Melrose North X 3								1800	2000	2650
Melville	45	20	42	60	80	170	300	550	650	675
Moffat View								350	450	600
Montgomery Park										775
Montroux									950	1500
Mountain View	1000	290	303	250	350	No Data			3600	3325

Township	Year									
	1904	1913	1922	1928	1934	1940	1946	1952	1958	1967
Newclare			40	40	45	120	200	350	350	47[illegible]
Newlands	17	20	2	5	10	40	60	200	250	275
Newtown		600	700	750	Commercial					
Northcliff						400	510	1250	1500	1750
Northcliff X 3								650	750	900
Northcliff X 5								1150	1250	1600
Norwood	48	42	40	40	46	160	300	600	650	825
Oaklands	150	100	80	82	145	450	785	2000	2500	3600
Observatory		265	185	267	300	470	850	1650	1800	2250
Observatory X 1					100	210	842	1650	1800	2400
Orange Grove		40	42	45	90	250	400	650	750	925
Orchard.	183	72	75	105	105	325	500	1200	1300	2100
Ophirton	100	38	31	36	40	225	850	Industrial		
Paarlshoop	40	105	37	44	55	80	110	210	350	350
Paarlshoop X 1							150	No data		325
Parkhurst		8	13	14	20	[illegible]	160	450	550	725
Parktown	1500	348	340	485	510	1000	[illegible]50	3600	3600	5000
Parktown X 1					220	No data	853	1850	1900	3500
Parktown North		60	70	87	100	350	750	1350	1500	2000
Pageview		143	130	207	301	425	550	1100	1300	2050
Parkwood		40	35	142	227	350	700	1000	1200	2300
Prospect			25	Commercial						
Percelia Estate					180	450	1100	1300	1650	
Percelia X 1						600	1300	1300	1975	
Percelia X 2						600	1350	1300	1975	
Pierneef Park									2300	
Pierneef Park X 1									2300	
Pine Park							650	900	1200	
Pine Park X 1							650	900	1200	
Pine Park X 2							650	900	1200	
Raedene Estate					350	575	1300	1500	2000	
Raedene Estate X 1							950	1200	1300	
Raadview	25	48	66	225	275	650	700	675		
Roumarais Park							1000	1100	1725	
Regents Park	18	30	35	120	175	350	450	600		
Regents Park X 1			50	140	250	450	450	600		
Regents Park X 2										
Regents Park X 3						200	350	450	600	
Regents Park X 4								450	600	
Regents Park X 5									625	
Regents Park X 6									650	
Rewlatch						250	450	No data	600	
Rewlatch X 1						275	450	500	600	

Township	Year									
	1904	1913	1922	1928	1934	1940	1946	1952	1958	1967
Rewlatch X 2								450	500	625
Rewlatch X 3								450	550	700
Rewlatch X 4									750	875
Reynolds View						300	No data	600	850	725
Richmond	50	25	30	55	50	130	175	400	450	500
Ridgeway										650
Ridgeway X 1										700
Risidale								650	900	1300
Riviera	500	200	275	571	643	1200	800	2350	2[illegible]0	3700
Robertsham								450	550	775
Robertsham X 1										875
Roseacre								400	550	[illegible]50
Roseacre X 1								250	550	650
Roseacre X 2									550	675
Roseacre X 3									550	675
Rosebank	150	100	140	240	370	650	800	1450	1650	2750
Rosetterville	125	45	35	50	65	300	350	450	6[illegible]0	650
Rosettenville X 1			10	20	60	180	No data	450	650	700
Rosettenville X 2							400	450	No data	1075
Rosettenville X 3							300	500	No data	775
Rosettenville X 4										600
Rossmore				150	150	200	350	1000	1000	1600
Rouxville	120	75	55	83	95	350	375	1000	1200	1450
Rouxville X 1						350	No data	1000	1200	1500
Sandringham							260	600	950	1500
Savoy Estates								1050	1450	2500
Saxonwold				275	395	550	950	2600	2900	3600
Spes Bona			5	55	250	475	Ceased to be separate township			
Sophiatown			24	25	35	110	200	350	Cease to be a separate township	
Springfield			55	50	50	380	650			
Southdale										725
Southdale X 1										1200
South Hills										300
South Hills X 1										300
South Kensington				60	100	400	575	1000	10[illegible]0	1275
Sunnyside			55	55	85	125	200	400	450	600
Sydenham			12	20	60	300	550	950	1100	1350
Talboton							40[illegible]	1100	1[illegible]	1500
Towerby									550	725
Towerby X 1										800
Towerby X 2										750
Townsview				35	90	200	No data	600	700	750
Trio 1							340	No	Data	300
Troyeville	300	177	161	182	200	275	400	600	600	575
Tulisa Park										500
Turf Club				40	45	160	250	550	7[illegible]0	775
Turffontein	115	40	43	53	60	200	275	500	600	625

Township	Year									
	1904	1913	1922	1928	1934	1940	1946	1952	1958	1967
Victoria			144	No	Data		560	1800	1500	1650
Village Main				45	210	Industrial				
Victory Park										1800
Victory Park X 1										2100
Victory Park X 4										2100
Victory Park X 5										2800
Victory Park X 6										2900
Victory Park X 8										2800
Victory Park X 10										2750
Victory Park X 11										2750
Victory Park X 12										2300
Victory Park X 13										2650
Victory Park X 14										2650
Victory Park X 15										2750
Victory Park X 18										2650
Victory Park X 21										2650
Victory Park X 22										2700
Victory Park X 23										2750
Vrededorp			65	96	70	120	225	250	350	300
Wanderers View	750	190	290	365	365	1000	1250	3250	4000	Commercial
Waterval			20	15	20	80	150	400	500	800
Waverley	112	83	71	81	94	550	750	1800	2300	3600
Waverley X 1								1150	1300	1700
Waverley X 2								2900	3300	3200
Welfare Park										250
Westcliff			250	280	400	775	1450	2900	3000	4000
Westcliff X 1					225	No data	600	No data	2300	2700
Westdene			15	15	20	100	175	300	400	500
West Turffontein	225	83	75	40	45	100	200	450	500	625
West Turffontein X 1									350	425
West Turffontein X 2									600	725
Winston Ridge							450	1050	1350	2750
Wolhuter	350	100	70	55	50	375	850	Industrial		
Yeoville	300	135	165	240	270	450	570	1050	No data	1300

APPENDIX B

Johannesburg : Mean Monthly Sales per Suburb of Residential Properties, 1960 - 1972 (x R000) (Record of Transfers)

TOWNSHIP ABBOTSFORD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	15.5			16.5	12.5	-	18.0	16.5		-	-		
F	-			-	14.5	-	25.0	-		19.5	-		73.5
M	-			-	-	12.0	17.5	20.0		23.5	40.0		35.0
A	-			-	-	-	-	-		26.0		40.0	
M	-			-	19.0	21.0	22.0	21.0	21.7	31.5	-	-	
J	-			-	13.7	-	21.5	-	-	-	-	-	
J	-			-	-	-	-	-	29.0	-	-	-	
A	-			-	14.0	-	-	19.0	-	40.5	-	-	
S	-			-	-	-	-	-	-	24.5	-	-	
O	-			-	-	-	-	22.5	30.0	40.0	-	-	
N	-	12.5	12.5	64.0	14.0	-	-	-	20.0	-	-	43.0	
D	-	-	-	13.5	11.2	-	17.5	-	-	40.0	-	-	

TOWNSHIP ALBERTSKROON

	1950	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	3.2	1.6	-	4.5	-	-	2.7	-	-	4.0	-
F	-	-	-	3.4	-	1.3	-	2.0	-	-	-	4.1	-
M	-	-	-	3.3	-	-	-	5.8	4.1	4.0	-	-	-
A	-	-	2.5	2.5	-	0.5	-	-	2.5	-	-	-	6.5
M	-	-	4.5	-	1.5	3.0	-	8.0	4.4	-	3.5	-	-
J	-	-	-	4.5	-	-	-	-	-	3.7	-	9.3	3.5
J	-	-	-	-	2.5	-	5.3	1.0	-	-	1.5	-	-
A	-	2.1	-	3.0	-	-	-	-	-	5.3	-	1.5	6.0
S	1.4	-	-	4.7	-	-	-	-	-	-	-	-	-
O	-	0.5	-	-	1.0	-	4.4	1.8	-	-	-	-	5.0
N	2.5	-	4.8	-	-	-	-	-	2.8	1.5	5.5	-	-
D	2.0	-	-	-	0.5	-	-	7.5	-	1.2	-	-	-

TOWNSHIP ALBERTVILLE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.6	2.0	-	3.8	4.6	1.1	-	-	-	-	6.4	6.8	-
F	0.5	1.3	-	3.2	1.0	0.5	0.5	-	12.0	-	-	-	2.0
M	6.8	0.5	-	3.2	3.7	0	-	1.5	1.5	-	-	-	-
A	6.3	-	-	2.9	-	3.5	-	-	-	-	-	1.5	-
M	4.4	0.6	-	2.6	4.3	3.3	-	-	-	-	-	-	-
J	2.5	-	1.5	6.5	6.5	-	-	1.6	-	-	-	3.4	-
J	0.5	-	2.5	3.3	3.5	-	-	2.2	-	-	-	-	-
A	1.7	4.0	3.4	4.5	2.8	-	-	-	-	-	-	1.5	-
S	2.7	2.3	2.4	3.4	4.3	-	-	-	-	-	-	1.7	-
O	-	9.1	3.4	3.1	4.5	-	-	-	-	-	-	-	-
N	5.5	4.5	4.5	1.5	-	1.4	-	-	-	5.5	-	-	-
D	3.0	-	4.5	3.5	4.3	-	-	-	-	-	2.5	-	-

TOWNSHIP ATHOL

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	20.5	19.5	13.5	12.5	22.2	22.2	21.5	28.7	38.0	37.0	-		
F	17.0	15.7	20.5	20.2	20.0	-	28.5	27.5	35.0	21.2	45.0	50.0	
M	19.0	17.7	20.0	20.5	20.0	28.5	20.2	40.0	37.5	53.2	65.0		
A	-	-	12.5	14.5	14.7	32.2	-	33.2	36.5	42.5	-	-	
M	-	-	-	11.0	21.5	22.2	30.5	26.2	-	32.0	52.5	61.2	
J	17.5	-	17.0	16.5	23.5	-	24.0	55.0	-	50.0	52.5	50.0	
J	-	20.0	-	-	21.0	23.0	28.7	40.0	30.0	25.0	-	45.0	
A	22.5	20.5	16.5	-	19.5	29.0	30.0	31.2	43.2	56.2	47.5	56.2	
S	15.5	14.5	17.5	13.5	20.1	-	-	55.0	-	50.0	47.7	-	
O	-	11.0	-	-	18.5	33.0	45.5	32.5	45.0	65.0	43.2	52.5	
N	14.5	16.5	16.5	18.5	29.5	-	25.0	-	32.5	38.7	53.2	72.5	
D	16.5	-	-	24.2	24.2	-	28.7	-	-	30.0	53.0	-	

ATHOL 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J							24.5	30.0	11.0	18.0	25.0	-	-
F							28.0	-	32.0	37.0	62.0	-	72.0
M							20.0	-	24.0	-	42.0	40.0	73.5
A							-	25.5	-	-	35.0	-	-
M							31.0	14.0	-	42.0		55.0	46.0
J							24.0	-	-	38.5	46.0	-	62.0
J							28.5	10.0	-	-	-	-	52.0
A							32.0	20.0	-	54.0	-	-	
S							8.0	31.0	-	-	-	-	
O								33.0	57.5	48.0	57.0	46.0	
N							19.0	-	-	44.0	-	-	
D							25.0	20.0	-	-	-		

TOWNSHIP ATHOLHURST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J					-	-	-	-	-	-	-	-	-
F					-	-	-	7.0	-	-	-	-	-
M					5.2	-	-	-	-	-	-	-	-
A					36.2	-	46.2	-	-	26.2	-	-	18.0
M					-	23.2	-	-	-	-	-	-	
J					25.0	-	-	14.5	-	-	19.9	-	
J					-	-	25.0	-	20.2	-	18.0	38.7	
A					-	-	-	25.5	-	-	-	-	
S					5.0	-	62.5	-	-	31.2	-	-	
O					6.2	-	5.0	-	-	-	-	-	
N				5.0	-	18.7	-	-	-	-	-	-	
D				-	-	25.0	-	9.9	-	-	35.0	-	

TOWNSHIP AUCKLAND PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.0	7.0	8.5	7.5	9.5	12.0	-	14.5	11.2	15.5	16.5	18.5	19.5
F	6.5	8.5	9.5	7.2	7.0	8.5	8.5	15.5	19.0	12.5	21.5	18.5	21.0
M	6.5	7.0	7.5	-	8.5	7.5	9.2	14.5	15.5	14.7	13.5	19.5	24.0
A	6.5	9.0	9.0	8.5	7.5	8.5	10.5	19.5	23.0	20.0	17.5	22.0	-
M	7.0	7.0	8.5	13.5	7.5	9.5	12.2	11.5	-	16.0	16.5	25.0	30.0
J	7.5	7.0	7.0	7.0	9.0	7.5	8.5	12.0	17.5	18.0	-	24.0	21.0
J	7.0	5.9	5.5	8.5	8.7	10.0	11.5	19.0	19.5	-	28.5	19.0	22.0
A	8.9	7.0	6.0	7.5	8.0	12.5	11.7	8.0	12.5	23.7	23.5	21.5	30.0
S	6.5	8.5	6.5	5.5	11.0	8.5	9.5	12.0	14.5	40.7	18.0	24.0	27.0
O	6.7	11.5	8.5	9.5	8.5	7.5	10.7	10.5	14.5	21.5	17.0	22.0	
N	6.2	8.5	-	11.0	7.5	7.5	9.9	19.0	16.5	19.5	24.7	-	
D	6.0	7.0	8.7	9.0	10.0	8.2	12.5	34.0	10.0	14.7	20.0	34.5	

TOWNSHIP BEDFORDVIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	14.1	14.0	30.7	21.8	6.5	24.7	16.3	34.6	35.5	37.5	26.0
F	15.8	14.0		13.0	14.0	17.5	6.0	21.5	18.6	48.0	41.0	28.5	-
M	-	-	17.4	16.5	23.5	16.3	29.5	10.0	14.5	44.0	37.6	47.0	39.1
A	16.5	-	12.3	-	14.8	20.5	21.2	12.5	16.2	34.7	45.5	-	30.0
M	15.1	-	-	18.0	16.8	19.5	20.2	9.9	28.5	40.1	31.5	34.0	35.0
J	12.8	-	-	14.8	-	24.0	21.6	22.5	24.9	28.4	33.7	22.5	-
J	16.5	15.5	13.2	15.8	14.2	18.5	22.2	23.2	21.5	32.0	40.0	-	-
A	14.3	13.1	6.8	-	14.6	52.0	13.0	24.0	29.5	-	33.5	36.9	23.0
S	-	7.0	-	25.0	18.1	-	32.0	19.8	25.0	34.0	33.0	43.0	23.0
O	-	12.1	5.0	-	31.2	-	15.4	25.9	34.0	19.1	42.7	48.0	-
N	-	-	15.5	15.4	24.5	-	25.5	21.2	21.2	31.5	34.5	34.5	-
D	13.0	15.3	-	-	15.5	-	10.5	21.7	27.1	34.0	43.0	39.5	-

TOWNSHIP BELLEVUE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.0	-	-	-	9.0	5.2	6.7	10.5	8.0	-	10.5	15.5	18.5
F	6.0	7.0	5.7	7.5	4.0	6.0	7.0	7.0	6.5	13.7	13.5	-	-
M	-	-	4.7	-	7.5	6.0	7.2	11.0	10.5	11.2	13.5	25.7	33.0
A	4.5	-	-	-	7.5	7.0	8.5	11.5	12.0	13.0	23.5		
M	6.5	-	4.5	6.0	6.5	8.7	7.7	13.0	11.0	27.5	12.5	-	18.0
J	12.0	5.0	-	6.0	-	7.0	7.7	-	13.0	-	7.0	13.5	-
J	-	-	-	4.5	6.5	-	8.7	11.7	13.0	-	17.5		18.0
A	6.5	-	5.0	-	6.0	7.5	-	7.0	14.0	14.0	17.5		16.5
S	-	8.0	6.5	-	6.0	-	8.0	7.0		10.5	15.0	21.0	-
O	-	5.0	6.0	4.5	10.7	-	9.0	11.5	10.0	15.5	-		-
N	5.5	-	6.0	-	9.5	7.2	5.0	13.0	9.9	15.5	-	19.7	
D	5.0	-	-	5.0	5.5	-	2.5	-	-	13.5		-	

TOWNSHIP BELLEVUE CENTRAL

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	5.3	7.5	-	-	-	-	-	-	-	15.5	-	-
F	8.0	-	-	-	-	24.0	7.0	11.0	-	-	-	-	-
M	-	-	-	-	-	7.6	9.5	-	-	-	-	-	-
A	-	-	4.0	-	-	-	-	8.5	-	-	-	-	-
M	-	4.5	5.0	-	-	9.8	-	-	4.0	-	-	-	-
J	13.0	-	-	-	-	-	8.0	-	-	-	-	-	-
J	-	-	-	-	-	-	-	5.7	-	-	-	-	-
A	-	-	-	-	7.5	-	-	-	-	-	16.0	-	-
S	-	-	7.3	-	12.8	-	6.5	-	-	7.2	-	15.0	-
O	6.0	-	-	-	-	-	-	7.2	-	12.3	-	27.8	-
N	10.8	5.8	6.5	-	-	-	6.5	-	11.7	-	7.3	11.2	-
D	-	4.2	-	5.3	-	-	-	-	-	-	20.0	-	-

TOWNSHIP BELLEVUE EAST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.0	5.0	-	5.0	6.0	10.0	-	5.0	10.0	-	17.0	9.5	-
F	5.3	7.5	-	6.5	4.8	5.7	-	8.5	9.5	12.0	10.5	15.7	-
M	5.0	-	8.5	5.0	7.5	6.7	-	11.0	8.5	10.5	15.0	14.5	12.5
A	6.5	6.0	5.0	6.0	-	5.0	-	13.0	8.2	10.0	13.5	16.5	24.0
M	4.5	-	-	-	7.5	8.0	-	5.5	11.0	11.0	15.0	17.7	-
J	4.0	4.0	4.0	12.0	7.2	4.7	-	6.5	9.9	-	-	19.5	14.0
J	4.5	5.0	5.0	-	5.7	6.7	8.0	8.5	11.0	12.0	20.0	20.0	
A	-	-	3.0	5.5	6.5	-	7.0	7.7	12.0	13.0	18.0	12.5	20.0
S	4.5	-	3.0	-	5.0	6.0	8.1	4.0	8.5	11.5	16.0	-	
O	-	-	4.5	5.5	5.7	5.0	7.0	7.7	12.0	19.0	18.5	16.5	
N	-	11.5	6.0	5.0	5.5	7.0	8.0	7.7	12.5	15.0	-	18.0	
D	5.0	-	-	4.5	5.0	-	-	7.2	11.7	16.5	-	21.0	

TOWNSHIP [illegible]RARIO

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.0	9.0	10.0	9.7	10.5	12.0	13.0	14.5	15.5	19.0	22.5	23.0	22.7
F	9.0	9.5	9.5	10.0	10.2	12.5	12.7	13.5	14.0	17.0	20.5	23.9	22.7
M	9.0	-	8.0	6.5	10.5	11.0	14.0	14.5	-	17.7	21.5	24.5	23.5
A	-	-	-	8.0	9.5	13.5	12.7	13.5	16.0	20.0	22.5	20.0	24.0
M	11.5	-	-	8.0	9.7	10.0	11.0	14.7	17.0	18.0	23.0	22.9	25.0
J	-	-	9.0	8.0	9.8	12.7	13.5	14.5	13.5	16.0	22.0	19.9	23.0
J	8.0	-	9.5	6.5	7.5	12.0	11.0	14.0	17.0	18.5	21.5	21.2	25.0
A	8.2	8.5	-	-	10.0	13.0	15.0	15.2	16.5	20.5	24.0	22.0	23.5
S	-	8.0	9.0	-	12.0	13.7	13.0	-	17.5	18.5	23.7	25.5	26.5
O	6.0	-	10.0	-	10.5	11.5	12.5	16.5	15.5	22.0	24.7	25.0	
N	10.0	10.0	9.0	10.5	11.0	-	13.0	17.0	16.0	22.5	23.0	23.7	
D	-	9.0	10.5	9.5	11.5	-	13.0	16.0	16.5	20.5	-	20.5	

TOWNSHIP BERTRAMS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	197
J	2.2	-	-	3.6	18.0	6.0	-	6.2	4.6	12.0	9.6		-
F	-	5.3	-	-	-	7.0	-	5.5	12.4	8.0	11.6		5.1
M	4.8	-	3.5	-	9.0	-	-	4.6	5.6	?	9.5		-
A	10.0	2.0	-	6.5	4.6	-	-	7.6	17.0	15.0	-		16.0
M	-	-	-	-	6.4	-	-	6.7	6.5	2.0	-	?	9.5
J	-	-	3.7	-	5.3	4.4	-	4.7	5.0	7.3	16.0		10.0
J	-	4.4	-	-	7.5	-	-	6.3	6.0	14.5	-		-
A	4.6	-	-	3.8	9.5	7.3	2.7	-	4.3	16.0	11.3		9.0
S	6,1	-	-	-	9.5	5.5	6.3	13.0	6.9	7.0	-		-
O	-	-	6.5	8.1	6.3	9.5	6.5	4.4	3.8	10.8	14.3		-
N	7.8	-	.4	11.5	6.0	-	8.8	8.4	-	8.0	19.5		-
D	-	2.0	4.4	10.0	14.0	-	4.1	13.0	11.4	7.5	-		-

TOWNSHIP BEZUIDENHOUD VALLEY

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.3	6.6	6.3	6.3	5.6	7.2	5.8	7.0	8.7	8.0	11.3	11.8	14.0
F	5.6	6.5	5.0	4.8	5.6	7.1	6.3	6.7	12.1	8.5	11.1	12.6	16.1
M	5.5	6.3	3.8	4.8	5.5	7.2	7.3	8.0	7.4	9.6	13.5	11.5	11.5
A	3.8	5.9	4.5	5.5	5.5	7.2	6.0	7.0	7.5	8.5	11.0	14.6	15.5
M	4.9	5.3	5.5	4.5	5.8	6.1	6.5	7.7	7.4	9.7	10.0	13.5	11.6
J	5.1	3.5	3.6	5.7	5.0	5.0	6.5	6.8	8.7	9.0	10.0	9.8	13.6
J	4.5	5.5	4.1	4.5	5.0	6.4	5.2	8.5	8.0	9.5	13.8	16.7	15.3
A	4.5	4.5	4.3	-	5.5	6.0	7.5	7.5	10.5	12.5	11.7	12.5	11.0
S	5.1	5.5	5.3	5.7	5.3	6.5	7.5	6.5	7.0	10.4	11.7	15.5	17.5
O	5.0	4.6	5.8	4.7	5.6	6.5	5.2	6.3	8.5	13.5	13.9	9.5	-
N	4.9	5.4	5.8	4.8	5.5	6.5	6.2	8.0	6.5	11.0	11.3	15.7	-
D	5.4	5.4	5.5	5.6	7.1	1.3	8.5	8.7	7.5	9.5	12.6	14.0	-

TOWNSHIP BIRDHAVEN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	24.0						26.0	46.0					
F	-						-	-	30.0	55.0	61.5	51.0	
M	-					34.0	-	-	-	-	-	-	
A	15.0		17.5	26.0	21.0	-	-	-	30.0	85.0	-	-	60.0
M	13.5		14.5	-	26.0	27.5	-	-	38.0	-	-	-	-
J	-		-	-	-	-	-	35.0	-	-	-	-	-
J	-		-	20.0	21.0	-	-	-	30.0	49.0	-	-	-
A	-		13.5	-	-	-	30.0	51.0	-	-	-	-	-
S	17.0		15.5	-	-	-	40.0	-	-	70.0	-	-	-
O	-		-	-	-	-	-	26.0	-	-	-	-	48.0
N	-		-	-	-	-	-	-	-	-	-	-	
D	-	17.5	-	27.5	-	-	-	-	-	-	77.0	-	

TOWNSHIP BIRNAM

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	10.0	-	-	-	10.5	-		-	18.5	-	22.0		-
F	-	9.0	11.0	-	-	12.0		15.0	25.0	28.0	-		30.0
M	9.5	-	-	-	-	13.5	16.0	-	-	20.0	-		
A	-	-	-	10.0	11.5	-	18.5	-	-	34.0	-		
M	-	-	10.0	-	12.0	-	18.0	14.5	-	22.0			
J	-	-	10.5	-	10.0	-	16.0	24.0	-	-	28.0		
J	-	-	-	12.0	13.5	-	16.5	-	25.5	-	-		
A	-	-	-	-	10.0	-	17.5	-	19.0	24.5	27.0		
S	-	10.5	-	-	-	-	-	9.5	-	-	-		
O	-	11.0	-	-	10.0	-	14.5	-	-	20.0	28.0	24.0	
N	13.0	-	11.0	-	14.5	-	13.0	-	22.5	26.5	-	-	
D	10.0	-	-	8.0	21.5	-		-	14.5	-	-	21.5	

TOWNSHIP BLACKHEATH and X's

	1960	19 1	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	10.1	-	10.7	9.3	12.0	12.3	21.1	-	19.3	24.3	-	-
F	14.0	10.2	-	10.0	13.7	-	12.7	15.5	14 5	-	-	35.1	-
M	-	10.7	-	8.7	-	13.4	-	16.1	13.0	28.7	-	31.2	-
A	-	10.5	-	11.5	12.7	13.5	15.0	-	-	22.0	31.3	-	27.0
M	12.3	-	12.3	9.5	11.0	14.5	15.9	-	18.0	21.0	28.0	27.0	-
J	10.9	-	10.7	9.5	12.7	14.0	18.5	17.0	19.5	24.3	25.4	-	-
J	10.7	-	9.5	11.4	14.0	20.5	-	19.6	23.0	23.8	-	28.5	30.7
A	10.5	10.2	-	13.0	14.4	15.8	-	19.0	19.9	-	-	28.0	-
S	-	11.5	11.7	13.7	12.4	14.7	-	20.1	24.0	23.5	26.1	31.9	-
O	-	11.7	-	10.7	-	14.6	-	18.7	-	33.0	31.0	-	-
N	9.9	10.3	-	9.9	11.5	-	20.7	32.0	19.4	27.6	-	25.7	-
D	-	-	5.0	11.6	14.2	-	14.1	18.0	22.0	20.3	21.6	-	-

TOWNSHIP BLAIRGOWRIE

	1960	1961	1962	1963	1964	1965	1965	1967	1968	1969	1970	1971	1972
J	8.5	8.5	7.5	8.5	9.5	11.5	12.0	12.0	14.0	14.5	18.5	20.7	22.0
F	8.5	8.7	7.5	8.5	9.0	11.5	11.5	13.0	13.9	14.5	18.5	20.9	22.0
M	8.5	7.7	8.5	9.0	-	11.7	11.7	12.5	14.0	15.0	19.0	20.0	22.0
A	8.7	-	9.5	8.9	9.5	11.0	12.0	13.0	13.5	15.7	18.5	21.0	21.5
M	-	-	9.5	8.5	10.0	8.0	12.0	13.0	14.0	14.0	19.9	21.0	22.0
J	9.2	-	9.0	9.2	10.5	12.7	11.7	12.7	13.0	16.0	19.0	19.7	21.0
J	8.5	-	8.2	9.5	-	12.5	12.0	13.0	14.0	17.0	19.0	20.0	22.0
A	-	8.7	9.0	-	13.0	-	12.0	13.5	14.0	16.5	19.7	20.5	22.0
S	7.0	8.2	7.2	-	9.6	10.5	11.7	13.0	15.0	16.5	20.9	20.0	23.0
O	8.2	8.5	7.5	-	9.0	10.5	12.5	13.5	15.0	18.0	19.9	21.5	21.0
N	8.2	9.0	9.0	9.5	-	11.5	11.5	13.0	15.0	17.5	20.0	20.0	
D	8.2	8.2	8.5	10.2	8.5	11.5	12.7	13 7	15.5	18.5	20.2	21.5	

TOWNSHIP BELLEVUE CENTRAL

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	5.3	7.5	-	-	-	-	-	-	-	15.5	-	-
F	8.0	-	-	-	-	24.0	7.0	11.0	-	-	-	-	-
M	-	-	-	-	-	7.8	9.5	-	-	-	-	-	-
A	-	-	4.0	-	-	-	-	8.5	-	-	-	-	-
M	-	4.5	5.0	-	-	9.8	-	-	4.0	-	-	-	-
J	13.0	-	-	-	-	-	8.0	-	-	-	-	-	-
J	-	-	-	-	-	-	-	9.7	-	-	-	-	-
A	-	-	-	-	7.5	-	-	-	-	-	16.0	-	-
S	-	-	7.3	-	12.8	-	6.5	-	-	7.2	-	15.0	-
O	6.0	-	-	-	-	-	-	7.2	-	12.3	-	27.8	-
N	10.8	5.8	6.5	-	-	-	6.5	-	11.7	-	7.3	11.2	-
D	-	4.3	-	5.3	-	-	-	-	-	-	20.0	-	-

TOWNSHIP BELLEVUE EAST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.0	5.0	-	5.0	6.0	10.0	-	5.0	10.0	-	17.0	9.5	-
F	5.5	7.5	-	5.5	4.5	5.7		8.5	9.5	12.0	10.5	15.7	-
M	5.0	-	6.5	5.0	7.5	6.7		11.0	8.5	10.5	15.0	14.5	12.5
A	6.5	6.0	5.0	6.0	-	5.0	-	13.0	8.2	10.0	13.5	16.5	24.0
M	4.5	-	-	-	7.5	8.0	-	5.5	11.0	11.0	15.0	17.7	-
J	4.0	4.0	4.0	12.0	7.2	4.7	-	6.5	9.9	-	-	19.5	14.0
J	4.5	5.5	5.0	-	5.7	6.7	8.0	8.5	11.0	12.0	20.0	20.0	
A	-	-	3.0	3.5	6.5	-	7.0	7.7	12.0	13.0	18.0	19.5	20.0
S	4.5	-	3.0	-	5.0	6.0	8.0	4.0	8.5	11.5	16.0	-	
O	-	-	4.5	5.5	5.7	5.0	7.0	7.7	12.0	19.0	18.5	16.5	
N	-	11.5	6.0	5.0	5.5	7.0	8.0	7.7	12.5	15.0	-	18.0	
D	5.0	-	-	4.5	5.0	-	-	7.2	11.7	16.5	-	21.0	

TOWNSHIP BERARIO

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	[illegible]	9.0	10.0	9.7	10.5	12.0	13.0	[illegible]	15.5	19.0	22.5	23.0	26.7
F	9.0	9.5	9.5	10.0	10.2	12.5	12.7	13.5	14.0	17.0	20.5	23.9	22.7
M	9.0	-	8.0	6.5	10.5	11.0	14.0	11.5	-	17.7	21.5	24.5	23.5
A	-	-	-	8.0	9.5	13.5	12.7	13.5	16.0	20.0	22.5	20.0	24.0
M	11.5	-	-	8.0	9.7	10.0	11.0	14.7	17.0	18.0	23.0	22.9	25.0
J	-	-	9.0	8.0	9.5	12.7	13.5	14.5	13.5	18.0	22.0	19.9	23.0
J	6.0		9.5	6.5	7.5	12.0	11.0	14.0	17.0	18.5	21.5	21.2	25.0
A	8.2	8.5	-	-	10.0	13.0	15.0	15.2	16.5	20.5	24.0	22.0	23.5
S	-	8.0	9.0		12.0	13.7	13.0	-	17.5	18.5	23.7	25.5	26.5
O	6.0		10.0	-	10.5	11.5	12.5	16.5	15.5	22.0	24.7	25.0	
N	10.0	10.0	9.0	10.5	11.0	-	13.0	17.0	16.0	22.5	23.0	23.7	
D	-	9.0	10.5	9.5	11.5	-	13.0	16.0	16.5	20.5	-	20.5	

TOWNSHIP BOSMONT

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	1.5	2.2	1.5	-	1.0	1.2	3.0	-	5.0	7.5
F	-	-	1.0	1.5	1.5	3.0	3.2	1.0	1.0	6.2	-	6.0	-
M	-	-	-	1.2	1.5	0.7	1.5	1.0	1.0	6.2	-	6.0	-
A	-	-	-	1.2	1.7	1.5	1.7	1.2	1.2	-	0.7	0.7	1.2
M	-	-	1.0	1.5	0.7	0.7	1.2	0.7	2.5	1.2	1.2	-	-
J	-	-	1.0	1.5	1.5	1.5	0.7	0.7	1.2	6.5	-	-	-
J	-	-	0.5	1.5	1.5	3.5	0.7	1.0	1.5	6.2	3.5	7.5	0.5
A	-	-	0.7	1.5	2.0	0.7	1.0	0.7	0.7	3.0	6.0	1.2	16.2
S	-	-	0.7	1.5	0.7	-	1.2	-	3.2	-	16.2	0.7	
O	2.5	-	0.7	0.7	1.2	-	1.0	-	0.7	1.2	-	2.5	-
N	-	-	0.7	3.2	0.7	-	1.5		0.7	1.0	6.5	9.0	
D	-	-	1.5	3.0	2.5	3.0	-	-	-	2.5	8.3	3.2	

TOWNSHIP BRAMLEY, BRAMLEY NORTH, BRAMLEY PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	10.5	12.0	11.0	12.0	12.7	13.9	14.7	23.5	19.5	22.0	25.0	15.5	-
F	11.5	10.5	-	13.0	12.0	17.2	13.0	16.0	20.0	28.0	27.0	17.0	30.0
M	11.5	9.0	-	13.5	14.0	13.9	-	18.0	22.0	24.7	15.0	16.0	28.5
A	10.0	-	10.5	13.5	13.0	16.0	14.0	14.0	16.0	21.0	26.0	15.0	26.0
M	11.5	-	-	9.5	11.0	12.5	-	20.0	38.5	27.0	22.0	30.5	35.0
J	10.5	-	13.5	10.0	15.0	12.5	15.5	14.5	16.5	-	26.0	30.2	34.0
J	-	8.0	10.0	12.0	12.0	14.0	-	16.5	17.0	23.5	30.0	28.0	-
A	8.5	18.0	11.5	-	13.0	12.0	13.7	23.5	22.0	23.0	32.0	-	33.0
S	13.0	10.0	13.5	-	8.0	8.0	17.0	14.5	22.5	31.0	33.0	29.0	26.0
O	14.7	9.5	13.5	-	14.5	-	-	17.5	21.5	21.7	32.0	29.5	
N	10.0	12.0	11.5	11.0	15.2	14.0	15.0	13.0	19.0	28.0	16.5	33.0	
D	-	13.5	10.5	11.2	-	16.0	16.0	14.7	31.5	29.5	-	20.0	

TOWNSHIP BRIXTON

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	4.5	5.5	5.5	5.0	5.5	6.5	5.2	4.5	-	7.2	11.5	11.5	15.0
F	4.1	4.5	3.0	4.0	7.51	6.2	5.2	5.0	7.0	8.0	9.5	12.2	12.5
M	4.0	6.5	5.0	4.2	4.5	5.5	-	8.5	7.1	5.5	12.5	10.0	11.0
A	6.8	-	4.0	4.2	4.5	5.5	6.0	9.5	5.0	10.2	11.5	11.5	13.5
M	5.0	-	6.8	4.9	4.5	5.7	6.5	9.9	7.2	[illegible]	13.0	9.0	13.5
J	4.9	4.5	7.0	4.0	4.5	-	4.5	6.2	8.1	9.2	12.5	-	11.5
J	5.0	4.5	-	5.9	6.9	6.5	6.5	7.2	9.5	10.5	11.0	12.5	-
A	3.2	4.5	5.2	4.5	6.5	7.2	4.7	9.2	6.2	9.5	15.0	12.5	8.0
S	4.9	6.0	5.2	4.2	5.5	4.9	5.0	6.2	6.0	9.5	9.5	10.8	
O	4.5	2.5	4.2	5.5	5.5	4.9	1.0	13.2	7.0	10.5	11.0	-	
N	5.5	6.5	4.1	4.0	4.8	3.9	4.5		9.2	9.5	14.0	13.5	
D	6.5	-	5.0	-	3.9	4.5	6.5	8.0	6.5	7.5	13.2	15.0	

TOWNSHIP BRYANSTON

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	12.5	15.5	11.0	12.0	13.2	19.5	18.5	19.0	22.0	29.5	32.5	32.0	33.5
F	17.5	11.2	13.0	12.0	14.0	17.0	19.5	22.0	22.0	31.0	31.5	31.5	33 0
M	14.5	16.5	-	13.0	13.5	18.0	19.7	21.5	24.5	29.5	34.0	35.4	35.5
A	13.0	-	12.5	13.0	14.0	19.0	21.0	21.2	26.0	27.5	33.0	38.0	32.5
M	12.2	-	11.7	11.0	15.0	16.0	20.5	21.9	25.0	35.0	31.0	36.5	36.0
J	11.2	-	12.0	12.0	14.5	17.5	20.2	22.0	24.2	21.0	35.5	38.0	36.0
J	10.0	14.0	14.0	11.0	14.5	18.5	18.5	23.0	24.5	30.0	31.5	35.9	35.0
A	8.5	11.0	12.0	-	15.0	19.7	17.7	20.7	27.5	32.5	36.5	33.0	34.0
S	13.5	11.0	15.0	-	16.0	18.0	19.0	21.5	27.0	31.0	34.5	30.0	38.5
O	13.7	11.2	13 0	-	17.0	20.0	18.5	23.5	25.5	33.5	34.9	36.5	
N	14.0	12.5	13.5	14.0	17.0	16.5	21.0	23.5	27.0	34.0	34.9	36.5	
D	10.5	-	13.7	13.2	18.0	15.5	21.0	26.0	25.0	33.5	26.5	37.5	

TOWNSHIP BRIXTON 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J							14.5	-	22.5	31.5	-	35.0	26.5
F							-	18.5	21.0	21.0	40.0	-	27.0
M							-	18.0	10.0	-	41.5	-	26.0
A							-	18.0	-	22.5	-	43.0	-
M							20.0	19.5	28.5	-	33.0	34.7	-
J							28.5	-	27.0	-	-	-	21.0
J							10.0	-	-	23.0	37.0	-	
A							18.0	-	21.0	-	-	17.2	
S							14.0	30.5	25.0	24.5	-	35.0	
O							17.5	-	-	29.5	52.0	-	
N							18.0	16.0	-	-	-	27.5	
D							-	-	-	30.0	-	28.5	

TOWNSHIP BUCCLEUGH

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.0			12.5					12.5	20.5	-	-	
F					14.0	12.5			13.5	20.0	30.0	-	
M					-	-	12.0	10.5	13.0	24.5	-	43.0	
A					-	-	-	21.0	-	15.0	35.0	37.0	
M					-	-	8.0	13.0	18 0	24.5	-	-	
J					11.0	-		10.0	10.0	22.0	31.0	26.5	48.0
J					12.0	-	20.5	15.0	9.9	22.0	14.0	45.0	
A					-	13.5	3.5	10.5	2.0	30.0	-	30.0	
S					-	22.0	-	-	17.0	24.0	30.0	39.0	
O			5.5		-		10.0	10.0	23.0	-	29.0	30.0	
N			7.5		14.5		14.5	15.0		39.0	17.0	-	
D													

TOWNSHIP CHRISTIE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	-	5.0	7.5	7.5	7.0	-	-	16.0	-	19.5
F	7.0	7.0	6.5	-	-	7.0	10.0	8.5	1.5	-	14.5	15.0	19.0
M	-	6.5	-	-	6.5	-	10.0	8.5	8.0	6.0	14.0	-	18.0
A	7.5	-	-	-	7.5	8.5	-	-	10.5	15.0	13.5	19.0	18.0
M	-	-	-	6.5	6.5	7.5	-	10.0	-	-	-	-	18.5
J	-	-	6.5	6.0	7.0	7.5	4.0	6.5	-	14.0	13.0	16.0	16.0
J	5.5	7.5	-	7.5	7.5	8.0	9.5	-	11.5	-	13.5	-	16.5
A	-	-	6.5	7.5	6.5	9.0	9.5	9.9	7.0	16.0	15.0	20.5	17.5
S	-	-	-	-	-	9.5	-	6.5	11.5	14.0	-	19.5	
O	8.5	-	7.5	-	8.0	-	-	-	6.5	-	-	18.0	
N	7.5	7.0	6.5	8.0	8.5	-	10.0	8.5	16.5	13.0	14.5	17.0	
D	7.5	-	10.5	6.5	8.0	-	-	8.5	13.5	15.0	-	16.5	

TOWNSHIP CRAIGHALL P[illegible].

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.5	10.0	9.0	8.5	9.5	11.0	13.0	17.0	16.0	21.0	28.0	23.0	27.5
F	11.5	11.0	8.0	12.5	14.5	12.5	14.0	24.0	29.0	21.5	26.0	27.5	28.0
M	13.0	9.0	10.0	10.0	13.5	14.5	16.0	16.0	28.0	25.0	27.5	24.0	21.5
A	10.0	-	12.0	10.0	10.5	11.0	19.0	18.0	20.0	18.0	29.0	26.5	28.0
M	12.5	7.0	12.0	11.0	10.5	15.0	14.0	16.0	20.0	23.0	26.0	30.0	26.0
J	11.7	10.5	12.5	9.0	11.0	15.0	16.0	16.0	24.0	25.0	23.0	28.5	32.0
J	8.0	10.7	9.0	9.5	12.0	14.0	14.0	15 5	30.0	24.0	30.0	27 5	30.0
A	8.0	15.5	10.0	8.7	13.0	13.5	15.5	19.0	15.5	28.0	29.0	28.0	26.0
S	10.0	10.0	11.0	-	11.0	12.0	12.0	24.0	15.5	28.5	27.0	25.0	28.0
O	10.0	-	13.5	14.0	14 0	15.0	17.5	15.5	21.0	27.0	26.0	27.0	
N	9.5	9.5	10.0	11.5	13.5	11.0	15.0	15.5	23.0	26.0	22.0	32.0	
D	10.0	7.0	11.0	9.0	13.0	-	21.0	20.0	20.0	26.5	30.0	19.0	

TOWNSHIP CROSBY

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.5	5.9	6.0	7.2	7.2	7.2	8.0	6.3	8.7	11.0	13.0	12.5	18.7
F	-	6.7	6.0	6.2	7.1	7.71	8.0	8.7	11.3	9.0	15.0	15.5	8.7
M	5.7	6.3	6.9	7.5	6.9	7.5	9.0	8.7	8.7	10.5	13.2	13.2	16.2
A	6.5	6.5	8.1	6.0	5.2	7.4	8.0	8.7	8.7	12.5	12.5	15.5	15.0
M	5.9	6.5	5.7	6.1	7.2	-	7.9	8.6	12.5	12.5	11.2	14.5	-
J	5.3	5.5	6.5	4.5	7.7	6.7	9.4	7.5	8.7	10.0	12.5	18.7	16.2
J	6.7	5.5	6.0	5.7	7.7	7.4	8.7	13.2	9.0	11.2	16.2	12.0	16.2
A	6.2	5.5	5.1	6.0	7.2	-	7.5	6.7	9.0	11.5	14.0	16.2	17.5
S	6.9	6.5	7.5	5.9	7.1	6.2	7.4	6.2	7.0	11 5	16.2	12.5	
O	6.0	6.2	6.9	5.2	8.0	8.0	7.5	9.0	7.5	12.5	12.5	10.5	
N	-	6.7	5.9	6.0	7.0	6 9	8.0	-	9.0	12.5	12.5	14.0	
D	-	-	6.5	5.9	6 9	7.5	6.5	8.7	12.5	11.5	10.5	-	

TOWNSHIP CROWN GARDENS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J				6.0	6.0	6.0	7.0	6.5	8.5	10.0	10.9	15.0	13 5
F				-	-	6.0	6.5	7.0	7.0	-	10.9	13.0	14.5
M				-	5.0	6.2	6.2	-	7.5	9.5	11.5	13.0	11.0
A	4.7			-	3.5	6.2	6.0	7.5	-	-	11.0	15.0	11.0
M	4.5	5.0		-	6.5	4.2	-	7.0	7.9	10.0	-	13.2	13.0
J	4.0	-		4.5	5.7	-	-	6.9	-	9.0	12.0	9.7	12.0
J	5.5	-	5.5	4.5	5.2	5.7	-	6.5	5.5	10.7	11.0	13.5	15.0
A	4.0	3.7	4.5	-	6.0	-	7.7	-	8.5	10.5	12.5	14.0	13.0
S	-	4.7	5.0	4.5	5.9	-	6.0	-	5.0	9.5	10.0	12.0	
O	-	-	4.5	-	4.5	6.0	6.2	-	-	-	-	13.5	
N	4.5	-	5.0	5.0	-	6.2	6 9	-	9.0	9.5	-	13.5	
D	-	-	-	-	-	7.0	7.2	-	8.5	9.5	12.5	-	

TOWNSHIP CYRILDENE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	12.5	10.5	10.5	10.9	11.0	13.5	14.0	14.0	13.5	19.5	20.0	25.5	28.5
F	12.5	10.5	8.5	12.0	11.5	11.5	15.2	16.5	19.5	21.5	23.5	25.5	25.0
M	15.5	11.5	8.5	10.5	13.0	13.5	12.5	19.5	18.5	20.0	19.5	-	23.5
A	13.5	8.0	10.5	9.2	14.2	9.5	14.0	15.7	-	18.5	26.0	-	22.7
M	9.5	-	15.7	12.0	11.7	12.5	14.5	21.5	19.5	21.5	24.0	21.5	16.0
J	12.5	8.5	10.5	9.5	13.7	12.5	13.5	17.5	16.5	29.0	24.0	25.5	21.5
J	12.5	10.5	11.2	9.5	11.0	14.5	14.0	17.7	21.5	-	20.0	23.5	22.2
A	10.5	-	11.0	9.7	13.5	-	17.0	16.5	19.5	22.5	24.5	22.0	22.0
S	11.0	-	10.7	11.7	13.5	10.5	14.5	15.0	18.5	24.5	19.5	26.5	27.0
O	10.5	10.5	10.2	9.0	12.0	12.5	15.5	16.5	20.5	24.5	23.5	24.5	
N	12.5	-	10.5	15.0	11.5	17.0	18.7	17.5	18.5	18.5	25.7	-	
D	10.0	10.5	9.1	10.5	1		17.0	15.5	20.0	19.5	25.5	-	

TOWNSHIP DUNFIELD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		24.5	14.5	-	16.0	34.2		-	26.5	-	50.0	-	-
F		25.0	19.0	17.0	-	-	23.5	-	36.0	76.5	-	35.0	55.0
M		-	18.0	24.5	18.5	33.5	-	38.0	46.0	51.0	-	-	35.0
A		-	27.0	10.5	33.5	34.0	41.0	-	33.0	44.0	-	-	
M		-	18.0	23.5		30.5	45.0	30.5	40.0	-	-	-	
J	31.5	-	19.5	22.0	-	23.0	-	32.0	28.0	-	40.0	71.0	
J	10.0	12.0	-	-	26.0	-	-	-	-	-	46.5	69.0	
A	-	-	18.5	-	18.5	-	-	38.5	56.0	-	-	55.0	
S	-	15.0	17.7	-	-	-	-	-	57.0	70.0		24.0	
O	20.0	-	-	26.5	-	-	-	-	60.0	-	-	90.0	
N	21.0	-	18.5	-	34.5	-	-	34.0	-	-	57.0	-	
D	-	19.0	-	20.0	-	-	32.0	39.5	52.5	-	-	-	

TOWNSHIP DUNKELD WEST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	14.0	14.0	-	-	20.0	-	22.0	32.5	39.0	43.5		-	45.0
F	-	14.0	-	-	17.0	18.5	-	28.5	44.0	35.0	46.5	56.0	36.5
M	14.0	12.0	-	15.0	13.5	-	27.0	-	34.0	-	-	-	44.5
A	-	-	20.5	-	26.0	17.0	21.5	18.5	32.0	24.5	33.0	-	-
M	14.0	-	-	16.5	17.0	31.0	-	-	45.0	51.0	-	-	71.0
J	12.0	-	-	15.0	-	-	19.0	24.0	37.0	34.5	-	-	75.0
J	18.0	15.0	-	18.0	38.0	-	23.5	34.5	-	20.0	-	33.0	
A	-	14.5	18.5	-	16.0	22.0	27.0	35.0	-	35.0	-	-	
S	-	-	13.5	-	33.5	26.0	-	26.5	-	63.0	36.0	54.0	
O	-	20.0	15.5	-	19.0	20.5	-	24.0	-	35.0	-	-	
N	14.0	18.5	17.0	15.5	11.5	-	29.5	-	28.0	-	55.0	-	
D	-	13.5	15.0	23.0	-	-	31.0	-	-	38.5	40.0	-	

TOWNSHIP DUNVEGAN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	10.5	8.7	9.5	9.5	9.2	8.5	12.0	13.5	12.0	15.5	18.7	22.7	22.0
F	8.5	9.9	-	9.9	8.9	11.2	10.5	12.0	13.5	12.5	25.0	-	23.0
M	5.5	10.9	-	9.2	9.9	10.0	11.5	13.0	13.2	20.5	19.0	21.0	20.0
A	9.5	-	-	11.5	9.9	10.2	15.0	17.0	15.0	19.5	21.0	21.0	24.0
M	9.5	-	10.5	10.5	9.9	12.5	12.0	13.5	17.0	-	-	19.9	20.5
J	-	-	8.5	9.5	8.0	6.5	13.0	-	-	17.0	20.0	20.0	23.0
J	10.5	8.2	9.0	8.0	9.5	15.0	12.0	15.5	21.5	20.0	26.5	-	23.0
A	9.0	8.0	8.5	9.5	9.5	10.5	10.0	18.0	15.7	22.5	20.0	19.9	27.5
S	10.0	9.0	8.0	10.0	11.5	10.5	12.0	12.0	16.5	17.0	21.5	25.7	-
O	8.0	10.5	8.5	9.0	10.5	12.0	-	-	16.5	17.0	21.0	24.0	32.0
N	9.5	6.0	8.5	8.7	10.5	-	-	17.0	19.5	17.0	23.0	23.5	
D	9.2	8.5	8.0	7.7	11.2	-	12.7	11.5	-	19.5	21.0	-	

RTOWNSHIP EDENVALE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.1	7.0	9.0	7.0	8.5	10.0	10.0	11.5	10.5	11.5	17.0	17.0	16.0
F	7.0	8.5	6.7	7.2	7.5	9.2	11.5	11.5	17.5	13.0	17.5	16.7	20.0
M	7.0	7.0	-	7.0	7.5	9.1	9.5	9.5	10.5	13.5	13.0	18.0	16.5
A	4.0	3.0	5.5	8.5	7.5	9.0	10.0	9.5	10.2	14.0	17.0	28.0	26.0
M	6.0	10.5	5.5	7.0	8.5	9.5	10.0	11.5	12.5	12.0	15.5	18.0	14.5
J	6.0		4.9	7.5	9.0	9.0	8.0	14.0	14.0	15.5	17.5	20.0	16.5
J	6.5	-	6.0	7.5	8.0	8.5	10.0	13.0	10.0	10.5	18.5	16.5	12.0
A	6.0	-	6.7	8.5	8.0	4.5	14.0	10.5	11.7	12.0	14.5	42.0	-
S	6.5	7.0	8.2	7.0	7.5	6.5	9.0	14.5	17.5	10.0	16.7	19.0	19.0
O	7.5	8.7	8.2	7.2	9.5	15.0	9.0	12.0	12.0	14.5	15.5	14.0	-
N	9.0	6.0	-	6.5	8.5	4.5	8.0	11.0	10.0	14.7	17.0	19.0	
D	-	4.0	-	7.0	9.0	-	10.5	10.0	12.0	14.0	20.5	13.0	

TOWNSHIP ELTON HILL X

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	14.0	15.0	12.0	14.0	-	-	24.0	-			-	50.0	
F	16.0	15.5	15.0	-	14.5	22.5	-	27.0			36.5	-	
M	16.5	-	-	16.5	-	18.0	20.5	26.0			-	47.0	
A	17.5	-	10.0	15.0	-	15.0	22.0	29.5			-	40.0	31.0
M	13.0	-	-	14.0	15.5	17.0	24.5	-			-	38.0	-
J	-	-	-	11.5	20.0	-	-	-		30.0	-	41.5	38.0
J	-	10.5	12.0	-	-	19.0	-	29.0	-	-	35.5	-	
A	-	-	20.0	-	-	17.5	17.5	-	-	-	-	-	
S	14.0	13.5	-	-	17.0	21.0	-	-	-	-	-	-	
O	-	-	-	-	-	-	-	10.0	-	-	36.5	-	
N	15.5	-	16.5	-	-	-	23.0	-		26.0	35.7	-	
D	-	-	15.0	15.5	17.5	-	25.0	-	-	-	-	-	

TOWNSHIP EVANS PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J						-	10.5	11.5	5.5	13.0	-	-	-
F						-	7.5	-	12.0	12.5	15.0	17.0	-
M						10.0	10.0	-	12.0	-	-	-	17.5
A						1.3	9.9	11.5	13.0	-	9.5	19.5	18.0
M						6.5	11.0	-	-	14.0	16.0	18.0	18.0
J						1.0	-	15.0	13.0	13.5	-	16.5	
J					1.5	11.5	9.5	7.0	16.0	-	-	-	
A					2.5	-	-	10.	12.5	13.0	-	-	
S					5.5	12.0	-	7.0	-	12.5	-	19.5	
O					-	6.5	-	2.0	13.0	-	16.7	-	
N					1.5	-	1.5	2.5	13.0	13.0	17.5	-	
D					-	10.0	-	6.5	10.5	15.0	-	15.0	

TOWNSHIP FAIRLAND

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	-	5.1	14.0	14.0	13.2	13.0	23.8	23.2	32.0	27.8
F	-	-	-	-	-	15.0	-	12.8	15.8	22.7	26.8	29.8	25.0
M	-	-	-	-	-	4.5	14.6	16.5	16.5	20.3	24.1	27.8	27.0
A	-	-	-	-	-	-	16.0	17.7	25.8	21.8	26.1	28.0	30.5
M	-	-	5.8	-	-	12.2	12.7	16.1	21.5	25.5	26.5	26.8	29.0
J	-	-	-	7.2	-	-	-	12.5	16.6	23.8	20.9	25.4	28.5
J	-	-	-	-	-	-	-	22.5	20.1	24.5	21.7	28.1	27.5
A	-	-	-	-	9.5	-	-	16.0	22.5	21.5	20.0	29.1	20.0
S	-	-	-	-	9.0	12.5	-	5.3	28.7	24.1	28.8	35.1	-
O	-	-	-	-	11.1	10.6	13.5	17.5	18.7	25.2	29.5	25.7	-
N	-	-	-	-	14.0	-	14.0	15.8	18.0	26.7	23.5	24.0	-
D	-	-	-	-	-	-	11.2	21.0	17.8	25.5	23.5	-	-

TOWNSHIP FAIRMOUNT 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	8.0	10.5	14.0	13.0	-	16.0	19.5	-	-	26.0	-
F	10.5	11.5		11.0	12.0	13.7	-	17.0	-	19.0	20.0	27.5	35.0
M	-	10.5		7.0	13.5	11.0	-	17.2	17.0	22.0	34.0	-	29.5
A	-	-		9.0	13.5	13.0	-	17.0	-	-	-	-	30.0
M	10.0	-	11.0	13.5	13.5	15.0	21.5	16.5	19.0	-	28.5	-	-
J	-	11.5	11.2	10.0	11.9	15.7	44.0	19.0	-	25.7	-	-	-
J	8.0	-	7.7	-	10.0	15.0	-	-	-	16.0	-	-	-
A	-	8.7	9.5	15.2	12.5	-	-	26.0	-	-	24.5	-	24.0
S	-	12.0	11.2	-	-	12.2	-	13.5	24.0	-	32.0	-	
O	-	-	10.0	12.7	-	10.0	8.0	-	15.0	-	28.0	-	
N	-	-	10.0	9.0	13.2	-	14.5	-	17.0	24.5		31.0	
D	-	-	7.0	12.0	-	11.0	16.5	9.7	-	-	-	-	

TOWNSHIP FAIRVIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	4.3	-	-	-	-	-	-	2.8	-	-	-	16.4	10.0
F	-	-	-	7.2	-	3.5	-	5.5	5.0	6.1	-	-	-
M	-	-	-	-	-	4.8	-	7.0	-	-	9.5	-	-
A	-	-	-	-	5.7	9.0	-	-	5.0	9.4	-	-	14.6
M	-	-	-	-	3.0	11.7	-	-	-	13.0	-	-	-
J	-	-	-	11.7	-	8.5	-	-	4.2	12.0	-	-	-
J	-	-	-	6.4	11.5	3.1	-	3.7	-	-	-	-	-
A	-	-	4.0	5.5	7.5	8.0	4.2	3.0	2.3	7.0	-	-	-
S	-	-	-	5.5	-	-	-	-	-	-	-	-	-
O	-	-	-	2.8	4.5	9.0	6.5	-	-	-	-	-	-
N	-	2.71	3.7	-	4.7	4.5	5.5	-	5.7	-	-	9.2	-
D	-	-		6.0	3.5	-	-	-	-	-	6.5	10.0	-

TOWNSHIP FAIRWOOD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.0			6.5	9.0	-	-	14.5	9.0	-	-		-
F	-			-	11.0	-	-	-	-	13.0	16.0	25.0	-
M	-			11.0	-	10.0	8.0	12.0	10.0	20.0	16.0	-	37.5
A	-		7.5	5.5	8.5	10.0	7.0	-	9.5	-	-	17.0	-
M	-		-	9.5	-	-	13.0	-	12.0	-	-	-	22.0
J	-		-	-	-	-	8.5	-	12.5	15.2	-	26.0	-
J	-		2.0	-	5.5		10.0	-	-	15.7	-	13.7	
A	-	6.0	9.5	-	11.5	9.0	10.2	-	-	-	17.0	18.0	
S	6.0	-	-	-	-	10.0	-	-	13.0	15.5	16.5	17.0	
O	9.5	-	-	4.2		-	-	-	-	10.0	-	10.0	
N	-	-	-	9.5	10.0	-	-	-	-		-	-	
D	-	-	6.5	-	-	-	8.0	27.0	7.0	-	-	21.0	

TOWNSHIP FELLSIDE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J				7.5		6.5	-	-	10.0	16.0	14.0	15.0	16.0
F	6.0		8.5	-		8.0	9.5	10.0	-	11.5	-	-	17.0
M	9.0		5.0	5.0	9.0	7.5	10.5	-	12.0	-	16.0	-	17.7
A	-		-	-	7.5	9.0	8.0	8.5	-	19.0	15.5	28.5	-
M	-			-	-	9.5	-	-	11.0	10.5	16.0	18.0	-
J	-		5.0	8.0	-	-	-	12.0	11.0	-	-	-	-
J	7.0		5.5	-	8.0	-	5.0	-	-	17.5	-	-	21.0
A	-		-	-	8.0	10.5	7.5	12.0	-	-	-	-	-
S	-		5.5	-	6 0	-	8.0	-	-	14.0	12.0	17.7	-
O	-			-	8.0	6.5	12.0	-	-	-	-	-	-
N	-			-	10.5	-	10.0	14.0	16.0	-	-	-	
D	--			-	7.5	8.0	11.5	--	-	14.0	-	-	

TOWNSHIP FERNDALE 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.0	9.0	10.5	10.5	8.5	9.5	13.0	12.0	17.5	18.0	22.5	26.0	24.5
F	8.0	-	7.5	8.5	9.5	14.0	17.0	19.5	15.0	20.0	21.5	24 5	29.0
M	8.0	-	5.5	7.0	-	11.0	11.0	12.0	15.0	17.0	25.5	35.0	29.5
A	7.9	-	7.0	6.0	11.0	10.5	15.0	16.0	19.0	19.0	21.0	23.0	22.5
M	7.0	-	8.5	6.5	9.0	10.0	17.0	20.5	19.0	18.5	23.5	22.0	25.0
J	5.0	-	6.0	10.0	9.0	12.0	15.0	19.5	14.0	19.0	22.0	26.0	24.0
J	8.0	8.0	9.0	10.5	6.0	13.0	17.0	15.0	19.0	18.0	25.5	21.0	28.5
A	6.5	9.5	5.0	-	11.0	8.0	14.0	18.0	18.0	20.0	22.0	24.5	21.5
S	8.5	6.5	12.0	-	9.0	9.0	16.0	13.7	17.0	22.0	27.0	26.0	
O	5.0	9.5	6.0	13.0	10 5	7.5	13.9	20.2	19.0	22.0	23.0	23.5	
N	7.5	10.5	8.5	8.0	8.0	8.0	17.0	22.0	20.0	21.0	24.0	21.0	
D	-	9.0	6.7	5.0	15.0	16.0	17.0	20.5	25.0	26.0	27.0	26.0	

TOWNSHIP FOREST TOWN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		12.0	11.0	10.0	13.0	13.5	17.5	40.0	19.5	48 0	5	29.0	35.0
F	10.0	13.0	10.0	42.0	16.0	15.5	17.0	-	-	36.0	23.0	29.0	33.0
M	17.0	11.0	17.0	11.0	13.0	12.5	23.0	32.0	30.0	24.0	24.5	-	27.5
A	11.5	-	-	19.0	20.0	14.0	-	32.0	-	50.0	-	30.0	34.0
M	9.5	-	10.0	11.0	11.5	19.5	-	27.0	20.5	-	27.5	38.0	34.0
J	16.0	-	10.5	12.0	19.0	18.0	27.0	-	23.0	26.5	40.0	-	38.0
J	9.0	-	-	14.5	11.5	17.0	-	-	26.0	-	31.0	-	36.0
A	-	9.0	12.0	-	17.5	24.0	16.0	15.0	25.0	-	27.0	-	35.0
S	12.0	12.0	8.5	-	16.5	11.5	-	18 0	18.0	27.0	-	-	44.0
O	11.0	16.5	14.5	21.0	13.5	11.5	-	-	26.0	25.0	30.0	28.5	
N	9.5	-	11.5	9.0	17.0	11.5	-	18.5	-	34.0	32.0	45.0	
D	11.5	12.0	11.0	9.0	16.0	15.5	22.5	-	27.0	53.0	25.0	-	

TOWNSHIP FRANKLIN ROOSEVELT PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	8.5	9.0	9.2	9.0	9.5	10.5	10.5	11.5	14.0	15.5	22.5	22.0	21.0
F	9.0	9.0	8.5	9.2	9.7	11.0	11.0	12.5	15.0	16.5	21.0	20.0	19.0
M	9.5	7.0	8.9	8.9	9.9	9.0	11.0	13.5	15.5	16.5	21.0	20.0	22.0
A	10.0	8.0	9.0	8.5	11.0	10.5	13.5	17.5	-	15.5	19.5	22.0	22.9
M	10.0	-	9.5	10.0	8.0	10.5	11.0	7.5	14.0	16.5	15.0	21.7	22.0
J	9.5	-	11.0	9.0	12.0	10.5	12.5	12.5	19.0	16.2	18.5	-	22.5
J	8.5	8.2	9.0	9.5	13.0	11.0	12.0	13.5	12.5	-	17.9	21.0	22.5
A	9.5	-	8.5	9.5	10.5	9.5	12.0	12.0	14.5	-	-	-	22.0
S	8.0	9.0	9.2	9.0	10.7	-	10.5	9.0	14.5	16.5	22.0	21.0	20.0
O	-	8.5	9.2	9.0	10.0	-	13.5	13.5	15.5	17.5	22.0	21.0	
N	9.0	9.9	-	10.5	10.5	-	12.5	14.0	17.5	22.5	22.0	21.0	
D	9.5	8.0	9.0	9.5	10.0	-	10.5	15.0	15.5	-	18.5	22.0	

TOWNSHIP GARDENS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	12.5	9.5	-	11.5	8.5	12.5	11.5	8.0	21.0	18.0	36.0	-
F	-	-	-	-	10.5	14.0	-	-	7.2	17.0	26.0	19.0	24.5
M	9.5	-	-	12.2	9.5	13.5	10.0	8.7	16.0	19.0	18.5	-	-
A	7.9	9.5	-	7.9	9.2	-	12.5	8.7	37.0	15.0	33.5	12.0	-
M	-	7.5	-	10.0	-	14.0	-	14.5	17.0	13.0	-	-	-
J	11.5	-	9.0	-	9.9	-	-	17.0	14.0	-	17.5	32.0	-
J	-	9.5	15.7	9.0	10.5	-	-	-	-	21.0	-	-	-
A	11.2	-	10.5	-	9.9	11.9	-	-	-	17.0	25.5	23.0	-
S	-	-	9.0	-	9.7	14.0	-	10.5	-	-	-	24.5	-
O	12.5	6.0	11.5	-	7.9	-	-	-	-	-	27.0	23.5	28.0
N	11.5	6.5	6.9	12.0	15.0	-	9.5	-	20.5	26.7	21.0	-	-
D	11.5	7.0	-	10.0	10.5	-	10.0	17.0	12.5	-	-	20.0	-

TOWNSHIP GILLVIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J								10.0	2.0	-	16.5	-	22.5
F						5.5		13.0	12.0	13.5	18.7	-	22.5
M						11.5	14.0	4.5	6.0	15.0	-	24.0	26.5
A	1.5					-	11.5	7.0	16.0	15.0	19.5	35.0	-
M					1.5	16.0	27.0	-	14.5	15.0	16.0	19.0	-
J					-	12.0	19.9	-	15.0	15.5	17.5	20.5	19.0
J					6.5	-	12.0	13.0	13.5	16.0	17.5	22.0	19.0
A						12.0	6.5	12.0	13.0	16.5	20.5	20.5	23.0
S								-	12.7	16.5	18.5	24.0	
O							13.5	11.5	16.0	16.0	20.0	18.0	
N								-	13.5	17.0	-	20.5	
D				12.0			13.0	-	16.0	20.5	-	-	

TOWNSHIP GLENHAZEL

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	13.5	12.5	16.0	13.5	15.5	14 5		20.5	20.2	23.0		44.0	39.0
F	11 7		13.5	15.5	13.0	18.0		26.5	29.5	30.5	34.5	38.5	-
M	10.2	13.(	12.0	15.5	15.5	20.5		24.5	26.5	22.5	-	-	33.0
A		-	11.5	14.0	15.5	20.5		25.5	21.5	37.5	30.0	-	37.5
M	14.0	-	15.0	15.2	15.2	17.5		24.5	27.5	31.0	-	24.0	38.5
J	12.0	-	13.0	15.7	14.7	19.5		25.5	25.5	50.0	31.0	28.5	42.0
J	12.0	12.5	13.7	13.5	16.5	-	25.0	24.5	26.0	30.0	43.5	38.5	
A	-	15.0	14.0	16.0	17.5	23.0	22.5	-	29.5	31.0	33.5	33.0	
S	2.7	14.0	13.2	12.5	18.5	17.5	19.0	27.0	30.5	45.0	31.5	34.5	
O	-	-	15.5	15.5	17.7	21.0	-	20.0	34.5	35.0	35.5	40.0	
N	11.0	13.7	12.5	15.5	1815	-	20.5	19.0	26.5	-	43.0	35.0	
D	-	13.2	15.5	14.5	13.5	-	25.5	25.5	26.5		38.0	34.0	

TOWNSHIP GREENSIDE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.0	10.0	-	8.0	10.5	9.7	13.7	13.5	12.5	22.0	21.5	20.5	-
F	7.0	8.7	10.0	9.0	10.0	12.5	13.0	14.5	15.5	20.5	20.0	20.5	23.2
M	8.0	10.5	10.0	12.0	10.5	10.5	9.2	15.5	19.0	15.7	20.0	24.5	-
A	8.0	-	8.2	13.0	10.0	13.7	13.0	14.9	23.0	16.2	19.2	25.0	24.5
M	9.5	8.5	8.5	9.0	10.5	11.5	10.5	20.0	14.0	18.9	25.5	22.5	21.0
J	8.5	-	9.0	9.0	10.5	9.7	14.0	19.0	19.7	-	21.5	19.5	-
J	9.5	-	-	8.0	8.2	-	12.0	14.0	15.5	34.0	27.5	21.5	20.0
A	7.5	11.0	9.2	-	10.5	14.5	12.2	14.2	14.0	22.5	22.5	23.0	20.0
S	12.5	8.2	9.5	10.5	9.5	14.2	14.5	20.0	19.0	21.0	22.0	24.0	23.0
O	9.5	15.0	8.2	10.7	9.9	10.5	14.5	15.5	16.7	18.0	23.0	23.5	
N	11.0	8.5	9.0	11.5	10.0	12.5	-	16.7	18.5	-	22.5	27.0	
D	10.0	-	-	12.2	10.5	15.5	11.5	14.5	16.2	22.0	-	27.9	

TOWNSHIP GREENSIDE 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	12.0	10.5	11.2	10.2	12.0	15.0	14.0	16.0	16.0	19.1	26.5	23.0	29.5
F	12.7	9.7	9.0	11.0	11.2	14.5	14.7	17.0	14.7	16.5	23.5	28.2	25.0
M	11.5	-	9.5	9.1	11.5	14.0	16.5	11.5	21.1	20.0	26.1	25.0	27.0
A	9.1	10.5	10.0	10.1	11.0	14.7	18.5	15.7	17.5	20.0	22.0	22.0	21.5
M	9.5	-	11.0	10.2	12.0	14.7	13.0	12.5	17.2	30.0	18.0	27.0	39.5
J	10.7	12.0	7.0	14.0	16.0	12.5	13.5	16.5	22.5	-	35.5	25.0	25.5
J	10.2	-	10 5	10.0	11.0	12.0	-	14.5	16.0	20.7	20.5	30.0	23.5
A	11.5	8.9	8.0	12.0	10.0	13.0	12.7	21.7	14.5	25.0	28.0	-	20.0
S	-	10.0	10.0	-	14.0	13.0	17.5	18.5	20 5	20.0	25.0	25.0	
O	12.0	12.0	-	10.0	12.0	14.2	15.0	14.5	18.5	21.5	-	-	
N	12.0	9.0	9.9	11.7	13.5	15.0	14..	16.5	18.5	21.2	-	27.5	
D	9.5	11.0	9.5	12.5	11.0	-	-	17.5	19.0	29.0	19.2	21.0	

TOWNSHIP GREENSIDE EAST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		-	11.5	-	8.9	-	13.5	20.5	18.5	21.0	-	-	-
F		6.7	-	-	11.2	20.5	-	14.5	16.2	-	-	34.5	-
M		-	-	-	9.5	-	13.5	-	-	18.5	22.5	30.0	25.0
A		-	-	10.5	12.2	10.?	14.0	-	22.0	17.0	-	20.0	-
M		-	-	-	13.0	-	14.0	17.5	17.0	-	-	-	25.0
J		-	-	-	13.0	13.5	-	-	19.5	-	27.5	-	27.2
J	13.0	7.5	9.9	-	-	-	-	-	-	-	-	25.0	
A	-	10.0	10.2	12.5	-	-	-	15.5	19.5	-	-	23.0	
S	-	-	-	-	-	-	-	-	-	-	25.0		
O	-	-	10.0	-	-	16.0	-	-	22.5	-	25.5	26.5	
N	9.0	-	10.5	-	9.0	-	-	17.0	15.5	-	-	-	
D	-	-	6.5	-	12.0	-	17.0	-	18.5	-	23.0	-	

TOWNSHI. GREYMONT

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	8.0	4.2	-	-	4.5	2.5	2.5	3.5	3.0	4 0	9.0
F	-	-	-	-	2.0	-	-	2.5	3.0	4.1	5.0	6.0	4.2
M	-	-	-	2.5	-	-	-	2.5	1.0	2.7	4.2	4.0	5.5
A	-	-	-	4.5	2.0	-	2.5	2.2	2.7	4.0	3.5	6.0	3.2
M	2.5	-	-	10.0	-	1.0	5.2	2.2	1.5	3.5	7.5	22.5	7.5
J	-	-	-	14.0	1.5	5.0	6.9	3.5	6.0	4.5	1.5	5.7	3.0
J	-	-	-	-	1.0	-	2.5	7.0	2.9	2.7	2.0	6.2	4.0
A	-	1.2	-	-	-	3.9	3.0	2.0	2.0	4.5	6.5	7.2	3.0
S	-	15 0	4.2	-	2.5	-	-	2.0	4.0	2.1	3.2	15.5	2.7
O	-	-	-	-	2.0	-	5.5	1.7	2.0	2.1	7.5	5.7	4.0
N	-	-	1.7	-	3.0	-	2.2	6.5	5.1	4.0	5.1	6.5	4.0
D	-	-	-	-	2.0	-	-	11.0	-	5.5	3.5	5.2	

TOWNSHIP HADDON

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.0	-	-	-	-	-	6.5	8.5	-	11.0	12.0	-	-
F	7.0	-	6.5	-	5.0	6.0	6.0	9.0	-	5.0	12.0	-	-
M	-	5.5	6.0	7.0	-	7.0	-	7.5	-	10.5	-	13.0	9.9
A	-	6.0	-	-	2.5	-	-	12.0	-	6.9	-	-	14.0
M	-	-	8.0	-	-	6.0	8.0	10.0	9.0	9.5	-	-	14.5
J	-	6.9	-	-	6.0	6.0	7.0	-	4.0	-	-	-	13.0
J	7.0	-	-	-	6.5	7.5	9.0	5.0	8.5	-	14.5	-	-
A	6.5	-	5.0	-	7.5	6.0	-	-	26.0	10.5	13.5	-	19.0
S	6.5		5.0	-	7.5	-	5.5	9.0	9.0	6.0	14.5	14.5	
O	-	6.0	-	8.0	-	-	10.5	7.0	8.5	-	23.0	15.0	
N	6.0	6.0	4 0	-	7.0	7 0	-	6.9	-	-	16.0	15.0	
D	4.5	-	8.0	4.0	-	6.5	7.5	8.0	-	-	-	-	

TOWNSHIP HIGHLANDS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-		-	-	-	-	-	-	-			
F	-	-		-	-	10.0	9.0	-	8.5	-			
M	-	-		-	-	-	-	11.5	-				
A	-	-		-	-	-	-	-	-	-			
M	-	-		-	-	-	-	-	17.5	-			
J	9.0	-		-	9.5	-	-	-	-	-			
J	-	-		-	5.5	-	-	-	-	-			
A	-	-		-	19.0	-	-	-	-	-			
S	-	-		-	-	9.5	-	11.5	8.5	-			
O	-	-		4.5	-	-	7.5	-	-	-			
N	-	-		6.5	8.5	-	-	-	-	17.0			
D	-	10.0		8.0	-	-	-	-	-	-			

TOWNSHIP HIGHLANDS NORTH

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.2	9.5	10.5	9.0	11.5	12.5	12.0	13.7	15.0	19.0	20.5	20.0	23.5
F	7.7	9.4	8.5	10.-	9.0	10.0	11.5	12.5	12.0	17.5	24.5	24.5	23.0
M	9.5	9.5	-	11.5	10.0	10.5	11.5	14.5	12.0	16.5	22.0	20.0	16.0
A	9.5	6.5	8.0	10.0	11.0	8.5	11.5	14.5	14.7	15.2	20.2	19.0	21.0
M	6.5	7.5	88.5	8.7	9.5	10.7	13.0	11.5	14.0	18.5	22.5	18.0	20.5
J	8.2	-	8.0	7.2	11.5	13.0	9.5	12.5	17.0	17.5	19.5	20.2	20.0
J	6 0	10.5	8.0	10.5	9.5	9.7	12.5	-	13.5	19.2	22.2	-	23.0
A	12.0	7.5	7.0	8.0	8.5	8.5	15.5	13.5	14.7	18.5	18.7	20.5	
S	10.0	7.5	8.2	-	8.5	6.5	11.5	18.7	13.0	17.5	18.0	22.0	
O	9.7	10.5	8.5	11.2	10.0	9.5	10.5	13.5	17.5	16.5	19.0	21.0	
N	8.5	-	10.5	9.5	10.0	11.5	12.5	12.5	13.0	22.5	22.5	24.5	
D	10.1	9.5	9.5	9.7	9.9	-	15.5	16.0	19.5	19.5	15.0	22.5	

TOWNSHIP HOMESTEAD AND HOMESTEAD PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.0	6.2	7.0	-	7.0	8.0	8.5	8.0	9.0	9.2	12.5	-	16.5
F	7.0	6.9	6.2	-	8.0	8.0	7.2	8.7	5.0	5.5	12.0	-	16.5
M	7.0	7.0	-	-	-	5.9	7.5	8.5	8.5	8.7	12.0	-	-
A	6.2	6.5	6.2	6.0	8.2	8 0	7.8	7.9	10.5	-	-	14.0	-
M	-	-	-	7.5	8.2	-	10.0	-	10.0	9.0	15.5	-	-
J	6.5	-	-	9.0	10.0	7.5	7.5	-	9.5	-	14.0	11 0	-
J	-	5.9	4.7	7.2	7.0	-	7.8	9.8	8.5	11.2	-	15.0	17.0
A	6.5	-	8.0	-	7.0	7.2	-	6.5	-	14.0	-	14.5	15.0
S	-	7.0	-	-	7.9	-	9.0	-	-	-	15.5	-	
O	-	6.8	7.0	-	7.0	8.0	8.0	-	9.7	9.0	14.9	17.5	
N	6.5	6.0	6.0	-	7.0	-	9.0	8.0	8.0	10.0	16.0	-	
D	-	6.9	6.5	7 8	6.2	3.5	7.0	12.0	-	12.5	-	-	

TOWNSHIP HOUGHTON ESTATE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	17.5	15.5	17.5	16.5	24.0	19.0	28.0	30.0	43.0	45.0	-	47.5	-
F	14.5	19.5	16.0	17.5	18.5	22.0	25.0	28.0	34.5	46.5	55.5	61.5	57.5
M	13.5	19.0	15.2	15.0	21.5	27.5	28.5	26.0	-	46.7	50.0	53.0	60.5
A	19.5	16.0	18.2	17.5	19.5	26.2	29.5	35.5	35.5	40.9	43.5	42.5	59.5
M	16.5	14.0	16.5	17.2	25.2	25.5	28.0	37.0	34.5	31.2	34.5	-	53.0
J	15.5	17.0	20.0	15.5	23.0	24.0	24.5	34.0	34.0	47.5	50.0	55.0	50.0
J	22.5	14.0	14.9	19.5	20.5	16.2	32.0	33.5	37.0	43.5	41.0	43.5	40.0
A	-	21.5	22.5	20.5	20.5	23.5	26.0	27.0	47.0	49.5	34.0	70.0	-
S	18.5	15.5	17.5	17.7	21.5	25.5	24.0	46.0	31.0	49.2	41.0	58.0	33.0
O	20.5	17.0	14.0	19.2	25.0	22.5	25.5	29.0	30.0	37.0	44.5	60.0	
N	15.5	17.5	18.5	23.0	23.0	16.5	24.7	33.5	61.5	51.5	40.0	42.0	
D	14.5	20.2	18.5	23.0	24.5	-	31.5	41.0	43.5	42.0	-	57.5	

TOWNSHIP KIRKLINGTON

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	14.0	16.0	15.0	13.7	15.5	20.5	22.5	-	-	-	25.0		
F	22.2	14.0	-	-	-	24.0	23.5	-	30.0	34.5	24.0	46.0	
M	17.0	-	-	-	-	18.5	20.5	28.5	-	34.2	49.0	44.0	45.0
A	-	-	-	-	20.0	-	21.0	-	33.0	28.0	37.5	-	20.0
M	-	-	-	-	17.5	21.5	16.0	29.0	-	34.0	60.0	45.0	26.0
J	-	-	-	-	17.7	16.0	24.0	31.0	-	16.0	57.5	47.0	52.0
J	-	-	13.5	16.0	19.5	-	24.0	-	31.0	41.0	22.5	-	
A	-	-	13.5	-	16.5	24.5	20.0	-	-	37.5	29.0	-	
S	-	16.0	-	-	17.0	-	23.0	18.0	30.0	45.0	50.0	47.0	
O	-	13.5	19.	-	26.0	-	47.0	38.0	29.0	39.7	44.0	55.0	
N	-	-	18.0	16.5	17.5	-	30.0	23.5	38.0	47.0	46.0	38.0	
D	15.0	-	11.5	15.5	-	-		34.0	31.0	41.5	-	-	

TOWNSHIP HURSTHILL

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		5.5	-	-	6.5	-	-	-	9.5	3.5	7.0	19.0	11.0
F		-	4.5	-	6.5	-	9.0	5.0	-	6.0	10.5	11.0	16.0
M		7.0	-	6.5	5.0	5.5	5.0	10.0	-	7.0	10.0	-	-
A	5.5	-	-	-	5.0	3.5	4.0	6.0	-	11.5	8.0	-	-
M	5.0	-	-	-	5.5	8.0	6.0	5.7	-	11.0	-	-	15.0
J	-	-	-	-	7.0	-	5.0	8.0	-	5.0	-	-	
J	-	-	6.5	-	-	2.7		-	6.0	-	11.0	-	
A	4.0	-	5.2	-	-	8.0	-	4.0	10.0	10.5	8.5	12.0	
S	10.5	-	4.0	-	5.0	-	-		4.0	8.0	8.0	7.5	
O	-	-	6.0	-	7.5	2.5	3.0	-	8.0	-	-	8.0	
N	-	-	-	-	4.0	-	6.5	9.0	6.0	-	8.0	-	
D	6.0	-	4.0	-		4.5	-	-	-	8.5	10.0	-	

TOWNSHIP HYDE PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.0	-	-	-	35.0	15.0	-	12.5	14.5	30.0	76.0	-	50.0
F	21.0	-	-	23.0	29.0	25.0	-	-	44.0	44.0	-	-	-
M	25.0	23.7	-	16.0	-	30.0	25.0	10.0	29.0	35.0	61.0	57.0	-
A	27.0	-	-	-	32.0	-	50.0	50.0	74.0	59.0	-	-	-
M	39.0	-	23.5	-	20.0	35.0	-	12.5	20.0	22.0	50.0	100.0	-
J	23.5	-	-	-	20.5	-	-	15.5	17.0	72.0	56.0	40.0	77.0
J	-	-	26.0	25.0	12.5	-	12.5	10.0	62.0	43.0	-	-	59.0
A	-	27.5	14.0	-	-	34.0	12.5	36.5	30.0	100.0	62.0	-	
S	-	-	17.5	-	30.0	34.0	21.0	16.0	44.0	94.0	68.0	-	
O	24.0	22.0	27.0	-	8.0	29.0	-	26.0	65.0	53.0	52.0	46.0	
N	-	-	20.0	-	22.0	-	49.0	20.0	22.0	-	-	61.0	
D	6.0	-	-	21.0	21.5	-	-	28.0	-	-	77.0	-	

TOWNSHIP INANDA

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	-	-	13.5	31.2	25.0	24.0	33.0	44.5	-	-
F	-	-	-	-	20.0	14.7	-	24.0	45.0	-	-	44.0	-
M	32.5	-	-	-	20.0	-	-	-	-	20.5	-	-	61.5
A	-	-	24.0	-	24.5	27.0	-	32.0	-	-	-	-	-
M	-	-	-	19.5	14.0	-	15.2	-	-	-	39.0	41.0	-
J	-	-	23.5	-	-	-	-	-	-	-	-	-	-
J	12.5	-	22.7	-	-	14.0	42.0	15.0	30.0	-	-	-	-
A	-	16.0	-	-	21.0	-	26.0	22.0	-	79.0	52.5	-	54.0
S	-	-	12.0	-	17.0	-	-	-	25.0	41.5	-	-	
O	10.5	14.0	-	-	21.0	29.0	-	36.0	23.0	-	-	-	
N	-	-	36.0	-	37.0	-	26.0	36.5	44.5	-	-	-	
D	-	-	-	18.5	-	-	-	26.0	39.0	-	-	-	

TOWNSHIP JEPPESTOWN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	2.5	1.5	-	6.5	4.9	3.0	7.8	6.8	8.2	10.4	8.2	10.1	9.2
F	4.3	6.0	4.5	5.5	-	4.5	5.2	4.5	6.8	9.4	7.6	10.8	28.5
M	3.1	-	3.5	6.1	5.7	6.0	5.5	6.4	7.5	5.3	7.8	12.8	9.4
A	5.1	2.9	1.4	5.2	4.7	7.0	4.3	5.8	6.0	5.0	7.8	8.6	8.0
M	4.5	7.0	4.5	2.0	4.3	4.8	5.0	5.0	7.5	9.8	7.5	11.1	9.0
J	5.0	-	4.9	4.8	4.7	5.3	6.0	5.4	7.5	8.8	7.3	10.9	12.5
J	5.0	4.4	3.5	3.8	7.5	8.0	6.1	6.0	6.0	5.5	7.7	6.1	7.5
A	2.3	5.0	5.0	2.5	5.0	4.5	5.4	8.5	4.7	7.5	6.0	9.8	10.0
S	2.0	7.0	4.5	5.3	4.0	9.0	6.5	4.5	5.7	7.0	5.0	14.5	-
O	4.0	4.0	2.1	4.0	4.5	5.4	4.3	6.8	4.5	10.2	7.5	11.7	-
N	3.5	4.3	5.6	4.1	7.0	2.0	6.6	6.4	8.3	8.5	8.6	8.0	-
D	3.0	5.2	6.2	4.5	3.2	-	8.5	4.5	8.3	6.7	8.2	10.3	-

TOWNSHIP JUDITHS PAARL

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	4.0	3.0	-	-	3.5	-	2.5	5.0	5.5	6.5	10.0	-	-
F	7.0	-	4.0	-	6.0	4.5	5.5	10.0	5.5	6.5	11.2	-	11.0
M	5.5	2.0	-	6.5	4.5	5.5	5.5	-	10.0	8.5	11.5	14.7	-
A	-	4.0	-	7.0	12.0	-	5.5	6.5	-	-	16.0	-	-
M	-	-	4.0	-	6.0	6.0	-	5.5	-	12.0	-	-	-
J	-	5.0	-	-	5.0	4.5	4.0	-	7.0	7.0	18.0	6.0	-
J	2.5	-	4.0	4.0	4.5	7.5	7.0	-	8.0	7.0	5.0	13.5	-
A	2.0	-	-	4.0	4.5	-	7.0	4.5	6.0	12.5	10.0	-	15.0
S	4.0	-	4.0	-	5.0	-	4.0	7.0	7.0	11.5	-	-	5.0
O	-	5.0	-	-	5.0	-	-	7.0	5.0	7.5	12.5	-	
N	5.0	-	-	-	9.0	-	4.0	8.5	8.0	9.5	-	13.5	
D	-	4.0	3.5	19.0	4.5	-	3.0	10.5	8.0	15.0	-		

TOWNSHIP KENILWORTH

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.2	4.9	5.2	4.5	6.5	5.5	6.0	5.9	6.5	7.5	10.5	12.0	10.5
F	6.2	5.5	4.9	4.2	4.5	5.5	5.0	7.2	7.5	8.5	8.5	12.5	10.5
M	5.0	4.5	5.2	5.2	7.0	7.0	6.5	6.9	6.5	10.5	11.5	13.5	14.5
A	5.5	4.5	3.9	4.9	5.2	5.0	5.9	6.2	9.5	7.5	12.5	13.0	13.5
M	4.7	6.5	5.5	5.2	4.5	5.2	6.2	6.2	7.2	8.5	11.5	11.0	11.5
J	5.5	5.5	5.2	6.2	5.5	8.5	8.7	8.5	7.1	7.5	11.0	12.0	13.0
J	4.5	4.0	6.5	5.9	5.7	6.0	9.5	7.5	8.5	8.9	10.5	16.0	13.0
A	4.5	4.5	6.7	5.0	5.7	5.9	8.5	10.5	6.5	8.9	10.2	12.0	13.5
S	6.5	5.0	4.5	-	5.9	10.0	5.9	7.5	7.2	9.1	10.5	10.0	14.0
O	5.5	5.5	4.2	5.7	8.7	5.5	6.5	6.5	7.2	8.0	9.5	12.0	18.5
N	4.0	5.0	4.0	4.7	5.5	7.0	6.4	6.9	5.5	8.0	9.7	10.5	
D	6.0	5.5	5.0	7.5	8.5	5.0	6.2	5.5	8.2	10.0	14.0	-	

TOWNSHIP KENSINGTON

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.3	7.51	8.1	7.5	9.5	8.1	8.9	10.5	11.0	9.7	14.5	15.3	17.7
F	6.8	7.5	7.0	7.5	7.6	7.5	8.1	9.3	10.7	6.5	13.1	15.6	15.5
M	6.9	6.5	6.4	7.4	7.5	8.0	8.5	10.5	10.1	13.4	14.3	17.4	19.5
A	6.0	6.5	6.6	7.0	7.6	8.0	8.0	10.5	11.5	14.2	18.5	17.0	19.2
M	7.0	5.8	5.6	6.1	7.6	9.3	8.0	9.5	12.5	12.5	17.3	13.8	21.4
J	6.5	7.5	6.7	6.4	7.3	8.5	8.4	9.5	11.2	11.5	16.1	17.5	20.3
J	6.8	6.5	6.8	6.9	7.8	9.0	8.4	9.5	11.3	13.3	16.1	13.8	15.5
A	6.7	5.7	7.1	6.6	8.0	8.6	8.8	9.5	10.7	16.5	14.1	17.0	17.0
S	5.8	6.5	6.5	6.0	7.0	7.5	8.5	9.5	10.6	13.1	17.0	18.4	17.0
O	6.5	6.5	6.7	7.0	7.2	7.5	7.8	10.7	11.4	14.4	13.4	15.5	15.4
N	6.3	7.5	7.3	6.5	8.5	8.0	10.1	9.6	13.1	12.8	15.5	16.3	-
D	7.2	7.3	6.0	7.1	8.3	2.3	9.7	10.8	11.7	10.3	15.7	14.6	-

TOWNSHIP NEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J			-		-	11.0	12.5	15.0	17.5	13.5	26.2	21.0	28.0
F			-		12.0	10.5	14.5	14.0	14.5	18.2	24.7	24.0	28.5
M	-		7.0		-	10.0	12.5	10.5	15.0	24.2	28.5	28.0	33.5
A			-		20.0	9.7	17.0	25.0	16.0	21.2	24.2	30.0	23.5
M			-		8.5	10.	9.5	10.0	20.0	22.5	27.0	36.5	21.0
J			-		6.0	12.0	9.2	14.0	16.5	23.5	20.5	32.0	-
J			-		12.0	10.0	4.7	14.0	20.2	21.2	21.7	-	20.0
A		8.0	-	5.5	9.7	12.0	4.5	15.0	23.2	19.2	24.5	51.0	20.0
S		-	-	-	10.5	8.0	10.5	10.5	18.0	23.5	29.5	20.5	24.5
O		-	-		9.5	-	18.0	15.0	18.0	26.5	23.5	25.0	
N		7.5	5.0	6.7	9.5	-	16.0	15.5	13.0	14.5	39.5	33.0	
D		5.0		5.7	14.0	-	11.0	16.0	14.0	25.0	24.5	20.0	

TOWNSHIP LA ROCHELLE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.0	2.0	4.5	4.5	4.5	3.0	-	5.5	5.5	8.0	11.5	9.0	20.0
F	4.0	3.0	-	8.5	5.0	5.0	7.5	6.5	8.5	5.0	-	13.0	13.0
M	-	-	-	3.0	3.5	5.0	5.5	4.5	8.0	10.5	7.5	10.0	-
A	6.0	3.5	5.5	-	4.0	4.5	6.0	7.5	8.5	7.5	9.5	11.5	-
M	7.0	6.5	4.5	5.0	4.5	5.0	8.0	6.0	7.0	8.0	7.0	-	9.5
J	-	4.5	4.2	2.5	5.0	5.0	5.0	7.0	8.0	8.5	7.0	12.0	10.0
J	4.0	4.0	-	4.0	4.0	5.0	5.5	7.0	8.0	10.5	11.5	10.5	13.0
A	2.0	2.5	5.0	3.5	8.0	3.5	5.2	7.2	7.5	5.5	9.0	11.0	11.0
S	5.0	5.0	4.0	-	9.0	5.5	3.5	7.7	6.0	6.0	12.5	8.0	
O	5.0	5.0	-	3.5	2.5	4.0	4.5	6.0	8.5	7.0	14.0	11.0	
N	4.0	4.0	2.5	4.0	3.5	7.0	5.5	8.0	6.5	7.5	9.5	14.5	
D	-	-	5.5	2.5	4.5	7.5	6.5	8.0	9.5	8.0	13.0	10.5	

TOWNSHIP LINDEN AND 'X's

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.1	9.3	12.7	12.6	9.8	11.5	11.7	12.3	14.0	16.5	20.5	25.3	26.7
F	9.5	9.8	9.4	8.3	10.3	12.3	11.7	13.3	13.8	19.2	23.2	17.7	23.6
M	8.6	10.0	9.7	9.4	10.4	10.8	12.8	12.8	13.5	17.6	19.7	25.3	22.6
A	9.1	-	7.7	7.4	9.8	12.2	13.4	15.5	14.0	20.3	21.2	23.1	30.2
M	9.2	-	8.2	11.4	11.8	11.2	11.1	12.3	17.0	17.5	22.5	26.8	25.3
J	8.7	-	9.4	9.3	9.7	11.2	12.5	14.6	18.1	18.6	22.6	26.5	23.8
J	9.1	7.7	8.5	9.2	9.0	12.7	16.0	14.5	15.2	20.7	27.7	23.7	24.6
A	8.5	9.0	8.2	-	9.8	11.3	10.4	12.9	18.2	17.8	24.2	22.5	21.0
S	8.4	7.7	10.2	7.2	11.3	13.4	11.4	13.0	16.4	22.7	22.3	22.3	
O	10.0	6.5	8.0	8.4	10.3	11.6	13.3	15.2	17.2	20.6	23.4	25.2	-
N	8.5	9.7	8.1	9.8	10.3	12.3	15.2	14.2	18.3	20.5	22.6	25.5	-
D	9.5	10.1	11.5	9.1	11.5	-	11.2	12.7	18.6	19.9	22.2	21.3	-

TOWNSHIP LINKSFIELD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	15.5			16.0	23.0		38.0	20.0	15.0	40.5	-	40.0	39.0
F	-			-	18.0	19.0	23.0	11.0	25.0	45.0	-	-	41.0
M	-			-	19.0	-	30.0	-	-	39.5	-	-	42.0
A	18.0			24.0	21.5	-	-	13.5	19.0	29.5	50.0	-	-
M	17.5		19.5	-	17.0	-	-	17.0	21.0	-	44.0	32.0	-
J	-		-	-	-	-	26.0	-	-	25.0	-	-	-
J	-		-	20.5	29.0	-	16.5	-	25.0	16.0	62.0	-	45.0
A	30.0		19.0	-	-	-	28.0	-	-	-	53.5	-	
S	-		-	-	32.0	-	25.0	-	-	-	-	-	
O	9.0		-	-	-	-	20.0	-	31.0	32.5	33.0	44.0	
N	-	13.5	20.0	21.5	-	-	16.5	21.0	32.0	36.0	-	61.0	
D	-	-	-	17.0	-	24.0	31.0	48.0		43.0	-		

TOWNSHIP LOMBARDY EAST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.5	7.5	-	6.0	10.0	12.5	13.5	14.2	16.5	12.5	22.5	24.5	26.0
F	-	7.5	7.0	7.5	9.0	10.7	13.2	14.7	14.5	21.0	23.5	22.5	19.0
M	-	-	-	9.2	10.0	13.2	13.5	13.5	16.7	19.0	22.0	21.0	23.5
A	6.5	-	6.5	9.0	10.0	12.5	15.0	15.2	15.0	18.0	25.0	26.0	22.5
M	7.0	-	10.0	9.5	11.0	11.7	13.0	15.0	16.7	19.9	21.5	-	-
J	7.0	-	10.0	7.0	10.0	12.5	13.5	15.5	18.5	19.5	22.0	28.0	-
J	6.5	-	7.5	8.5	9.2	15.7	-	13.1	14.9	17.5	23.5	27.0	28.0
A	-	-	10.0	-	10.5	12.5	15.2	14.7	20.2	20.5	25.5	21.0	30.0
S	8.2	9.5	7.0	-	12.2	1012	13.2	14.1	19.9	18.0	-	28.5	
O	8.0	-	7.2	-	12.0	12.5	15.2	14.7	18.5	16.5	22.5	27.0	
N	-	6.51	8.5	10.0	11.2	-	12.7	14.0	15.5	19.0	23.5	23.7	
D	-	7.0	9.5	9.0	9.5	-	13.5	14.5	1015	20.5	20.5	19.5	

TOWNSHIP LINMEYER

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.0	8.9	9.0	7.9	9.0	9.9		14.0	11.5	15.0	16.5	18.5	17.0
F	7.0	9.0	8.9	7.9	10.5	10.5		13.5	11.5	15.5	17.5	20.5	22.0
M	8.5	-	-	9.5	9.5	10.0		11.5	14.5	16.5	21.5	12.0	30.0
A	6.0	-	-	9.7	9.5	10.2			10.5	17.5	20.0	-	25.0
M	8.7	8.5	8.2	-	8.4	9.7	12.5	-	15.0	15.2	17.5	20.0	19.0
J	8.0	-	9.2	9.5	10.0	12.0	-	-	14.5	19.5	19.5	18.5	23.5
J	8.0	-	8.5	-	9.0	9.5	4.0	-	12.0	14.5	17.2	19.0	-
A	-	-	10.5	8.0	9.0	10.0	-	15.5	15.0	19.9	16.5	20.0	19.0
S	9.0	7.5	9.9	8.0	10.5	18.0	12.0	-	14.5	20.0	21.0	24.0	
O	-	8.2	7.2	7.2	10.9	10.5	7.0	18.2	14.0	17.0	23.0	18.0	
N	9.0	8.9	9.5	9.5	9.2	-	14.0	12.0	14.5	19.5	21.0	19.0	
D	9.0	-	6.9	10.7	10.5	-	15.0	11.5	15.0	17.0	25.0	20.7	

TOWNSHIP LYNDHURST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		-	-	-	8.0	10.5	13.5	14.5	16.5	16.7	20.5	-	24.5
F		-	-	10.0	-	12.5	12.9	13.5	11.5	22.5	24.5	22.0	19.0
M	7.5	-	-	8.5	-	10.5	-	9.5	7.5	21.5	29.5	21.0	-
A	-	-	-	-	9.5	11.7	15.0	16.5	17.5	17.5	21.5		24.0
M	-	-	8.9	6.0	8.0	10.0	14.0	13.5	16.5	27.5	17.5	39.0	30.0
J	-	-	9.0	--	9.0	9.0	11.0	10.5	19.5	21.5	-	-	-
J	6.5	6.5	9.7	-	6.2	7.0	14.0	11.5	17.5	22.5	31.0	24.5	24.0
A	-	7.61	-	-	10.5	14.0	-	6.5	-	-	-	-	
S	8.0	-	-	-	10.2	-	9.2	12.5	19.5	-	27.5	37 0	
O	10.0	7.5	9.5	-	11.5	12.5	-	19.7	16.0	22.5	24.0	-	
N	6.0	-	4.5	6.2	13.0	-	13.5	11.5	21.5	17.5	25.0	30.0	
D	7.5	9.0	-	9.9	-	-	13.5	15.0	17.0	-	35.0	27.0	

TOWNSHIP MALVERN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.7	5.5	5.0	5.8	5.7	6.5	6.5	6.0	7.5	8.9	9.5	10.5	12.0
F	6.5	5.5	4.5	6.8	5.5	6.0	5.5	7.0	7.2	9.5	11.0	11.0	12.5
M	5.5	5.2	5.5	5.5	6.5	7.0	6.2	7.2	8.0	9.5	11.2	11.0	14.5
A	4.0	5.0	4.0	4.7	6.5	6.5	5.7	9.0	7.9	11.0	12.7	11.0	14.0
M	4.5	5.5	5.2	6.7	6.0	6.2	6.0	7.8	7.7	10.0	10.5	13.5	10.5
J	4.7	4.0	5.5	-	6.5	6.1	6.0	7.9	8.2	10.9	11.9	11.5	12.2
J	6.9	4.2	5.0	5.2	5.7	6.5	6.0	7.5	10.0	10.0	12.0	13.2	13.0
A	5.9	4.5	5.2	7.0	5.9	7.0	5.8	7.4	8.8	8.7	14.0	13.2	12.2
S	6.2	5.5	5.0	5.6	5.9	6.0	6.0	6.2	10.0	8.8	13.0	11.5	15.0
O	6.5	6.0	4.0	4.0	6.5	6.0	5.5	7.0	9.9	9.0	11.5	12.0	14.0
N	6.1	5.5	5.5	5.5	6.5	4.9	7.5	7.5	9.0	10.2	11.9	14.2	
D	6.0	6.2	5.5	6.5	5.9	-	7.7	7.9	9.7	10.2	13.5	14.2	

TOWNSHIP MAYFAIR

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.0	5.0	4.5	4.7	4.5	5.0	5.5	5.5	6.5	7.7	8.5	10.7	9.7
F	6.5	4.5	5.0	4.5	4.5	5.2	5.5	7.0	5.9	7.0	11.5	12.0	10.7
M	5.5	4.5	5.0	4.7	5.0	5.7	4.5	5.5	6.5	7.7	9.5	14.5	11.2
A	5.0	3.7	4.0	5.0	4.7	4.7	4.5	6.5	7.5	9.0	10.5	11.0	14.0
M	4.7	-	4.0	4.2	4.7	5.9	6.5	5.5	7.0	7.0	9.0	14.0	8.0
J	4.0	6.5	3.9	4.7	5.5	5.0	4.5	7.5	6.5	7.5	10.5	10.5	12.0
J	4.7	5.0	4.5	5.5	5.2	4.9	5.5	6.0	6.5	7.5	10.2	11.5	10.0
A	5.5	5.7	4.5	6.5	5.0	8.0	6.5	6.0	6.5	7.5	10.2	11.5	10.0
S	5.2	4.0	4.5	6.5	4.7	6.2	6.5	6.0	6.9	7.2	13.0	10.5	-
O	4.5	4.5	4.5	4.0	4.7	5.0	5.5	6.0	7.2	7.7	11.5	13.5	-
N	4.7	4.5	4.0	4.5	5.5	6.0	6.5	7.0	7.0	8.2	12.0	12.7	
D	6.5	4.0	5.5	4.0	5.5	6.0	5.5	5.5	7.9	9.0	11.0	12.5	

TOWNSHIP MAYFAIR WEST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.2	5.9	4.0	6.5	6.8	7.9	5.5	7.7	5.7	9.9	-	14.5	11.6
F	5.6	4.9	5.8	5.6	6.0	7.5	5.6	7.0	9.1	8.5	10.3	13.0	15.5
M	5.5	-	6.0	6.3	6.7	5.9	7.4	7.01	8.3	10.5	12.3	12.3	13.5
A	5.3	5.8	6.5	-	6.5	6.8	6.5	8.1	7.5	9.7	10.5	15.4	-
M	5.7	-	5.9	5.5	7.0	6.5	6.8	6.6	7.2	10.0	12.6	14.3	14.0
J	5.9	5.8	5.5	6.6	5.9	7.3	5.9	8.0	9.0	11.0	11.7	12.3	13.5
J	6.2	6.0	6.1	5.8	6.5	6.1	7.1	8.8	7.7	9.5	13.0	15.5	12.5
A	5.3	-	5.4	-	6.7	8.6	7.3	7.8	10.0	10.3	11.3	14.8	14.0
S	6.0	6.4	5.5	7.7	6.8	7.2	6.8	7.5	10.0	10.5	10.8	15.5	15.0
O	5.3	5.9	6.8	6.5	6.1	6.0	8.0	7.1	7.2	9.0	10.5	12.6	-
N	6.4	5.8	5.8	-	6.2	-	6.9	6.8	9.2	11.3	12.6	13.0	12.0
D	4.5	6.1	7.3	4.6	5.4	-	7.2	10.7	7.0	-	12.5	12.3	-

TOWNSHIP MELVILLE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.5	-	5.0	6.0	5.2	6.0	8.5	7.0	10.0	9.5	13.5	17.0	15.0
F	5.5	7.7	6.7	6.0	5.9	7.5	7.5	5.7	7.5	10.0	16.0	13.7	11.5
M	6.5	5.7	5.5	6.0	8.7	7.5	7.5	6.0	9.5	11.0	13.0	16.0	20.5
A	6.5	4.0	5.7	5.9	5.5	7.0	8.5	6.7	7.5	10.2	15.0	12.5	18.0
M	6.9	5.7	4.9	5.9	6.2	5.0	8.5	9.5	8.0	13.7	16.5	20.0	-
J	5.0	6.0	8.0	6.5	6.5	6.2	4.0	7.5	12.0	13.0	13.7	19.0	-
J	6.0	5.0	4.7	6.5	6.0	9.5	5.5	8.0	8.5	13.0	12.0	19.5	18.0
A	6.0	5.5	6.0	6.7	7.0	8.5	5.5	9.0	9.0	12.0	16.0	16.5	9.0
S	5.7	5.7	5.5	-	6.5	13.7	7.5	8.0	10.0	13.0	11.0	15.5	
O	4.7	6.5	5.5	-	6.2	6.7	7.0	7.0	8.0	11.5	13.0	15.0	
N	6.0	-	8.5	7.5	7.5	-	7.0	8.0	8.2	15.5	14.0	19.0	
D	-	7.0	7.5	4.9	6.7	5.0	8.5	8.0	9.5	13.5	16.5	21.5	

TOWNSHIP MOFFAT VIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.5	-	-	-	-	-	-	7.5	9.0	-	13.5	-	17.0
F	-	-	-	6.0	-	-	-	-	-	-	14.5	-	-
M	-	-	-	-	6.9	7.7	-	-	-	-	-	-	-
A	-	-	-	-	6.2	-	-	7.5	-	-	-	13.5	14.0
M	6.9	-	-	-	-	-	8.7	-	-	-	-	16.0	-
J	-	-	6.5	4.9	-	-	-	-	-	8.0	-	-	-
J	-	-	6.5	-	8.0	-	7.7	-	-	-	-	-	15.0
A	-	6.5	-	-	-	-	-	10.0	-	14.0	-	-	18.0
S	-	-	-	-	7	-	-	-	11.6	-	-	-	
O	-	-	-	-	-	-	7.2	-	11.0	11.0	-	15	
N	-	-	-	6.0	-	-	-	-	11.5	14.0	14.5	-	
D	-	6.5	-	6.5	-	-	8.0	-	-	15.5	16.5	-	

TOWNSHIP MONDEOR

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		5.5	10.0	6.5	8.0	9.5	12.0	11.5	11.5	14.5	20.0	21.5	24.5
F	8.0	-	5 5	11.5	7.5	11.5	10.0	11.0	13.5	15.5	17.5	25.0	23.7
M	9.5	8.5	-	8.0	9.9	9.5	10.0	12.5	16.5	16.0	18.0	24.5	20.0
A	6.5	7.5	6.7	8.5	9.5	10.5	-	11.7	14.5	18.5	20.5	18.5	-
M	10.0	11.0	-	-	8.5	9.5	-	11.2	15.2	16.5	20.0	20.5	22.5
J	8.0	7.5	6.0	10.5	8.5	10.7	7.0	7.0	11.0	16.0	21.5	19.0	20.0
J	-	6.5	7.0	8.5	8.0	7.5	10.0	6.0	13.0	17.5	19.5	19.0	24.5
A	8.0	-	-	6.5	8.5	11.5	-	9.0	11.0	18.0	22.5	19.2	24.0
S	-	9.5	8.0	-	10.0	10.0	11.0	4.5	13.0	16.0	21.5	19.5	21.0
O	-	-	7.5	8.5	9.0	6.0	11.5	5.5	15.0	19.5	23.5	19.0	
N	7.5	9.0	-	9.5	10.0	8.0	8.0	12.5	14.5	17.0	18.7	23.5	
D	-	-	7.0	7.5	8.5	10.5	11.5	-	13.5	16.0	19.7	22.0	

TOWNSHIP MONTGOMERY PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J			7.5	8.5	9.7	12.5	11.0	12.0	16.0	12.5	17.0	19.5	20.0
F			-	12.0	9.5	12.5	10.5	-	15.5	17.0	19.5	21.5	-
M			-	-	9.7	10.5	12.0	13.0	14.5	17.5	20.5	20.5	23.0
A			8.5	9.2	8.0	10.7	11.5	-	16.0	15.5	19.0	20.0	21.5
M			10.0	9.0	9.5	11.5	12.5	14.5	15.0	18.5	20.0	21.5	24.0
J			-	9.5	10.5	11.2	11.5	12.5	17.5	17.5	18.5	22.0	25.0
J			-	-	11.0	-	12.0	14.5	11.5	16.0	-	22.0	25.0
A			-	-	11.0	11.2	13.5	13.5	16.0	17.5	20.5	22.5	23.5
S		7.5	9.0	10.2	9.5	11.5	12.0	16.5	14.5	14.0	23.0	21.5	23.5
O		9.0	-	-	10.5	12.5	13.5	15.0	16.0	-	19.5	18.0	22.0
N	8.5	-	-	8.5	11.2	-	13.5	15.5	16.0	16.5	19.5	21.0	
D	-	-	9.0	9.5	10.5	.	13.5	12.5	16.0	16.0	24.0	20.5	

TOWNSHIP MONTROUX

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		11.0	12.0		15.5	-	-	-	-	17.5	-	33.0	-
F		-	-		-	14.0	-	-	-	-	-	-	-
M	11.0	-	-		-	14.5	17.0	-	-	-	25.0	31.0	-
A	-	-	-		13.0	-	-	-	-	-	26.0	-	-
M	11.0	-	-		-	-	23.7	17.0	15.0	-	25.5	-	-
J	-	-	-		-	-	-	-	-	-	34.5	40.0	35.0
J	-	-	-		14.5	-	19.0	-	17.5	24.0	-	-	-
A	-	-	-			14.5	-	-	17.5	-	-	-	28.0
S	-	-	-			-	-	-	27.5	22.0	-	-	
O	12.0	16.0	-			15.0	-	15.0	-	38.0	-	-	
N	-	-	-		14.7	-	-	-	-	-	-	-	
D	-	12.0	12.0	14.0	-	17.5	16.0	-	-	-	-	-	

TOWNSHIP MOUNTAIN VIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J				13.5		25.0							
F				32.0		20.5							
M				11.0		26.0							
A				10.0		-							
M				-		-							
J				26.5		-			18.0	21.0		30.5	
J				12.0	60.0	-			-	-		-	
A				12.0	-	-			-	-		-	70.0
S				-	-	25.0			36.0	-	72.0	-	-
O				-	16.5	-			-	-	-	-	
N	17.5			11.0		-	-		-	-	-	-	
D	17.0			11.0		-	-		-	-	35.0	44.0	

TOWNSHIP NEWLARE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	1.0	1.1	-	-	3.2	2.0	6.2	-	16.2	10.0	-
F	1.5	-	6.2	17.0	4.2	-	2.5	3.2	1.2	11.0	6.2	-	7.5
M	1.0	5.7	1.0	4.5	2.0	2.0	-	3.0	4.0	3.2	-	-	-
A	-	-	-	1.2	7.0	1.0	3.0	1.1	1.5	3.2	-	-	-
M	3.5	-	2.0	2.0	3.0	-	1.5	1.2	-	-	-	8.7	7.4
J	4.0	-	1.0	1.5	-	1.0	1.0	1.2	1.5	5.0	8.7	-	1.5
J	2.5	3.7	1.2	1.0	4.2	1.0	10.5	2.5	8.7	-	1.2	1.2	-
A	1.5	4.0	1.5	1.0	1.0	6.2	1.0	-	6.2	-	-	-	-
S	1.0	1.0	3.0	2.5	-	-	2.5	2.0	3.2	-	5.0	16.2	2.5
O	3.5	4.0	5.0	2.0	12.0	4.0	1.2	1.4	1.2	-	3.2	-	
N	1.5	-	3.0	1.5	11.0	-	-	3.2	-	-	3.0	-	
D	10.5	3.0	2.7	-	-	6.0		1.0	-	7.5	7.5	-	

TOWNSHIP NEWLANDS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	3.0	4.0	4.2	1.5	4.2	4.6	4.1	6.5	3.9	5.5	6.2	8.7	9.5
F	-	1.9	3.2	3.5	3.0	6.0	4.2	3.5	4.2	3.5	7.7	7.5	2.5
M	3.5	4.5	3.8	3.2	6.5	4.5	4.2	4.5	5.2	4.5	6.8	8.5	7.5
A	3.5	-	4.2	4.5	4.0	3.5	3.5	4.7	5.5	3.5	5.9	6.2	9.5
M	2.9	5.5	4.2	5.5	4.2	3.5	3.5	3.9	4.7	4.5	7.7	6.5	9.2
J	3.5	1.0	4.2	5.5	3.9	4.5	5.7	6.9	5.8	5.0	6.5	8.5	7.2
J	3.9	3.5	4.6	4.8	5.5	3.9	4.2	4.2	3.6	7.0	6.5	6.5	6.2
A	2.0	5.0	3.9	4.5	4.2	4.1	3.5	4.1	5.0	6.0	8.5	7.5	10.5
S	4.5	5.5	3.5	4.9	5.2	3.9	4.2	4.3	4.1	6.0	8.7	7.8	9.5
O	4.0	2.8	5.5	4.5	5.0	2.9	4.2	5.8	5.2	5.9	5.9	8.8	
N	5.0	5.0	3.5	5.5	5.0	4.1	4.5	4.5	4.5	5.5	6.7	9.5	
D	4.2	4.0	5.4	3.2	4.6	3.2	4.0	6.2	4.0	7.7	7.7	10.5	

TOWNSHIP NORTHCLIFF

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	14.5	11.5	14.0	12.5	13.0	15.5	15.0	17.0	22.0	25.0	28.0	39.0	34.0
F	13.0	10.0	11.5	13.0	14.5	15.5	16.0	24.5	24.0	26.5	33.0	29.5	40.0
M	12.0	11.0	10.5	10.5	14.0	19.0	17.0	17.5	22.0	26.5	26.5	32.5	27.0
A	11.0	11.5	12.5	11.5	13.5	16.5	16.0	19.0	21.0	24.5	17.0	31.0	31.0
M	12.0	10.5	11.5	13.0	13.0	16.5	16.5	22.5	21.5	33.0	25.0	30.5	36.5
J	10.0	12.5	14.5	12.0	13.0	16.5	18.0	21.5	23.0	29.5	24.0	27.5	32.5
J	9.9	12.0	11.5	-	12.0	16.0	18.0	17.0	22.5	25.0	31.5	28.5	33.0
A	12.0	13.0	13.0	14.5	12.0	17.5	22.0	19.0	20.5	30.5	31.5	29.5	36.5
S	8.0	15.5	13.0	11.0	16.5	16.5	24.0	27.0	23.5	31.5	26.0	32.5	32.5
O	10.0	11.5	13.0	12.5	14.5	15.0	24.0	23.0	27.5	28.0	36.5	35.0	
N	11.0	11.0	13.0	12.0	16.5	16.5	19.0	22.0	27.5	32.0	32.0	34.0	
D	16.0	11.0	10.0	14.0	19.5	-	21.5	22.5	26.0	23.5	31.5	35.5	

TOWNSHIP NORWOOD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	3.5	6.5	5.5	6.5	5.5	7.2	7.7	9.5	10.2	9.2	17.5	15.0	11.5
F	7.5	3.5	4.5	6.5	7.0	7.5	7.5	8.2	8.5	12.9	15.0	17.0	18.5
M	3.0	5.0	5.0	6.0	5.5	7.5	7.2	8.5	-	11.5	15.0	17.0	16.2
A	5.5	4.5	-	6.0	6.2	6.5	6.7	9.2	10.5	12.5	16.0	15.0	18.5
M	4.5	4.5	5.0	6.0	5.5	7.0	7.5	9.5	10.0	12.2	15.0	17.0	17.5
J	5.5	6.5	4.5	6.5	7.0	7.5	7.9	8.5	11.0	13.0	13.0	18.0	19.2
J	6.5	6.5	5.0	-	7.5	8.9	8.0	11.5	11.0	13.0	16.5	18.0	18.5
A	6.5	5.5	4.0	7.5	7.5	7.0	8.9	7.5	10.9	12.5	14.7	16.2	21.5
S	5.5	6.5	6.0	4.5	6.0	7.0	8.0	9.0	10.9	15.0	21.2	15 2	17.5
O	5.7	6.5	6.5	5.5	7.5	10.0	9.5	9.5	10.5	14.5	16.0	19.5	19.5
N	5.5	-	7.0	7.5	6.5	8.0	8.0	10.5	9.5	13.2	16.0	18.0	
D	7.5	7.5	9.0	7.5	7.5	8.7	8.2	11.0	12.2	13.5	12.5	17.5	

TOWNSHIP OAKLANDS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	17.0	-	14.5	14.0	10.0	-	13.5	-	-	25.0	-	32.0	50.0
F	14.9	21.0	13.0	11.0	15.2	10.5	22.0	-	-	28.5	40.0	-	42.0
M	16.5	18.0	17.0	13.5	14.7	18.0	23.7	24.0	-	33.5	35.0	-	41.5
A	-	11.5	14.5	15.5	14.0	14.5	12.0	-	-	45.0	37.0	42.5	41.5
M	-	-	18.0	15.0	14.0	17.5	-	17.5	-	35.0	36.0	39.0	43.0
J	-	14.5	-	-		16.5	-	-	32.0	35.0	-	-	39.0
J	-	10.0	-	17.0	17.5		-	26.5	26.0	-	41.5	-	-
A	-	12.5	13.5	11.5	24.0	35.0	21.0	27.0	17.0		22.0	35.5	-
S	-	10.0	14.5	-	16.0	20.0	22.0	17.5	30.0	56.0	42.0	33.0	35.0
O	13.5	-	-	-	19.0	25.0	-	-	40.0	37.0	28.0	-	
N	12.2	-	16.0	9.5	24.5	-	-	13.0	31.5	52.0	32.0	41.0	
D	-	-	18.5	-	26.5	-	-	-	26.0	25.0	42.0	-	

TOWNSHIP OBSERVATORY

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	11.5	11.0	-	15.0	13.2	12.0	12.0	16.0	18.5	18.5	19.2	35.0	27.5
F	10.5	8.5	9.0	14.7	11.5	-	14.0	29.0	14.5	22.0	26.0	27.0	31.2
M	-	22.0	8.7	10.5	12 5	18.5	17.2	16.7	19.5	26.0	26.2	26.7	-
A	9.0	-	13.5	14.2	11.5	16.0	20.5	21.0	27.0	28.5	38.0	27.0	31.5
M	12.0	-	10.7	10.5	12.5	17.7	16.7	15.5	17.0	28.8	30.0	27.5	32.5
J	14.0	11.5	14.5	-	10.5	14.0	16.0	12.0	20.0	26.5	27.5	28.0	25.5
J	12.0	14.7	10.5	15.0	10.7	13.5	17.0	23.0	21.2	28.5	23.0	28.5	39.5
A	11.5	16.0	9.7	-	11.5	9.7	22.5	20.0	14.0	36.0	31.5	25.0	
S	-	11.5	14.2	11.5	12.2	13.7	13.0	18.5	21.2	37.5	32.0	42.5	
O	-	15.5	11.0	11.7	16.0	16.0	16.5	24.0	13.7	29.5	38.0	-	
N	-	-	7.0	16.5	12.0	-	15.5	18.5	15.0	26.5	27.0	-	
D	11.0	-	7.5	15.0	13.2	-	14.0	22.2	-	25.0	27.5	-	

TOWNSHIP OBSERVATORY 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	15.0	17.0	7.0	10.5	-	7.0		25.0	26.5	26.0	36.5	-	16.0
F	16.5	-	18.5	11.0	6.0	15.0	14.5	14.5	14.5	28.5	-	-	-
M	15.5	18.5	-	11.0	-	8.5	17.0	9.0	17.0	17.0	20.5	24.0	-
A	-	-	-	-	16.0	10.5	16.5	25.0	8.0	25.0	-	28.0	-
M	-	-	13.5	16.5	-	25.0	-	8.5	-	7.0	13.5	-	33.0
J	10.5	-	-	-	7.5	19.5	19.0	11.0	26.5	27.0	30.0	38.0	-
J	-	18.5	-	15.0	8 5	-	32.5	-	24.5	7.0	-	-	36.0
A	14.5	18.0	6.0	-	28.5	8.5	9.2	-	21.5	28.0	27.5	-	-
S	9.5	14.0	-	-	8.5	-	-	14.5	28.5	-	45.0	-	38.0
O	14.5	13.5	15.5	7.0	17.0	-	19.5	9.0	14.0	46.0	23.0	28.0	
N	-	-	12.5	14.0	-	11.5	-	-	29.0	17.0	26.0	46.0	18.5
D	15.0	-	-	5.5	28.5	-	-	21.0	-	14.0	36.0	16.0	

TOWNSHIP ORANGE GROVE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.5	7.0	6.2	6.2	7.5	7.5	8.0	9.5	9.5	12.5	16.0	17.5	16.5
F	7.2	8.5	7.7	7.0	7.5	8.5	9.5	9.7	11.5	12.7	15.5	16.5	17.0
M	7.0	6.5	6.2	6.9	7.5	8 0	7.7	9.7	9.5	12.0	15.5	18.5	19.5
A	6.2	2.5	7.0	8.0	8.0	7.5	8.5	9.9	10.5	15.0	15.5	18.5	19.5
M	5.0	6.0	6.5	7.0	7.0	8.5	9.5	10.5	12.5	12.5	14.0	15.5	18.0
J	6.5	7.5	6.5	7.5	8.0	8.5	7.5	9.9	10.0	14.0	17.0	18.5	17.5
J	6.5	7.5	5.0	8.0	6.5	7.5	8.7	9.5	10.5	12.5	17.0	18.5	19.0
A	5.	6.5	6.7	7.2	7.0	8.5	8.7	10 2	10.0	13.0	16.5	15.5	18.7
S	7.0	6.5	6.7	6.0	8.0	8.0	10.5	10.5	12.0	15.0	16.5	17.5	21.5
O	7.0	6.7	6.7	7.5	8.0	7.5	8.5	7.7	12.2	14.0	16.5	15.5	
N	7.0	6.5	7.5	6.5	7.5	10.0	9.5	8.5	12.0	14.5	16.0	16.0	
D	8.0	7.5	6.7	7.2	8.0	-	9.0	11.0	10.0	16.0	16.0	16.5	

TOWNSHIP ORCHARDS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	8.7	8.7	-	-	10.5	15.0	14.5	11.2	21.0	21.5	24.5	31.0	36.0
F	7.2	11.9	10.5	8.2	12.5	14.2	11.5	15.5	14.5	22.5	28.0	23.0	27.5
M	14.0	-	11.2	8.2	10.7	8.0	11.2	10.5	15.5	20.5	29.2	32.2	
A	9.5	-	-	8.0	11.0	-	13.5	-	15.5	18.2	-	-	30.5
M	-	8.5	13.2	10.0	8.7	8.5	15.0	14.5	17.0	23.2	25.5	30.0	17.0
J	11.2	-	8.5	10.7	12.5	-	15.9	14.0	22.5	-	28.0	21.0	26.0
J	-	6.0	17.0	-	8.7	11.5	16.5	7.2	22.0	16.2	19.9	22.0	
A	16.0	-	10.5	-	9.2	-	-	13.5	20.5	-	24.0	-	
S	-	-	-	-	9.2	10.0	16.0	16.0	-	21.0	23.5	23.0	
O	-	7.7	-	7.7	14.5	-	12.5	12.5	18.5	-	27.0	22.5	
N	10.9	9.5	4.5	7.0	10.5	8.0	15.0	14.5	13.5	19.0	28.5	23.5	
D	-	6.5	5.2	7.5	11.2	-	12.0	17.5	17.5	30.5	24.5	31.0	

TOWNSHIP PAARLSHOOP

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J								-	-	-	-		
F							3.5	-	-	-	4.0		
M							1.5	-	-	4.0	-		
A							3.0	-	-	4.0	-		
M							-	-	-	5.0	7.5		
J							4.0	-	-				
J							-	-	3.0				
A							5.7	-	3.0				
S							-	3.0	-	-	-		
O							6.5	-	-	-	8.5		
N							10.5	-	-	-			
D							-	-	-	-			

TOWNSHIP PARKHURST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.5	6.0	4.0	5.0	6.7	8.5	-	8.5	9.5	12.5	15.0	17.5	20.0
F	6.5	6.0	6.5	6.5	6.2	6.5	-	8.5	9.5	12.7	16.6	16.5	21.5
M	6.5	6.0	5.5	7.0	6.7	7.5	-	9.5	10.5	12.9	16.0	18.0	20.0
A	6.0	6.5	7.5	6.5	7.2	7.5	-	9.5	11.5	12.9	14.5	16.5	20.0
M	6.5	4.0	6.5	6.5	7.2	7.7		9.0	11.5	12.7	16.5	17.5	20.5
J	5.5	7.0	6.0	6.5	6.7	7.5	-	9.0	11.5	14.0	15.9	17.0	19.0
J	6.5	5.5	6.0	7.0	7.7	7.5	8.0	10.0	11.0	15.5	16.0	18.5	21.0
A	5.0	6.0	6.5	6.5	6.5	7.7	9.0	9.5	11.5	14.0	16.0	18.0	22.0
S	6.5	6.0	6.5	6.5	7.2	7.7	7.5	9.5	11.5	15.2	16.5	17.5	21.0
O	6.5	7.0	6.0	6.5	6.2	7.5	7.5	8.5	11.0	13.9	16.0	17.5	18.0
N	6.0	6.0	6.5	6.0	6.0	6.5	7.7	10.0	11.0	13.9	16.0	18.0	
D	5.5	6.0	6.0	6.0	7.5	-	8.5	10.0	13.0	15.7	16.7	21.0	

TOWNSHIP PARKMORE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		10.0		11.0	12.0	12.2	14.2	15.2	17.5	22.5	24.5	28.5	26.0
F		-		-	10.5	11.5	13.2	15.2	15.5	22.7	25.5	25.5	27.0
M	10.0	-		12.2	11.5	12.5	13.2	15.5	18.5	20.2	25.5	26.5	28.0
A	-	-		9.0	13.0	12.2	14.2	16 0	17.5	21.5	27.0	26.7	28.5
M	-	-		9.0	11.7	13.0	14.2	15.5	18.5	22.5	28.5	25.2	27.5
J	-	-		10.5	13.2	14.0	14.2	15.7	21.5	21.5	26.0	28.0	26.5
J	-	-	11.0	11.0	11.0	13.0	14.0	15.7	17.7	22.0	28.5	26.5	31 0
A	10.5	-	-	-	11.7	13.0	14.5	16.5	18.5	21.7	25.5	26.5	30.5
S	-	-	-	-	11.2	12.2	14.0	16.5	17.5	20.5	25.5	28.5	33.0
O	-	-	8.5	11.5	11.2	12.2	15.5	15.5	19.5	22.2	26.0	27.5	
N	9.0	11.0	11.0	10.0	12.0	14.5	17.0	16.5	20.5	23.5	26.0	28.5	
D	-	10.5	11.0	13.5	12.7	15.0	15.0	17.5	21.5	22.5	24.5	34.5	

TOWNSHIP PARKTOWN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	13.5	12.5	11.0	20.7	21.5	42.5	21.0	70.0	-	23.0	38.0	-	-
F	14.2	25.5	21.5	14.0	28.5	-	40.0	17.0	24.0	133.0	-	-	36.0
M	26.0	13.0	35.0	9.9	42.0	27.5	21.5	27.5	29.5	165.0	-	80 0	-
A	15.0	-	14.5	16.9	29.5	20.5	28.0	41.5	26.9	-	-	29.0	76.0
M	16.5	17.0	27.0	22.0	42.0	14.5	-	46.0	31.0	92.0	-	-	40.0
J	19.5	16.5	14.0	28.5	31.5	14.0	71.5	39.0	65.0	-	-	70.0	-
J	17.0	10.5	-	19.5	13.5	-	-	24.5	52.0	121.6	-	75.0	29.0
A	-	14.0	12.0	31.0	32.0	27.5	32.0	26.0	79.0	-	122.0	-	-
S	90.0	9 5	13.0	-	27.5	-	40.5	27.0	38.0	28.0	46.0	40.0	-
O	6.0	29.0	22.0	14.0	21.7	42.0	23.5	26.7	78.9	42.0	48.0	30.0	
N	28.5	14.0	20.5	44.5	25.5	-	-	23.0	123.0	44.0	67.0	52.0	
D	22.7	23.5	20.0	28.5	20.5	-	-	34.7	90.0	87.0	39.5	36.0	

TOWNSHIP PARKTOWN NORTH

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	11.0	10.0	9.0	9.7	8.5	13.5	-	18.6	19.9	20.5	31.0	29.5	28.7
F	8.7	10.2	9.0	12.1	11.0	7.5	-	16.2	19.5	28.7	28.7	23.7	22.5
M	7.0	11.0	9.0	11.2	10.2	11.2	-	15.5	14.0	22.5	26.2	29.0	28.7
A	10.5	11.0	11.0	9.3	12.2	12.5	-	17.5	19.0	20.0	23.2	30.5	27.5
M	9.2	8.0	10.0	11.0	10.5	10.2	-	16.0	18.7	25.5	23.2	25.5	30.0
J	10.5	9.0	6.5	9.2	9.3	12.8	-	16.7	17.5	24.0	29.5	30.5	27.5
J	9.0	5.5	8.5	8.2	11.2	15.5	13.2	16.3	24.0	27.5	28.7	26.5	29.5
A	9.5	8.0	11.5	11.2	11.7	16.0	14.0	18.7	18.7	31.2	27.5	27.0	31.5
S	10.2	12.0	10.0	-	10.3	7.8	15.5	16.2	22.5	22.5	23.2	32.5	26.5
O	9.7	9.5	11.0	12.0	10.8	12.2	16.0	16.2	16.2	30.5	29.5	26.5	-
N	9.7	10.0	10.0	11.5	14.5	14.5	15.0	20.0	26.2	26.2	32.5	30.0	-
D	7.0	10.0	7.0	10.0	9.5	-	16.2	19.5	18.7	25.0	29.5	28.7	-

TOWNSHIP PARKVIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.5	7.5	9.2	8.5	9.5	13.5	11.5	15.0	13.0	20.0	23.0	21.5	30.0
F	11.0	11.0	9.9	10.0	12.0	11.0	13.0	14.5	17.7	22.0	27.0	24.7	26.0
M	12.5	12.2	10.0	8.5	10.5	10.0	12.5	15.0	22.0	21.5	22.5	28.5	30.0
A	11.0	11.2	-	9.0	11.0	11.2	13.0	14.0	14.7	23.0	27.5	28.7	30.5
M	11.0	9.0	12.5	8.5	12.0	10.5	14.5	17.5	16.5	19.5	20.5	28.0	24.0
J	11.5	-	10.5	11.5	12.2	13.0	11.5	19.5	17.0	22.5	28.5	21.0	38.0
J	9.0	8.5	10.5	.5	9.5	12.5	13.5	11.5	20.0	20.9	22.5	23.0	28.5
A	8.0	8.9	9.5	7.5	9.5	10.5	13.5	19.0	15.5	23.5	31.0	40.0	26.5
S	10.2	9.5	11.0	10.0	10.5	16.0	12.0	18.5	18.0	21.5	27.0	19.0	43.0
O	11.0	9.7	9.5	10.5	11.0	10.0	15.2	15.5	20.0	22.7	28.5	26.0	25.5
N	9.2	10.2	13.0	11.0	11.5	10.5	18.5	16.5	21.0	26.5	26.0	23.0	
D	10.2	8.0	11.5	9.0	11.0	11.0	14.5	16.51	23.0	-	24.5	23.0	

TOWNSHIP PARKWOOD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	12.5	12.0	11.5	12.2	10.2	13.2	16.5	21.0	15.5	25.0	28.5	24.5	27.5
F	13.2	10.5	-	12.5	9.2	13.2	13.5	16.5	23.0	25.5	30.5	42.5	35.0
M	9.5	10.5	9.7	9.2	10.0	12.5	12.5	13.5	36.5	30.5	29.9	24.5	32.5
A	9.5	12.0	10.5	8.0	11.0	19.5	13.7	29.5	24.5	26.0	30.5	31.0	23.0
M	9.5	-	12.2	8.5	11.2	17.5	-	13.5	16.5	15.7	29.9	26.0	30.0
J	14.0	-	8.5	10.0	11.5	15.0	13.9	14.5	26.0	24.5	23.0	-	26.0
J	8.0	-	9.5	5.5	11.5	9.0	15.7	22.5	26.0	27.	31.0	21.5	31.5
A	8.0	9.5	10.0	9.0	24.5	11.5	14.5	16.5	22.5	29.5	24.5	26.5	33.5
S	11.2	9.5	12.0	9.2	13.2	10.7	17.0	15.5	17.5	25.5	42.0	40.5	46.0
O	10.2	-	9.2	11.2	13.2	12.0	13.5	16.0	21.5	27.0	31.5	35.5	
N	9.2	-	8.5	9.5	12.2	14.5	15.5	20.0	20.3	22.5	43.0	36.0	
D	11.2	11.5	10.5	12.2	13.2	11.0	17.0	15.5	20.5	24.5	26.0	-	

TOWNSHIP PERCELIA ESTATES

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	13.5					-	12.0		-	20.0	-	28.0	-
F	-					-	11.2		-	-	-	-	-
M	10.0			9.7		10.5		14.5	-	16.5	-		-
A	10.0			-	12.7	-		-	15.0	-	-	-	28.0
M	-			-	10.0				-	-	-	-	-
J	-			-	-			15.0	-	-	-	-	-
J	10.5			-	15.0			-	-	-	-	20.5	32.0
A	-				12.0				-	-	-	24.0	
S	9.5			-	13.0			-	19.7	-	-		
O	9.2			-	16.0			-	-	36.7	25.0	-	
N	-			-	-				-	-	-	-	
D	-			11.5	13.5	13.7	15.5	-	-	-	22.0	-	

TOWNSHIP RAUMARAIS PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J			12.5	-	10.0	5.0	-	24.5	-	-	-	36.0	30.0
F			12.0	-	-	-	-	13.2	6.5	-	-	-	26.9
M	14.5		-	-	12.0	17.5	15.5	-	19.9	-	-	-	
A	-		-	-	9.5	-	-	-	-	-	-	-	
M	-		-	-	-	-	-	-	19.9	-	-	-	
J	9.0		-	-	7.5	-		22.0	34.7	-	-	-	25 0
J	-		-	-	-	16.5	-	-	-	29.0	-	29.0	
A	-		-	-	13.0	-	-	-	15.0	-	27.0	-	
S	-		-	-	-	-	-	-	-	-	-	-	
O	10.7		-	-	11.5	-	14.5	25.0	-	22.0	-	-	
N	-		10.2	-	-	-	-	-	-	-	-	-	
D	-		-	-	-	20.0	-	-	-	23.5	-	-	

TOWNSHIP REGENCY

	1960	1961	19 2	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
									-	-	6.0		
F									-	-	8.5		
M							8.		-	-	-		
A									10.0	-	-		
M				4.5					6.0	-	-		
J									-	-	-		
J			8.0						-	-	-		
A							8.5		-	-	-		
S								9.5	9.5	-	-		
O								9.5	-		15.0		
N					7.5			9.5	-	10.5	-		
D								10.5	-				

TOWNSHIP REGENTS PARK PLUS 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	4.5	3.5	5.5	-	5.5	7.2	9.0	6.5	7.5	7.0	14.5	12.5	11.5
F	3.5	4.0	-	5.5	5.0	6.0	3.9	7.0	7.5	9.0	8.0	10.5	7.5
M	5.2	6.5	3.9	4.0	5.9	7.5	6.0	7.0	6.5	8.0	9.0	12.0	12.5
A	6.0	6.5	4.9	5.0	6.5	6.7	5.5	8.0	7.5	6.0	10.5	15.0	11.5
M	4.5	3.7	5.5	6.5	5.1	6.5	7.0	6.5	11.5	13.0	10.0	11.5	12.0
J	4.7	6.0	4.8	5.0	5.2	6.7	6.0	6.0	7.0	7.5	12.0	14 0	10.5
J	4.2	-	6.1	-	5.0	7.2	6.5	3.5	7.5	9.9	10.5	10.5	10.5
A	5.5	4.7	-	10.0	7.0	6.7	6.0	7.5	-	9.7	10.5	11.5	-
S	4.0	4.2	-	-	5.5	6.0	5.5	7.0	11.5	12.0	11.0	13.0	9.5
O	5.0	4.0	4.8	4.5	7.0	6.0	9.5	6.5	9.0	9.5	10.5	-	
N	4.0	4.5	4.8	3.5	5.7	7.2	-	7.0	6.5	10.0	12.5	6.0	
D	4.5	5.0	5.0	4.0	8.5	-	7.5	8.5	6.5	9.9	-	10.0	

TOWNSHIP REMBRANDT PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J			8.0	-	-	11.5	-	-	13.2	14.5	27.0	19.0	-
F				-	10.0	-	-	12.7	-	16.0	20.7	21.0	19.7
M				-	-	11.0	11.5	14.7	17.7	-	-	18.0	-
A				8.5	-	11.5	-	12.7	15.0	26.0	22.5	-	-
M	6.0			5.5	10.0	9.2	15.0	-	13.0	-	18.0	18.0	20.0
J	-			-	11.0	-	-	-	18.0	17.0	22.0	20.7	24.5
J	-			7.0	10.0	12.0	-	-	12.0	-	20.0	-	23.5
A	-			-	10.5	-	12.7	13.0	15.5	19.0	20.5	18.7	27.0
S	-			-	9.7	-	13.0	-	15.5	-	18.0	25.7	-
O	7.0		8.5	-	12.5	-	12.0	14.0	17.0	20.2	23.0	-	
N	-		-	9.0	-	-	13.5	-	-	-	19.0	19.0	
D	-		8.0	6.0	10.5	11.5	11.5	-	-	-	15.0	22.0	

TOWNSHIP ROWLATCH

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	7.4	5.5	7.5	8.9	9.0	8.2	9.8	13.0	15.1	15.6
F	5.8	-	6.9	7.3	6.4	7.8	-	8.4	9.5	8.8	-	-	-
M	-	-	6.4	6.9	5.8	6.8	8.3	8.7	10.2	-	12.3	11.5	14.5
A	7.8	5.9	-	6.5	6.3	5.1	10.0	8.9	-	10.0	-	13.6	-
M	6.4	-	-	6.7	7.5	5.8	-		-	8.5	13.5	15.9	-
J	6.4	7.3	6.4	-	6.4	8.9	7.7	-	8.8	11.7	12.8	15.3	15.0
J	6.5	6.0	6.4	-	7.0	7.2	7.0	8.2	11.7	11.7	17.6	-	16.0
A	6.6	6.2	7.7	5.9	6.8	6.9	-	5.7	8.6	-	12.4	15.0	21.0
S	5.7	7.9	-	-	-	-	-	8.7	11.4	-	11.5	15.0	-
O	5.8	6.0	-	-	9.1	10.0	7.5	8.0	10.5	12.5	13.1	16.0	-
N	5.8	7.4	-	-	-	6.8	9.8	-	9.5	12.4	18.6	-	-
D	6 .9	-	-	6.8	-	-	9.8	-	9.2	12.5	11.7	-	-

TOWNSHIP REYNOLDS VIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		-	-	-	-		-	-		15.0	18.9	-	17.0
F		-	-	-	-		-	-		14.0	-	-	
M		-	-	-	-		-	-	11.2	10.5	-	-	
A		-	-	-	-		7.0	-	10.5	-	-	-	
M		-	-	-	-		-	14.5	-	-	-	-	
J		-	-	-	-		-	-	-	-	-	-	
J		-	-	-	-		-	-		10.0	-	-	
A	8.5	7.2	8.0	-	-		-	-	-	18.0	-	-	
S	-	-	-	-	-	7.2	8.0	-	-	14.5	22.0	22.0	
O	-	-	-	-	7.5	7.5	-	-	-	14.0	13.5	-	
N	-	-	-	-	10.5	-	-	-	10.2	-	-	-	
D	-	-	-	16.0	-	11.0	-	10.0	7.5	-	-	-	

TOWNSHIP RICHMOND

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	10.0	-	-	-	4.5	5.5	-	-	7.0	-	-	20.5
F	-	7.2	7.0	6.5	-	-	-	-	-	6.0	-	15.0	-
M	4.0	-	-	-	-	8.7	-	8.2	7.0	-	12.2	-	-
A	-	-	3.0	9.0	4.0	-	-	7.0	-	5.5	-	-	-
M	-	7.7	-	-	8.0	-	7.0	5.9	-	14.0	-	-	-
J	-	-	-	-	-	-	7.0	-	8.2	-	-	10.0	16.0
J	-	5.0	-	-	-	-	-	-	10.2	9.0	9.0	15.0	20.0
A	-	-	7.0	-	5.5	-	-	4.0	-	-	-	-	
S	-	-	-	-	5.5	-	-	-	9.0	13.9	-	-	
O	5.5	-	6.0	-	6.0	-	6.2	-	10.0	-	12.7	-	
N	-	-	-	-	8.0	-	9.5	7.5	-	12.5	-	-	
D	-	-	5.0	8.2	-	-	-	-	10.5	-	-	18.0	

TOWNSHIP KINGSWAY

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-				9.0	11.0	11.0	11.5	12.2	14.0	18.0	17.5	-
F			-	8.0	9.0	-	11.2	12.0	13.0	18.0	-	23.5	19.0
M					10.0	9.0	8.0	13.5	14.0	-	17.0	19.0	19.0
A	-	9.0			-	10.5	11.2	12.5	13.2	15.0	15.5	16.0	17.5
M	-	-			10.0	9.5	10.9	13.5	13.0	13.7	20.0	19.5	20.0
J	-	-	8.0		11.5	11.0	11.5	12.5	12.0	13.5	17.0	18.5	21.0
J	-	-	8.0		-	10.7	-	-	13.7	-	17.5	21.0	22.0
A	-	-	7.0		10.5	11.0	10.9	12.0	13.9	16.0	18.0	17.5	-
S	-	-	-		9.0	10.9	12.0	13.0	9.0	16.0	18.5	15.5	-
O	-	-	-		10.5	11.2	11.0	13.0	14.0	15.0	17.5	21.5	26.0
N	-	-	-		10.5	11.0	12.0	12.5	14.0	16.0	20.0	20.0	
D	-	-			10.0	11.2	12.5	13.1	14.5	17.0	20.0	21.0	

TOWNSHIP RISIDALE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		-	11.0	9.0	9.2	15.0	14.0	12.5	-	16.0	-	-	22.0
F	7.5	13.0	-	10.0	10.7	10.5	-	15.5	14.0	17.0	23.5	-	-
M	9.0	9.0	-	-	10.5	16.0	12.5	14.0	-	20.0	-	-	23.5
A	-	-	-	8.5	10.0	12.2	-	12.2	15.0	16.0	-	-	-
M	-	-	-	11.0	9.2	18.5	24.0	14.9	17.0	-	-	-	24.5
J	-	-		-	10.7	10.5	-	15.7	14.5	28.0	-	8.0	27.0
J	-	-	-	-	10.0	11.5	13.0	-	14.5	-	-	-	-
A	10.5	-	-	-	10.0	13.5	12.5	13.0	-	-	22.5	20.5	22.0
S	-	-	6.5	-	-	11.2	15.0	-	15.5	18.0	17.5	-	30.0
O	-	10.5	-	9.5	12.0	11.7	14.0	13.5	-	17.5	36.0	18.0	
N	9.5	12.0	7.5	9.5	10.0	-	12.5	-	17.5	16.0	-	-	
D	-	-	10.0	10.5	10.0		-	-	15.5	20.0	23.0	-	

TOWNSHIP ROBERTSHAM AND 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	7.5	8.0	7.5	7.2	7.8	8.5	10.0	9.55	11.7	13.0	13.5	19.0	19.0
F	7.2	-	7.0	6.9	8.81	8.5	10.2	9.7	12.2	14.0	15.5	18.0	21.7
M	6.9	7.0	8.5	8.5	8.5	8.5	10.0	9.7	12.5	11.2	15.0	16.5	18.0
A	5.5	7.5	9.5	7.7	8.9	8.9	10.5	12.0	11.2	13.0	15.5	19.5	17.7
M	7.5	8.0	-	7.2	9.0	8.9	10.0	12.0	11.5	15.0	17.5	18.0	17.7
J	5.0	6.5	8.5	9.0	7.5	9.0	9.0	11.7	11.2	12.5	16.5	17.0	21.5
J	7.0	-	-	8.0	7.2	9.5	10.5	13.0	13.2	13.7	17.5	17.5	17.0
A	7.5	6.51	9.0	8.0	10.5	10.0	10.5	11.0	12.5	14.2	18.0	19.0	20.5
S	7.7	7.7	7.5	8.5	9.9	10.5	10.5	10.7	12.0	14.7	16.0	23.0	19.0
O	-	7.5	7.2	8.0	9.5	11.0	11.0	10.5	13.5	16.2	18.5	16.7	20.0
N	8.0	6.0	7.0	8.0	8.7	9.0	10.5	8.0	14.5	15.0	18.0	19.0	
D	9.2	8.5	8.0	9.0	8.7	9.0	11.5	11.2	14.0	15.0	21.5	19.5	

TOWNSHIP ROBIN ACRES

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	-	-	-	6.5	-	-	-	27.0	27.5	30.0
F	-	-	-	-	-	-	-	-	21.0	-	27.1	-	-
M	-	-	-	-	-	-	-	-	17.8	-	-	-	-
A	-	-	-	-	-	-	15.0	-	-	-	-	-	31.0
M	-	-	-	-	-	-	-	-	21.3	25.5	-	-	-
J	-	-	-	-	-	-	-	-	-	25.0	-	-	-
J	-	-	-	-	-	-	-	-	17.2	-	-	28.6	-
A	-	-	-	-	-	-	15.0	-	-	25.0	-	-	-
S	-	-	-	-	-	-	-	-	-	-	-	28.6	-
O	-	-	-	-	-	-	-	-	20.5	-	-	26.0	-
N	-	-	-	-	-	-	-	-	22.5	26.5	-	-	-
D	-	-	-	-	-	18.0	-	-	-	22.5	29.7	38.0	-

TOWNSHIP ROBINDALE AND 'X's'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	9.5	10.4	7.5	-	13.3	13.1	11.5	12.5	15.0	-	21.5	23.5	26.0
F	-	-	-	17.6	10.5	10.5	15.2	-	13.4	15.9	21.5	24.0	-
M	11.0	11.4	-	9.9	-	11.7	11.5	-	16.2	26.6	-	16.8	-
A	10.0	-	-	7.0	-	11.3	13.5	16.7	17.0	18.5	19.7	25.0	24.5
M	9.7	-	-	9.6	10.2	13.0	-	15.0	18.6	22.0	19.7	21.5	-
J	9.0	-	7.5	1.4	11.3	-	-	12.3	18.3	-	23.4	21.3	-
J	10.7	-	8.2	9.3	10.7	14.4	-	13.0	12.6	21.0	20.9	-	-
A	-	-	9.8	-	15.7	12.5	-	6.0	14.0	-	-	20.0	23.0
S	-	10.1	-	-	10.3	12.5	-	12.7	12.7	19.0	25.5	23.7	-
O	-	8.8	8.3	-	12.5	-	-	15.0	19.6	18.4	22.6	-	-
N	8.3	-	9.3	12.4	11.5	15.9	13.8	12.8	16.7	20.7	20.3	21.6	
D	-	9.4	-	9.3	-	-	15.0	-	-	-	-	-	-

TOWNSHIP ROSEACRE AND 'X 1-3'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		-	-	7.5	-	8.2	9.0	8.7	-	13.0	1 .5	15.5	18.0
F		-	-	-	6.5	.0	9.0	10.0	9.5	12.0	-	15.0	15.5
M		5.5	-	-	-	8.0	9.0	9.0	9.5	12.5	9.0	16.0	17.0
A		-	6.5	6.5	7.0	9.0	10.0	-	9.5	11.5	-	-	17.0
M	7.0	-	6.2	6.5	-	9.0	10.0	9.5	11.0	12.5	15.0	15.5	16.5
J	-	8.0	-	-	7.0	9.0	8.0	10.0	10.5	12.5	13.5	15.5	18.0
J	6.5	7.0	-	-	7.0	-	10.0	10.0	-	-	13.5	16.5	
A	-	-	-	5.0	7.0	9.0	9.0	-	-	13.0	15.0	17.5	
S	6.5	-	-	-	7.0	9.0	9.0	10.5	11.0	13.0	17.5	18.0	
O	-	6.0	-	-	8.0	9.0	7.0	10.5	10.5	12.5	15.0	17.0	
N	4.5	-	-	-	8.0	9.0	9.5	9.0	12.0	13.5	16.0	17.0	
D	-	-	-	7.0	-	8.0	-	10.0	-	13.5	-	-	

TOWNSHIP ROSEBANK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		-	11.0	18.0	13.5	18.5	28.5	19.5	-	27.0	20.0	17.0	-
F		13.5	7.5	8.5	-	23.5	16.5	30.5	26.51	30.0	-	36.0	-
M		11.01	5.5	22.5	15.5	11.0	23.5	26.0	28 0	26.0	75.0	-	70.0
A	16.0	-	15.0	16.0	12.5	13.0	-	25.0	29.0	25.0	40.0	-	-
M	10.0	8.5	14.5	11.0	15.0	28.0	-	-	10.0	-	29.0	-	-
J	-	-	15.0	14.5	11.5	-	26.5	27.0	-	48.0	43.0	-	-
J	10.0	13.5	19.0	-	-	27.0	-	25.5	19.0	21.0	19.0	35.0	30.0
A	-	11.5	15.0	-	-	16.0	19.5	21.0	22.0	52.0	15.0	32.0	
S	12.0	10.0	11.0	-	30.0	35.0	-	23.5	26.0	42.0	20.0	32.0	
O	-	15.0	13.5	14.0	10.5	12.5	23.5	-	32.0	26.0	37.0	-	
N	12.5	-	10.5	-	17.5	23.5	-	17.0	29.0	17.15	32.0	43.0	-
D	-	-	13.0	10.0	22.5	-	36.0	-	20.0	-	24.0	35.0	

TOWNSHIP ROSETTENVILLE and'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.5	4.5	6.0	6.2	6.7	8.2	7.0	6.5	8.0	10.5	13.0	16.5	12.5
F	5.7	6.2	6.0	7.0	7.5	6.7	7.5	6.5	10.5	9.0	12.0	15.0	15.5
M	6.2	6.7	5.5	4.9	5.5	9.0	7.4	7.0	9.5	9.5	11.5	14.0	13.0
A	6.9	7.0	6.2	5.5	6.7	6.0	7.0	6.5	8.5	10.5	13.0	13.5	8.0
M	4.9	6.1	5.0	6.1	6.5	5.0	7.0	7.0	9.0	10.5	13.5	13.5	14.0
J	6 2	5.5	5.2	5.9	6.7	6.0	7.5	9.5	7.5	11.5	13.0	13.5	11.0
J	5.5	6.0	5.5	6.7	7.1	5.5	7.0	9.9	7.5	9.5	12.5	13.0	15.5
A	6.7	4.0	5.5	6.0	6.1	6.5	7.0	7.5	8.0	9.9	12.5	14.5	15.5
S	8.5	6.5	5.0	8.01	5.7	7.5	7.4	9.5	10.5	8.5	13.0	14.5	16.5
O	5.5	5.7	6.0	6.2	6.1	9.9	7.5	9.5	10.5	11.0	14.0	16.5	
N	5.3	6.9	6.0	5.0	7.5	5.0	7.5	9.5	7.5	11.5	11.0	12.5	
D	5.3	6.0	5.0	5.2	6.1	5.5	6.5	7.0	9.5	13.0	15.5	13.0	

TOWNSHIP ROSSMORE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	14.0		9.0	6.0	-	22.5	9.5	-	34.0	30.0			
F	-	7.0	-	6.5	-	-	-	-	20.0	35.5			
M	7.0	-	7.5	--	7.5	8.5	9.5	21.0	-	34.0			
A	14.5	-	7.0	-	-	9.5	19.0	16.0	25.0	6.5		19.0	
M	-	-	-	-	14.0	-	21.51	-	-	-		-	
J	9.5	-	-	9.5	13.0	18.5	9.5	21.5	21.0	-		17.0	16.0
J	8.5	-	-	11.0	16.0	17.5	15.0	21.0	23.5	-	17.0	-	-
A	-	-	10.0	-	11.5	-	-	25.5	17.5	35.0	-	46.0	-
S	-	8.7	13.0	-	12.5	-	15.0	28.5	-	-	-	40.0	42.0
O	-	3.5	5.5	8.5	8.5	-	20.0	-	41.5	-	-	-	
N	-	10.0	5.5	14.0	9.5	-	10.0	-	-	-	-	43.0	
D	-	16.5	-	14.5	1.0	12.5	13.0	18.5	-	-	-		

TOWNSHIP ROUXVILLE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J			12.0	8.0	8.9	-	10.0	12.5	-		16.5	22.0	-
F		8.5	-	11.0	-	-	-	-	22.5	29.0	20.0	-	24.0
M		8.5	11.5	-	10.0	-	-	7.5	-	19.0	-	-	-
A	9.0	-	-	11.0	10.2	11.5	11.0	-	12.5	-	-	-	-
M				12.5	5.0	-	12.5		-	23.9	20.0	-	-
J				12.0	10.0	-	-		-	-	-	19.5	16.0
J		-	9.0	-	-	6.5	10.7	1.0	-	18.0	17.0	-	
A		-	-	-	-	-	10.0	13.0	20.0	18.0	20.0	28.0	
S	8.5	11.0	-	-	9.0	8.0	-	13.5	13.5	18.5	-	-	
O	11.7	-	-	-	8.5	12.0	10.0		15.0	19.0	17.0	-	
N	-	10.5	-	9.5	7.5	11.0	10.5	-	-	18.0	20.5		
D	-	9.0	9.7	8.9	-	16.0	-	-		24.0	-	18.0	

TOWNSHIP SAINT ANDREWS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J								10.0	37.0	45.0			
F								10.0	39.5	-			
M								11.0	12.2	-			
A								10.5	8.0	-			
M								12.0	8.5	-			
J								11.6	9.0	-			
J								18.5	11.0	-			
A								16.5	10.0	-			
S								10.0	-	-			
O								20.5	-	-			
N								11.0	16.0	-			
D								-	-	-			

TOWNSHIP SANDHURST

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	23.0	-	-	16.0	-	14.0	-	-	-	-	39.0	-
F	24.0	30.0	16.0	-	42.0	-	17.5	24.0	38.0	-	50.0	-	75.0
M	-	-	-	15.5	24.0	-	40.0	29.0	34.5	-	63.0	-	85.0
A	16.5	-	26.5	-	26.0	-	20.0	64.0	-	-	42.0	-	
M	23.0	-	-	10.0	-	-	-	50.0	30.0	-	-	-	
J	-	-	-	16.5	30.5	-	-	-	-	-	-	-	
J	26.5	-	-	-	28.0	35.0	35.0	-	42.0	-	70.0	-	
A	-	-	23.0	-	29.9	50.0	-	43.0	-	-	-	-	
S	-	-	29.5	-	15.0	52.0	-	-	-	-	-	-	
O	-	23.5	-	-	30.0	32.0	13.0	33.0	75.0	-	59.0	-	
N	-	-	30.0	-	-	12.0	-	51.0	52.0	-	56.5	-	
D	-	12.5	-	11.5	10.0	-	20.0	56.0	70.0	-	-	-	

TOWNSHIP SANDON

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	16.0	21.0	-	-	38.0	-	28.5	-	48.5	85.0	-	45.0
F	-	-	-	-	30.5	-	26.0	11.5	24.0	40.5	19.0	-	-
M	-	10.0	-	16.0	15.0	28.0	24.0	-	25.0	38.5	40.5	-	-
A	12.0	-	21.0	-	20.5	-	27.0	-	27.5	43.0	38.0	-	-
M	-	-	-	10.5	21.0	-	26.0	16.5	37.0	-	75.0	-	-
J	-	-	21.0	22.0	27.0	-	28.0	-	26.0	-	-	-	-
J	-	-	-	18.5	31.0	-	24.9	-	-	56.0	-	37.0	-
A	10.0	17.5	14.0	-	-	21.0	41.0	22.0	22.0	-	-	45.0	81.0
S	-	21.0	31.0	-	23.0	-	-	25.0	33.5	-	-	36.0	-
O	-	14.0	23.0	-	22.0	-	54.0	10.5	37.0	-	-	-	-
N	-	-	17.0	19.5	12.5	-	30.0	22.5	-	-	-	-	-
D	16.0	14.0	-	-	-	-	11.0	22.2	26.2	-	-	-	-

TOWNSHIP SANDOWN 'X'3, 'X'5, 'X'7, 'X'9, 'X'23

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J								-		-	25.0	22.0	
F								-		42.0	-	-	
M								-		-	17.0	-	
A								-		-	38.0	-	
M										-	20.0	36.0	
J							32.0		27.7	-	39.0	22.0	
J							-	-	-	44.0	-	-	
A							-		-	-	-	65.0	
S							23.5		-	-	64.0		
O							18.5		32.5	-	24.0		
N							-		-	-	-		
D							-		-	-	-		

TOWNSHIP S'NDRINGHAM

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	10.5	8.0	8.5	9.5	9.9	11.1	9.7	13.7	14.0	15.5	20.0	20.2	27.0
F	8.2	8.7	9.5	9.5	9.9	9.7	12.5	12.5	15.51	21.0	16.5	22 0	28.0
M	9.5	10.5	8.5	9.2	10.9	10.7	11.5	13.5	15.0	17.7	19.5	-	26.0
A	9.5	-	-	8.5	9.5	12.5	13.2	-	-	16.0	23.5	19.0	23 7
M	9.2	-	9.5	9.0	9.9	13.0	16.5	14.5	19.0	17.0	22.5	22.0	26.5
J	10.0	-	8.0	10.5	10.0	13.5	17.0	13.0	15.0	18.5	25.2	21.7	22.5
J	8.7	8.5	-	8.5	10.0	11.0	14.5	13.2	-	20.5	-	22.2	27.0
A	9.5	8.0	9.5	9.0	10.2	11.0	12.5	-	16.0	17.5	26.0	19.2	
S	7.5	7.5	8.5	9.0	11.2	10.5	14.5	14.0	16.2	23.0	23.0	-	
O	9.0	9.5	10.5	-	11.0	11.0	14.0	15.0	16.7	22.5	-	25.2	
N	8.9	9.5	9.5	10.2	10.1	10.5	12.0	14.0	19.0	20.5	20.0	24.0	
D	7.7	9.0	-	9.9	10.7	-	14.5	-	17.0	18.0	26.5	22.2	

TOWNSHIP SAVOY ESTATE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
	15.9	-	14.2	12.5	14.5	21.0	-	-	21.0	36.0	-	-	-
F	16.5	15.9	-	14.2	13.5	16.5	19.0	27.0	-	23.9	-	-	30.0
M	16.5	13.5	-	10.5	16.7	16.7	23.5	23.0	22.0	26.0	29.0	33.5	43.0
A	14.0	-	-	-	-	18.0	-	-	22.5	35.0	36.0	-	-
M	-	-	-	-	14.5	19.2	9.0	-	13.0	42.0	43.0	-	43.0
J	-	-	17.0	14.5	10.7	-	15.5	-	25.0	26.5	-	41.0	-
J	15.0	11.5	-	16.0	12.2	15.0	22.2	25.0	-	26.0	39.0	26.5	-
A	-	-	15.2	-	16.0	17.0	19.5	28.0	-	-	35.5	36.0	-
	-	15.0	17.0	-	15.5	-	-	-	20.7	15.0	-	-	36.0
O	13.0	-	17.2	-	17.2	13.0	29.0	-	26.5	35.0	-	-	-
	14.0	12.2	14.5	9.0	-	-	-	29.0	21.4	28.0	-	34.9	44.0
D	13.5	13.0	-	16.0	15.0	-	-	24.0	-	45.7	41.2	-	

TOWNSHIP SAXONWOLD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	13.5	23.2	-	16.7	16.0	17.0	-	26.5	25.5	31.5	40.0	50.0	45.0
F	13.5	12.2	-	17.5	20.5	19.5	17.0	28.0	27.5	35.5	43.0	33.0	40.0
M	12.5	13.2	13.7	14.5	14.5	17.0	22.5	16.0	26.5	31.5	35.0	36.5	33.0
A	19.5	11.2	15.5	15.8	13.5	18.2	18.5	24.0	29.5	-	34.0	33.0	34.0
M	13.5	21.2	16.5	15.8	17.0	-	31.5	28.5	29.0	20.5	-	33.0	39.0
J	17.5	-	-	14.0	22.4	25.0	20.2	27.5	31.5	33.0	39.0	64.0	-
J	13.5	16.9	10.5	18.5	12.5	27.0	18.5	26.2	30.5	26.2	43.5	40.5	-
A	15.0	17.1	14.9	19.2	15.2	19.5	24.5	26.5	26.5	33.5	49.0	36.5	57.0
S	11.0	12.0	13.0	45.0	22.0	19.0	21.5	33.0	24.5	43.0	38.0	40.0	32.0
O	16 0	12.0	13.0	13.5	19.5	22.5	23.5	25.0	26.5	33.5	-	31.0	
N	15.5	14.0	12.7	13.5	20 0	26.0	21.5	21.5	51.2	58.0	-	33.0	
D	14.5	17.7	17.2	13.0	18.0	-	30.0	23.5	29.5	46.7	66.5	27.0	

TOWNSHIP SENDERWOOD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	24.0	16.5	-	5.0	14.0	-	22.0	-	22.0		46.0		
F	-	16.5	-	-	13.0	-	-	30.0	21.0		-	44.5	42.0
M	-	-	-	16.0	17.5	-	-	30.0	31.0	58.5	-	-	-
A	-	-	-	-	17.5	-	-	21.0	-	-	-	-	-
M	-	-	12.0	-	-	16.0	-	28.5	27.0	34.5	-	-	-
J	-	13.0	14.5	-	-	-	-	-	58.0	-	-	58.0	43.0
J	13.0	-	-	-	-	17.0	-	43.5	-	-	-	-	
A	-	-	-	-	19.0	-	-	30.0	-	65.0	-	-	
S	15.0	15.0	-	-	19.0	-	-	-	-	33.0	-	-	
O	-	14.0	13.5	-	8.5	-	-	-	-	-	-		
N	19.5	20.0	26.0	14.5	-	-	26.0	22.0	-	-	41.0	-	
D	-	-	-	7.0	7.0	-	-	32.0	-	72.0	-	75.0	

TOWNSHIP SOUTHDALE AND 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J						9.1	-	10.2	10.5	[illegible]	14.5	-	-
F						-	1.5	-	10.5	13.1	14.0	16.5	17.5
M						-	1.5	10.0	-	10.2	16.0	17.0	-
A					9.0	9.1	-	-	6.5	-	4.5	-	-
M					-	9.1	1.5	-	8.2	-	4.5	-	17.5
J					-	9.1	-	-	11.2	-	10.5	17.5	17.0
J					-	9.1	-	10.5	11.5	14.0	-	-	
A					-	9.0	3.0	6.5	11.5	-	-	16.0	
S					9.2	1.5	-	10.5	12.5	12.9	-	-	
O					9.1	-	10.0	6.5	-	13.2	-	-	
N					9.1	-	-	-	13.5	15.0	-	17.0	
D					-	-	10.5	-	13.2	9.2	-	18.5	

TOWNSHIP SOUTH HILLS

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	3.5		3.0		5.0		5.0	4.5	5.0		7.5	10.0	9.5
F	-	3.5	-		-		5.0	6.0	6.7	8.0	8.2	10.5	-
M	-	5.0	-	3.0	-		-	6.5	-	6.0	9.2	10.0	12.0
A	-	-	-	-	3.0		5.5	4.0	6.0	7.5	9.2	10.0	10.0
M	-	-	3.2	3.0	3.5		4.0	4.5	-	6.7	-	-	-
J	-	3.5	3.5	-	-	5.0	5.7	5.5	-	7.5	10.0	11.5	11.7
J	-	-	-	-	-	-	5.0	4.0	6.0	-	7.9	10.5	-
A	-	-	-	3.5	5.0	-	-	5.0	4.5	7.5	9.5	10.7	11.0
S	-	3.5	-	-	-	5.0	4.5	6.0	-	4.0	11.5	12.5	
O	3.5	-	-	3.0	-	-	3.0	5.5	-	6.5	10.5	11.0	
N	-	3.2	-	3.5	4.5	-	3.5	-	-	7.5	12.0	10.5	
D	-	-	-	-	-	-	4.5	4.0	-	7.0	10.5	-	

TOWNSHIP SYDENHAM

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	8.5	9.0	8.5	9.9	9.0	9.5	12.0	13.5	12.7	14.5	19.5	23.5	-
F	10.5	9.5	9.5	10.2	9.2	13.5	11.7	12.5	13.5	17.5	18.1	19.0	21.0
M	9.5	9.0	11.0	12.0	9.5	9.7	10.7	13.5	14.5	16.2	20.5	20.7	21.5
A	7.51	9.5	12.0	9.0	10.0	11.0	12.1	12.0	13.5	16.2	20.0	21.5	23.0
M	9.0	-	9.5	9.9	10.5	14.0	11.9	15.0	14.5	17.5	19.5	22.0	22.0
J	8.5	-	10.5	10.2	8.5	9.7	11.9	12.0	13.5	17.9	22.0	23.5	27.0
J	10.0	10.0	7.0	6.5	10.5	9.0	11.5	12.5	15.2	18.2	19.5	21.5	25.0
A	6.5	10.5	6.5	7.1	8.5	9.5	12.5	13.0	14.5	15.2	21.0	16.5	22.0
S	10.0	11.0	8.2	10.0	6.5	10.7	11.2	14.0	16.0	16.9	20.0	20.0	
O	8.5	9.5	9.2	8.0	17.0	16.5	11.2	11.0	15.5	20.9	19.5	23.5	
N	9.0	9.5	11.5	9.5	9.5	-	11.2	12.5	14.5	20.0	21.0	24.5	
D	7.0	8.1	10.0	12.5	10.5	-	12.5	13.2	15.5	20.5	19.5	18.5	

TOWNSHIP OF [illegible]

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.5	7.5	8.0	7.0	7.0	10.0	8.5	7.5	11.2	12.0	16.5	16.0	17.0
F	5.0	6.2	7.0	7.0	7.5	7.0	10.0	6.0	11.0	12.5	15.9	19.0	14.7
M	8.5	7.0	8.5	7.0	7.2	8.0	10.0	11.0	16.0	12.0	15.2	-	15.5
A	9.5	7.0	-	7.0	9.0	7.0	8.0	9.0	13.0	13.0	15.5	16.0	16.5
M	8.5	7.0	7.0	7.0	7.5	6.0	9.0	9.2	12.0	13.5	18.5	15.0	15.5
J	8.0	6.7	8.0	6.0	8.0	7.5	9.5	11.5	14.5	13.5	14.5	20.0	15.5
J	7.0	6.2	-	7.5	8.7	7.5	7.5	9.5	11.0	12.5	14.5	16.0	15.5
A	7.2	6.3	7.0	8.2	9.7	8.2	7.2	7.5	9.0	4.5	13.0	14.5	19.0
S	7.2	13.0	8.0	10.5	6.5	9.1	9.5	10.5	6.5	15.5	15.5	15.0	13.0
O	7.2	8.0	6.5	-	10.0	10.9	11.5	10.7	12.5	13.0	18.7	14.5	15.0
N	8.5	-	8.5	9.0	8.5	10.5	8.0	9.5	12.0	14.5	15.0	15.0	14.0
D	8.7	7.0	-	6.5	7.0	10.0	9.5	14.5	15.5	15.5	17.0	15.5	

TOWNSHIP TOWNSVIEW

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.5	8.7	6.2	-	6.0	5.2	-	8.0	7.5	9.5	13.0	13.5	14.0
F	-	-	-	6.0	5.5	7.0	8.0	9.0	11.0	13.0	13.0	15.0	-
M	-	-	6.0	-	-	8.5	7.5	-	10.0	11.0	14.5	19.0	-
A	-	-	-	6.0	-	-	-	7.0	16.0	11.5	14.0	-	-
M	-	-	-	-	6.2	11.0	8.7	10.0	-	10.5	9.0	16.0	19.0
J	-	-	-	-	-	-	8.5	10.0	9.9	13.0	12.0	12.0	-
J	6.0	-	-	-	-	-	-	-	8.2	10.5	-	-	15.0
A	-	4.0	-	-	-	-	10.5	-	-	12.0	12.0	-	-
S	6.0	-	6.7	-	-	7.5	8.5	-	-	-	-	18.0	-
O	-	-	-	-	-	4.0	5.5	10.5	9.0	-	34.0	-	
N	-	4.5	-	-	6.0	8.0	8.0	8.5	-	-	14.0	15.0	
D	8.0	-	-	-	8.0	6.0	7.0	9.0	-	-	-	-	

TOWNSHIP TRIOMPH

	1960	1961	1962	1963	1964	1965	1966	19 7	1968	1969	1970	1971	1972
J							5.2	5.5	6.2	-	7.5	6.2	12.5
F							5.3	5.5	1.0	3.0	6.3	7.5	11.2
M						2.5	5.5	5.0	2.5	2.5	7.5	8.7	-
A						5.0	4.7	5.5	5.0	6.2	8.7	6.2	10.0
M						-	5.5	-	1.2	3.0	4.0	10.0	12.7
J						-	5.5	5.0	1.5	6.2	3.0	7.5	13.0
J						5.5	5.5	5.5	5.5	3.2	9.0	11.2	10.5
A						4.5	5.0	6.2	-	-	8.7	9.9	12.5
S						4.5	5.5	6.0	5.0	-	11.0	7.5	-
O						4.6	5.5	4.5	5.5	7.5	7.5	12.5	11.2
N						4.5	7.5	6.2	4.0	6.2	9.9	6.2	
D						5.2	7.5	-	2.5	7.5	1.5	9.5	

TOWNSHIP TROYEVILLE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	3.5	-	3.2	3.2	4.0	5.0	-	7.0	-	6.2	12.5	6.2	12.5
F	5.0	-	5.5	4.0	5.0	5.5	-	6.5	4.5	-	-	-	8.7
M	3.5	3.2	4.5	6.2	6.2	5.0	-	9.0	-	12.0	18.7	12.5	-
A	3.2	-	3.0	5.0	5.5	5.5	-	3.2	12.0	8.7	10.0	-	15.0
M	3.5	5.5	3.2	3.2	4.0	18.0	-	10.0	8.7	11.2	-	7.0	16.2
J	5.5	5.5	4.5	3.2	4.0	8.7	-	8.0	-	8.7	5.0	3.2	14.0
J	3.0	7.0	3.2	-	5.0	4.5	3.2	6.2	10.5	-	-	12.5	-
A	3.1	-	5.0	3.0	4.0	5.0	2.5	8.0	7.5	7.5	-	8.0	6.2
S	-	-	5.5	3.2	4.5	-	7.0	8.7	8.0	-	-	-	
O	5.0	2.5	7.0	7.5	6.2	3.0	6.2	6.2	7.5	11.2	11.2	10.0	
N	3.2	-	6.2	3.2	4.5	-	5.5	5.0	6.2	7.5	21.0	11.2	
D	-	3.2	5.5	-	4.0	7.5	-	8.7	-	-	-	10.5	

TOWNSHIP TULISA PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J					13.0	6.0		4.0	9.0	9.9	17.0	14.5	17.0
F					8.0	-		9.0	10.0	14.0	15.5	21.0	8.0
M	6.0				-	-		8.0	-	15.0	16.5	20.0	4.0
A	-	12.0		5.0	6.5	-		-	13.0	7.0	16.5	13.5	5.0
M	5.0	-		-	5.7	-		2.0	12.0	3.0	19.5	-	20.0
J	4.5	-		-	3.0	-		-	12.2	15.0	11.0	14.0	9.5
J	-	-		-	5.0	28.5		-	-	13.0	11.0	20.5	
A	-	-		7.0	5.5	-	7.0	-	9.0	-	19.5	18.0	
S	-	-		-	-	-	-	-		15.0	24.0	15.0	
O	5.0	-		-	-	-	-	-	-	15.0	19.5	16.5	
N	4.0	-		6.0	5.7	-	-	7.5	9.0	-	17.0	3.5	
D	-	-	5.0	13.0	6.7	8.0	-	-	12.5	15.5	13.0	22.0	

TOWNSHIP TURF CLUB

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.0	-	-	-	-	-	8.0	8.5	-	-	-	16.5	-
F	-	-	-	-	-	-	-	9.0	-	12.0	7.5	8.5	-
M	-	4.5	-	-	4.5	-	6.0	8.5	-	-	14.0	-	-
A	-	5.0	4.5	5.5	5.5	-	6.5	-	-	-	13.0	-	8.0
M	4.9	-	-	-	-	6.5	6.5	6.0	-	10.5	28.0	-	-
J	7.5	-	-	-	15.0	-	-	-	-		-	11.5	18.0
J	-	5.5	-	-	-	-	-	-	-	-	-	-	-
A	-	4.0	-	-	-	5.0	4.0	-	-	-	-	-	-
S	5.5	-	-	-	-	-	6.0	-	-	-	13.5	-	15.0
O	-	-	-	-	8.0	-	5.5	7.0	-	-	-	-	
N	-	6.0	5.5	6.0	6.5	-	-	6.5	-	9.0	-	-	
D	-	-	-	-	3.5	-	-	-		-	-	-	

TOWNSHIP TURFFONTEIN

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	5.0	5.5	4.7	4.9	5.0	5.0	5.5	8.0	7.0	8.0	12.0	12.0	16.0
F	4.5	3.5	4.5	4.5	4.5	6.0	4.9	6.5	9.0	7.0	9.0	11.5	16.2
M	6.0	5.5	4.9	5.2	6.0	5.5	4.9	6.5	7.0	8.0	9.5	12.0	17.5
A	-	4.7	4.2	3.0	5.0	8.0	7.0	6.7	6.0	8.0	9.0	12.0	12.5
M	4.0	5.9	4.5	4.5	4.5	6.0	5.5	6.0	7.0	10.0	12.5	12.0	11.5
J	6.0	4.9	5.0	5.0	7.0	6.5	5.0	5.0	6.0	7.0	11.0	13.0	13.5
J	6.0	6.5	5.0	4.0	5.0	5.5	5.0	6.0	9.0	8.2	11.0	12.7	14.0
A	-	5.5	7.0	4.9	5.2	5.5	5.2	6.0	7.0	10.0	12.0	11.0	10.0
S	4.0	4.7	3.7	4.0	5.0	5.5	5.2	6.0	7.0	8 0	12.0	11.2	13.5
O	4 5	4.0	4.9	4.0	5.5	8.0	6.5	5.2	6.0	10.2	10.0	12.2	18.0
N	-	4.5	6.9	5.0	6.0	5.5	5.5	7.0	9.0	10.0	13.0	13.9	
D	-	6.9	5.9	5.1	8.0	5.5	5.5	6.5	7.0	9.0	12.0	15.1	

TOWNSHIP VICTORIA

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	11.0	-	-	-	-	11.0	7.0	11.0	-	-	-		
F	-	11.5	7.5	14.5	11.0	-	-	12.0	-	-	-		
M	-	-	14.5	-	-	-	-	-	-	35.0	-	-	29.0
A	-	-	4.7	-	-	-	14.0	27.5	24.0	-	-		
M	-	9.5	-	15.0	11.0	-	-		-	23.5	-		
J	-	-	6.5	-	-	-	14.0	25.0	-	-	28.9		
J	-	-	-	13.5	-	-	-	-	-	24.0	-		
A	-	-	-	-	-	-	7.0	-	-	17.0	-		
S	-	-	-		-	-	8.0	28.0	-	-			
O	-	-	12.9	12.0	16.5	-	-	-	-	-	40.0		
N	10.0	-	-	-	-	-	-	-	20.0	-	-		
D	-	-	7.0	-	-	-	-	-	-	-	-		

TOWNSHIP VICTORY PARK

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	-	14.3	-	22.7	25.0	26.6	30.5	23.0	42.1	-
F	11.7	10.5	12.0	-	13.7	-	22.5	-	27.8	31.3	-	28.9	22.0
M	-	11.0	-	12.7	10.4	18.8	25.4	-	17.2	24.5	24.0	20.0	-
A	-	-	13.5	11.3	12.3	-	13.5	22.3	23.9	26.8	40.0	-	30.4
M	15.0	-	-	-	16.4	-	-	25.7	25.0	-	26.2	42.1	-
J	-	-	-	-	18.3	-	22.5	-	27.0	-	-	45.0	-
J	-	-	-	17.0	14.0	-	-	26.3	26.3	20.0	45.0	-	-
A	14.1	-	13.2	16.0	-	28.7	22.3	8.3	32.0	50.0	-	-	29.0
S	-	-	-	13.5	18.4	-	-	14.0	30.6	24.1	-	38.0	-
O	-	-	16.4	-	13.4	-	22.3	20.3	34.0	35.3	41.2	49.0	-
N	-	16.2	13.0	21.0	45.0	-	-	18.3	23.0	18.0	25.0	41.5	-
D	-	8.9	-	16.3	13.0	-	15.0	26.9	-	24.8	47.0	-	-

TOWNSHIP VREDEDORP

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	-	-	2.0	2.7	3.2	4.1	-	-	-	-	-
F	-	-	-	-	3.0	-	4.7	1.0	3.0	-	-	-	5.5
M	-	-	-	-	-	2.9	1.5	2.5	3.2	-	-	3.0	10.0
A	-	-	-	3.0	3.7	8.0	6.5	2.2	-	-	7.0	-	6.0
M	-	3.7	-	-	6.0	1.0	3.7	2.2	5.0	4.2	-	-	-
J	4.5	-	-	-	2.9	3.0	2.7	-	3.5	-	-	5.0	-
J	-	-	2.5	-	1.2	2.0	4.5	4.5	-	-	-	6.7	7.5
A	-	2.2	3.5	2.0	3.9	1.2	2.5	1.0	4.5	-	-	5.2	8.5
S	-	1.9	1.2	-	3.0	3.7	4.0	-	-	-	-	-	
O	2.2	2.9	-	2.0	4.0	-	6.0	-	2.0	3.2	-	-	
N	5.7	-	3.2	2.7	4.7	4.2	4.2	4.0	7.5	-	-	-	
D	-	1.9	2.0	-	2.5	4.2	-	-	4.2	-	5.0	5.7	

TOWNSHIP WATERFALL ESTATE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J		7.0	-		-	11.0		4.0		4.5			
F		-	-	1.2	7.0	-		-		-			10.5
M		-	-	-	-	-		-					-
A		-	-	-	10.0	6.0		-	17.0				-
M		-	-	-	-	10.0		18.0	-			28.0	-
J		-	-	16.0	9.5	2.0		12.0	16.0			28.0	-
J		-	10.5	-	-	9.5		-	10.0			19.0	25.0
A		-	-	-	-	-		-	-				
S		-	-	-	-	10.0		-	-				
O		-	-	-	7.0	-		-	-				
N		8.0	-	-	-			-	8.0				
D		-	-	10.5	-			-	-				

TOWNSHIP WAVERLEY AND 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	19.5	21.0	12.7	12.2	19.7	-	-	20.0	35.0	34.4	27.0	31.2	31.0
F	15.5	18.2	-	12.5	15.7	24.2	20.0	-	32.0	51.2	44.0	32.0	-
M	-	-	-	13.2	8.5	-	-	30.7	34.5	-	55.0	61.0	69.0
A	-	-	11.0	18.0	8.5	-	17.0	22.7	-	33.5	79.7	-	-
M	17.7	-	12.2	20.5	17.7	-	24.0	-	-	30.5	31.5	-	-
J	14.2	-	16.7	16.0	20.2	16.2	27.0	34.0	37.0	54.0	43.5	41.7	-
J	21.0	-	16.0	-	12.5	15.0	-	-	21.0	39.0	-	38.0	53.0
A	-	-	16.5	-	14.0	-	-	19.7	25.2	-	-	-	
S	14.5	-	-	-	17.0	-	-	28.0	22.5	50.0	-	30.0	
O	10.0	23.7	17.0	-	22.2	-	28.0	25.5	32.0	33.5	60.0	-	
N	12.0	16.2	16.0	21.7	23.7	-	30.0	-	25.7	20.0	-	-	
D	-	15.0	-	10.5	14.7	-	-	-	40.0	37.0	52.0	-	

TOWNSHIP WENDYWOOD

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J					11.0	11.7	-	-	14.5	19.7	22.5	22.7	17.0
F					11.5	-		14.5	13.5	20.0	20.0	19.0	23.0
M					10.5	-	.5	1[illegible].9	16.2	19.7	25.5	24.5	24.0
A					-	11.0	5.0	15.7	14.9	21.5	23.5	-	23.0
M					10.7	-	-	15.0	15.0	18.7	26.2	26.5	24.5
J					10.2	9.5	-	13.9	17.1	19.5	27.0	22.7	-
J					-	-	11.5	15.1	17.0	20.0	24.0	25.0	28.0
A					11.2	-	12.5	14.5	17.2	26.0	25.0	23.5	20.0
S					9.7	-	15.0	14.5	15.5	28.5	21.0	23.5	-
O					-	-	-	10.0	18.8	23.0	25.0	28.0	-
N					-	-	11.0	16.0	17.5	24.5	25.7	26.5	
D					11.0	-	-	12.5	17.5	21.5	22.0	25.0	

TOWNSHIP WESTCLIFF

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J			19.5	23.0	-			-	18.0	32.5	21.0	41.0	-
F	11.0	35.0	16.0	19.0	16.0	18.0	28.5	27.5	30.5	27.0	-	-	-
M	-	14.0	-	-	-	21.5	28.5	20.0	-	24.0	50.0	-	-
A	17.0	15.0	-	12.0	-	-	-	-	-	32.0	54.5	-	40.0
M	-	-	-	28.5	-	-	32.0	32.5	39.0	37.0	82.0	-	-
J	-	17.0	16.5	-	20.0	25.0	22.0	-	33.0	46.5	40.6	31.0	31.0
J	-	-	17.0	-	18.0	15.0	32.0	29.0	-	61.0	-	-	-
A	13.0	-	-	14.0	25.0	21.0	29.0	26.5	-	-	-	-	-
S	-	-	-	-	-	-	24.0	-	37.0	53.0	48.0	30.0	-
O	20.5	-	16.5	-	-	-	25.0	-	-	48.0	36.0	-	47.0
N	-	24.0	11.0	14.0	-	-	25.0	-	42.0	35.0	45.0	50.0	
D	26.0	-	17.5	18.5	-	-	28.0	26.7	-	-	42.5	46.0	

TOWNSHIP WESTCLIFF 'X'

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J													
F													
M								15.5		21.0			
A						18.0		19.5		-	46.0		
M		12.5		16.0		-	20.0	15.0		-	-		26.0
J		-		11.0		17.0		-		-	-		-
J		-		-		12.0		-	29.0	-	-		-
A	11.0	-		-	16.0		33.0	-	-	-	-		
S		-	13.0	21.0	14.5			-	-	25.0	-		
O		-	-	-	-			-	-	37.0	-	41.0	
N		-	-	-	-			12.5	-	-	-	25.0	
D		-	20.0	-	-			-	-	-	-	-	

TOWNSHIP WESTDENE

	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	6.0	4.7	4.5	5.0	4.0	5.2	5.7	5.5	4.0	9.0	9.0	9.5	13.5
F	5.7	4.7	3.5	3.0	7.0	4.9	5.9	4.5	6.0	9.5	10.6	13.5	11.0
M	6.0	7.0	5.5	4.5	4.5	5.9	7.0	5.0	6.0	8.0	10.0	10.0	10.5
A	5.5	-	5.5	4.5	4.7	5.0	5.5	6.1	5.5	6.0	10.5	11.5	8.3
M	3.5	4.5	3.5	6.0	6.5	5.5	6.5	6.2	6.5	8.2	9.9	12.5	9.5
J	4.7	5.2	4.5	4.5	5.5	5.4	5.5	5.0	6.0	8.7	10.5	8.5	11.0
J	4.0	5.7	7.5	4.0	5.0	3.5	5.5	7.0	7.0	8.5	9.7	9.5	18.5
A	5.5	4.5	3.5	5.2	4.5	5.0	5.7	5.5	6.7	6.5	10.7	12.5	9.5
S	4.5	4.2	5.0	3.5	4.7	3.0	6.2	4.5	6.0	8.5	13.5	12.2	15.0
O	5.0	3.0	5.5	6.5	4.7	4.5	5.5	6.2	5.7	8.0	9.5	12.5	
N	4.0	3.0	4.0	4.5	5.7	6.5	5.0	6.4	7.0	8.5	12.2	11.0	
D	4.5	5.5	6.0	3.5	6.5	5.0	4.7	6.7	7.7	7.5	8.9	13.0	

TOWNSHIP WEST TURFFONTEIN

	196	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	-	-	4.8	-	5.8	7.8	-	2.3	-	-	13.5	9.7	14.0
F	-	8.8	5.9	-	6.2	3.5	6.0	5.8	6.8	8.3	8.7	13.1	18.5
M	-	-	-	3.5	6.3	-	3.8	6.0	5.5	5.8	11.4	10.9	-
A	-	-	6.8	-	5.9	6.9	4.8	8.5	4.2	6.1	15.4	10.5	13.0
M	-	-	-	5.2	5.7	-	4.8	6.1	10.2	8.2	15.0	16.8	9.6
J	-	-	5.3	-	12.3	8.0	12.0	2.3	7.5	9.0	21.5	-	11.0
J	-	-	5.8	-	3.0	-	8.5	6.7	9.8	-	13.8	-	-
A	-	9.0	6.8	3.3	-	3.3	7.0	5.7	6.5	13.5	13.5	17.4	15.0
S	-	-	-	-	11.5	4.3	10.9	8.7	-	15.1	10.9	9.9	-
O	4.0	-	6.0	-	-	6.1	8.0	3.7	-	10.9	8.8	6.4	-
N	5.8	6.0	6.4	5.3	6.4	6.9	7.1	8.6	11.5	10.5	11.4	16.7	-
D	-	-	-	6.9	5.2	7.0	-	-	12.0	12.0	12.9	18.0	-

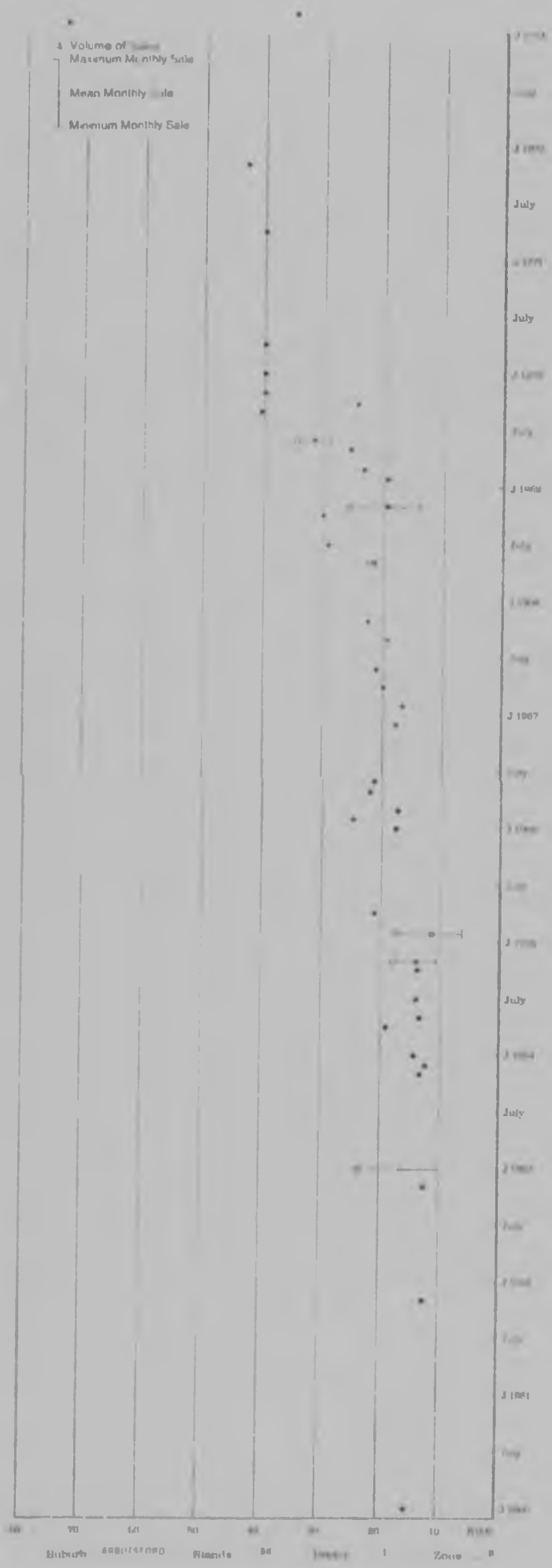
TOWNSHIP YEOVILLE

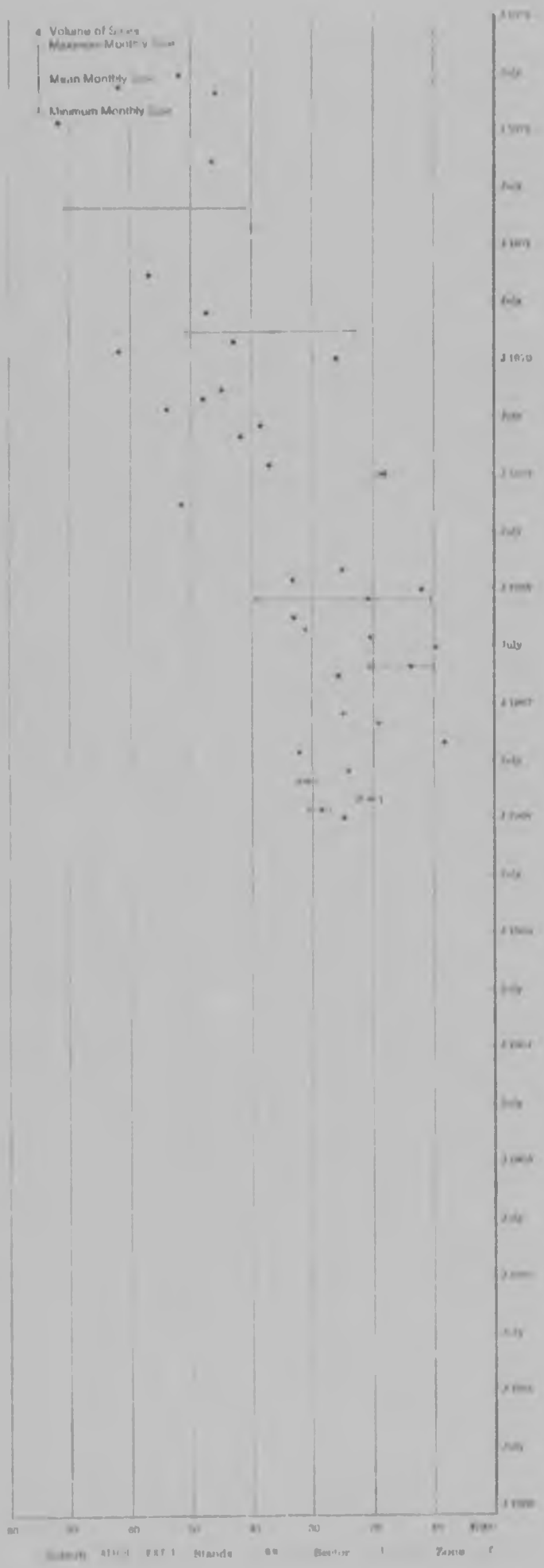
	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972
J	11.9	6.3	6.5	6.5	8.1	7.5	7.6	8.8	9.5	11.8	17.0	19.5	19.0
F	7.5	-	4.5	6.5	7.0	8.2	10.5	8.5	9.5	12.3	16.3	18.4	-
M	8.3	5.5	8.5	8.4	7.3	9.2	9.2	10.1	10.5	11.8	19.[illegible]	-	18.5
A	7.5	5.2	6.9	-	6.0	13.3	9.5	8.5	11.2	15.2	20	21.1	20.[illegible]
M	8.0	-	5.0	-	8.5	9.2	8.0	13.5	11.2	11.2	15	17.8	11.0
J	8.3	-	10.8	9.0	7.7	9.3	7.3	10.5	8.7	12.8	17.5	19.5	-
J	6.5	6.5	7.5	5.5	6.9	13.5	8.4	7.8	10.6	14.3	21.5	-	20.0
A	5.0	6.5	7.5	-	7.5	5.5	8.6	8.0	9.5	13.3	17.3	16.7	-
S	5.9	8.3	8.5	6.0	7.7	6.6	8.4	14.0	11.0	14.7	22.5	-	-
O	-	5.8	-	-	7.0	-	7.5	11.0	14.0	-	-	15.0	
N	3.2	2.2	8.0	4.2	6.8	-	9.2	13.3	11.3	13.8	16.5	-	-
D	6.0	6.5	-	12.0	6.1	-	9.5	8.4	14.2	14.6	-	10.1	-

APPENDIX C

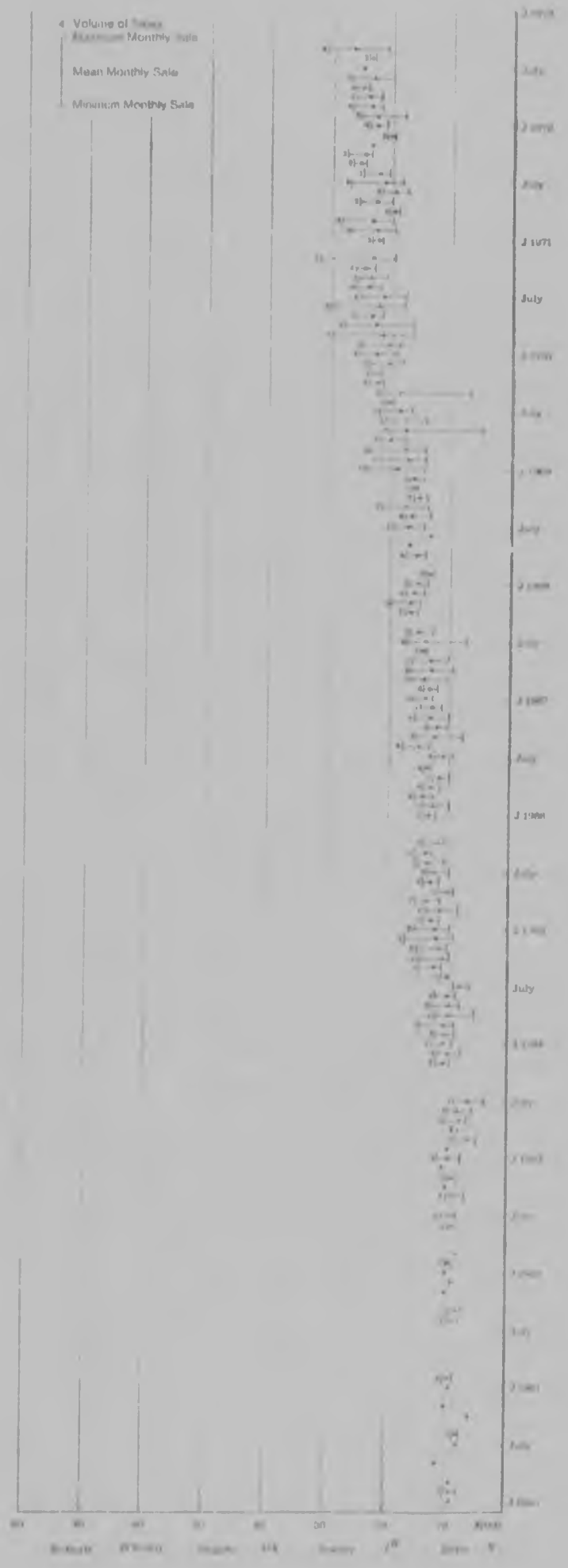
Johannesburg (Selected Residential Townships))
Maximum and Minimum Monthly Sales; Mean Monthly Sales,
and Volume of Sales per Month, 1960 - 1972.

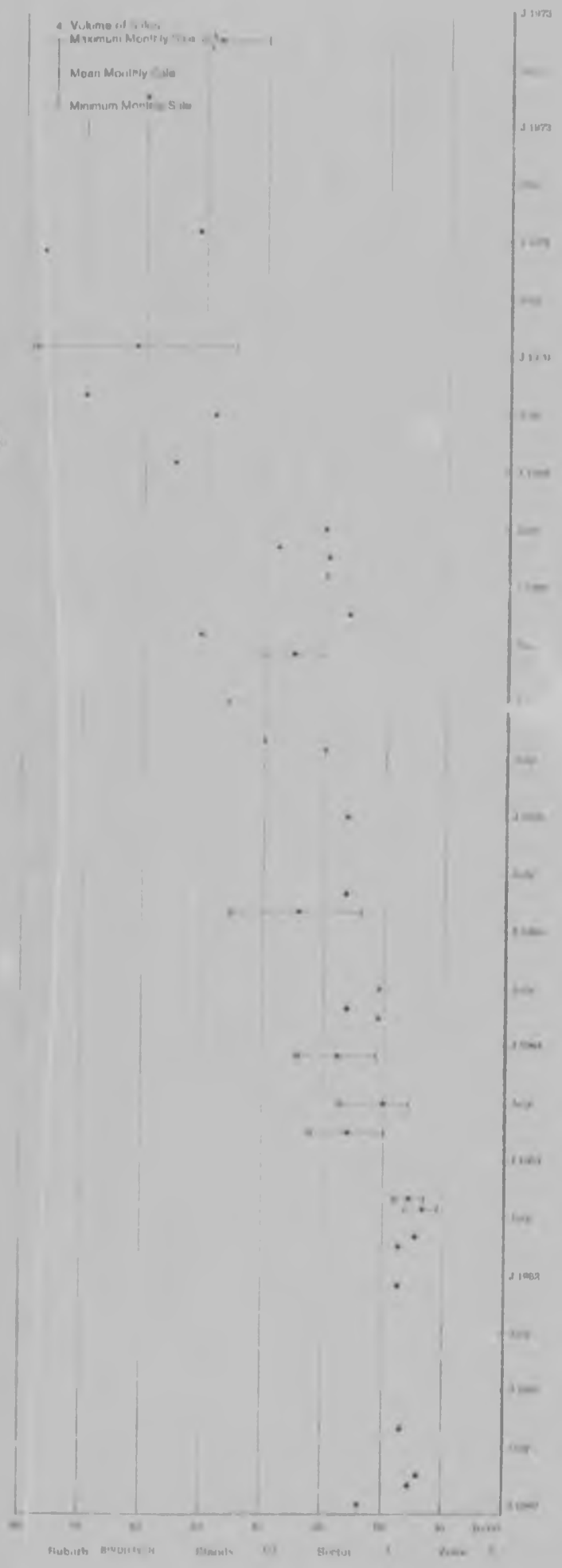
(Record of Transfers)


Volume of
Maximum Monthly Sale
Mean Monthly
Minimum Monthly Sale
July
July
July
July
J 1961
J 1967
July
July

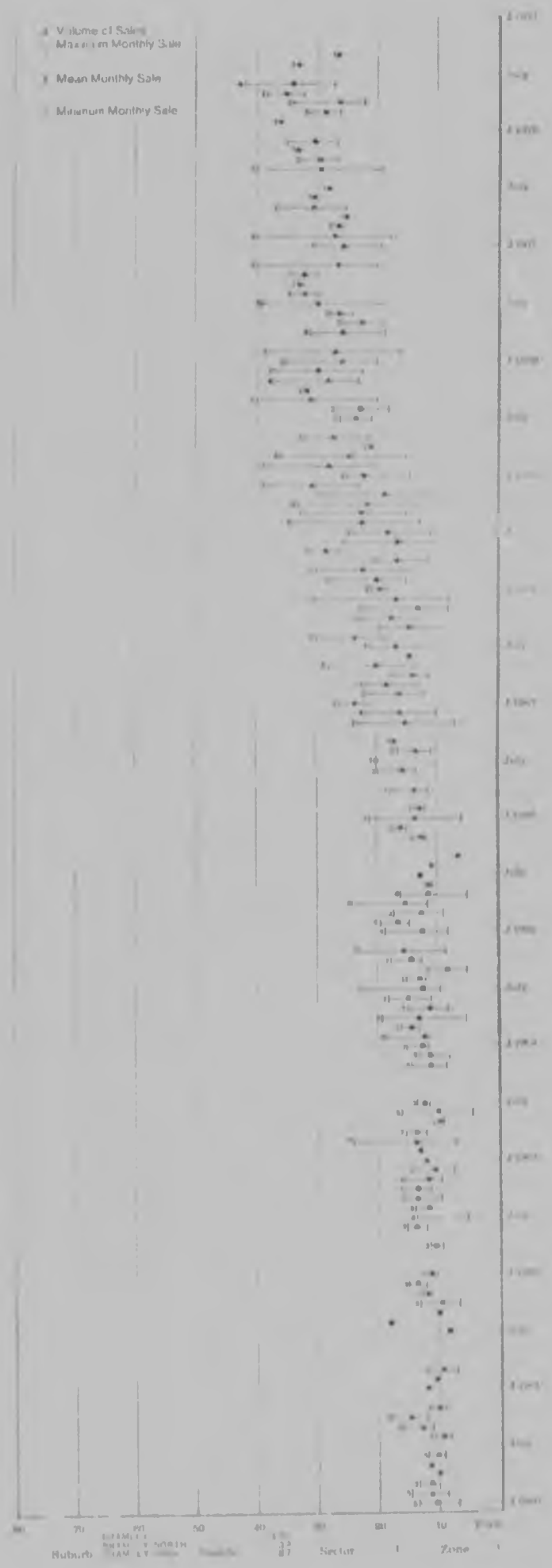

Volume of Sales
Maximum Monthly
Mean Monthly
Minimum Monthly
July
July
July

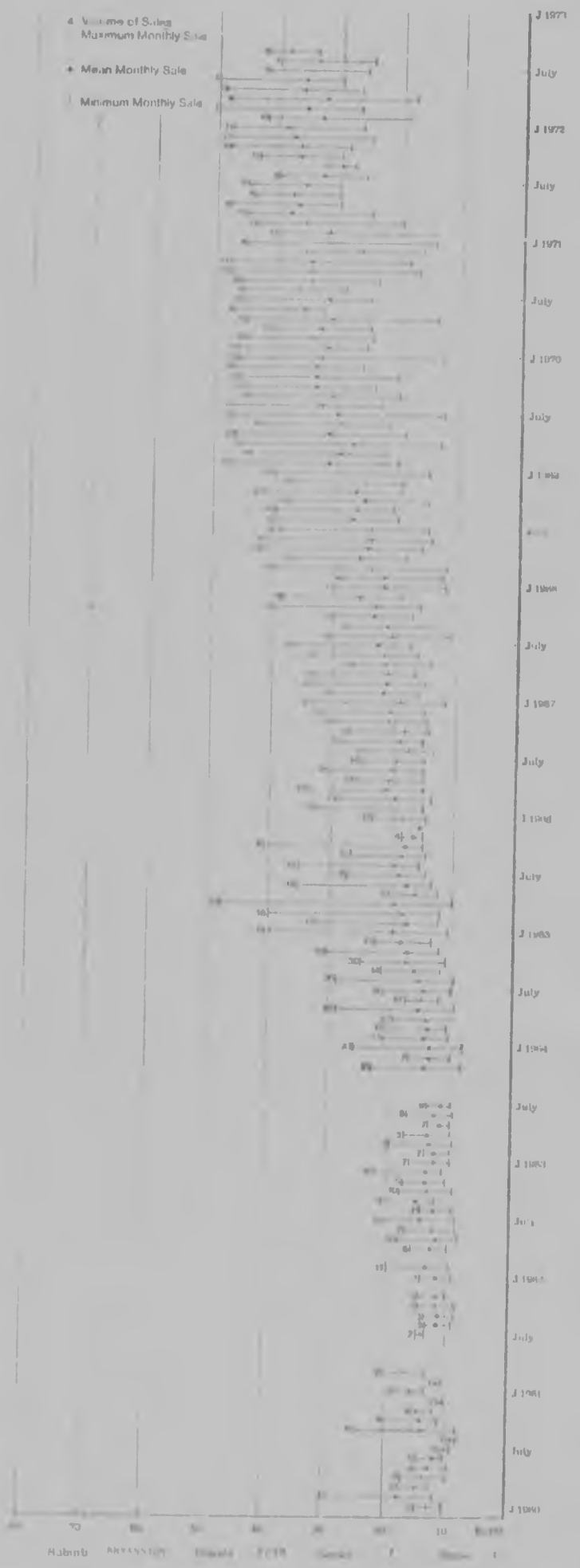

Volume of Sales
Maximum Monthly Sale
Minimum Monthly Sale


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July

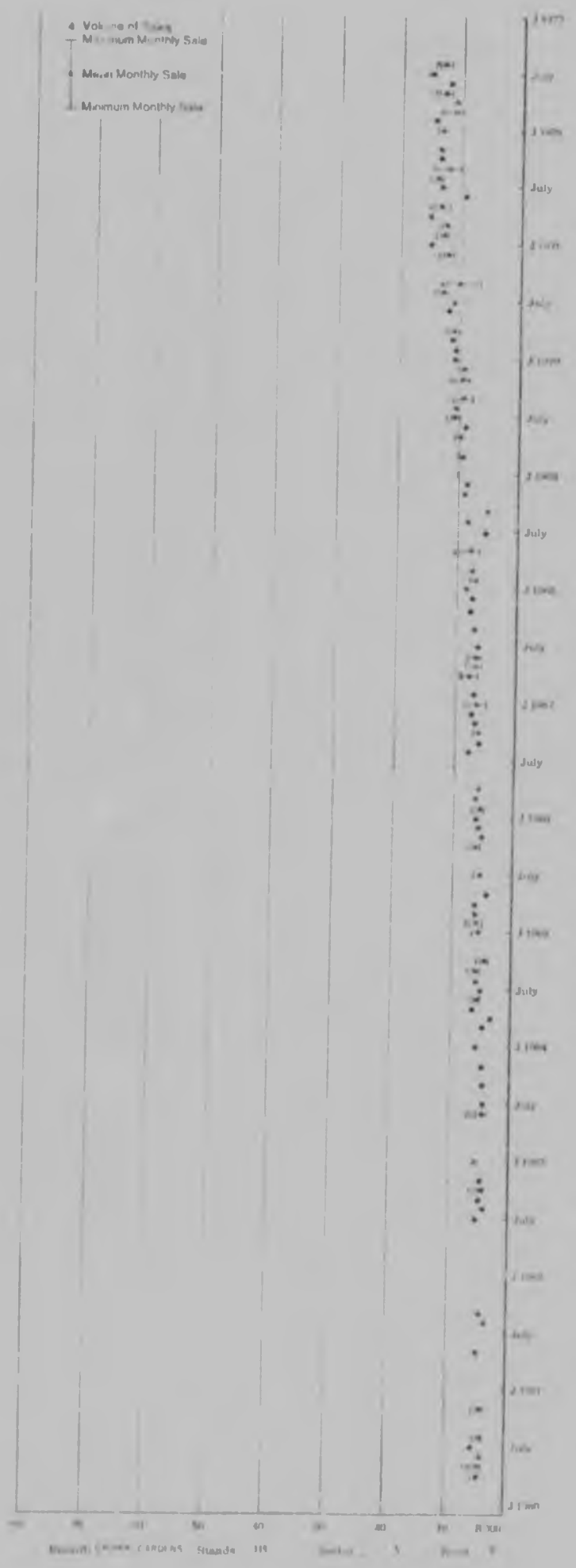

Mean Monthly Sale
Minimum Monthly Sale

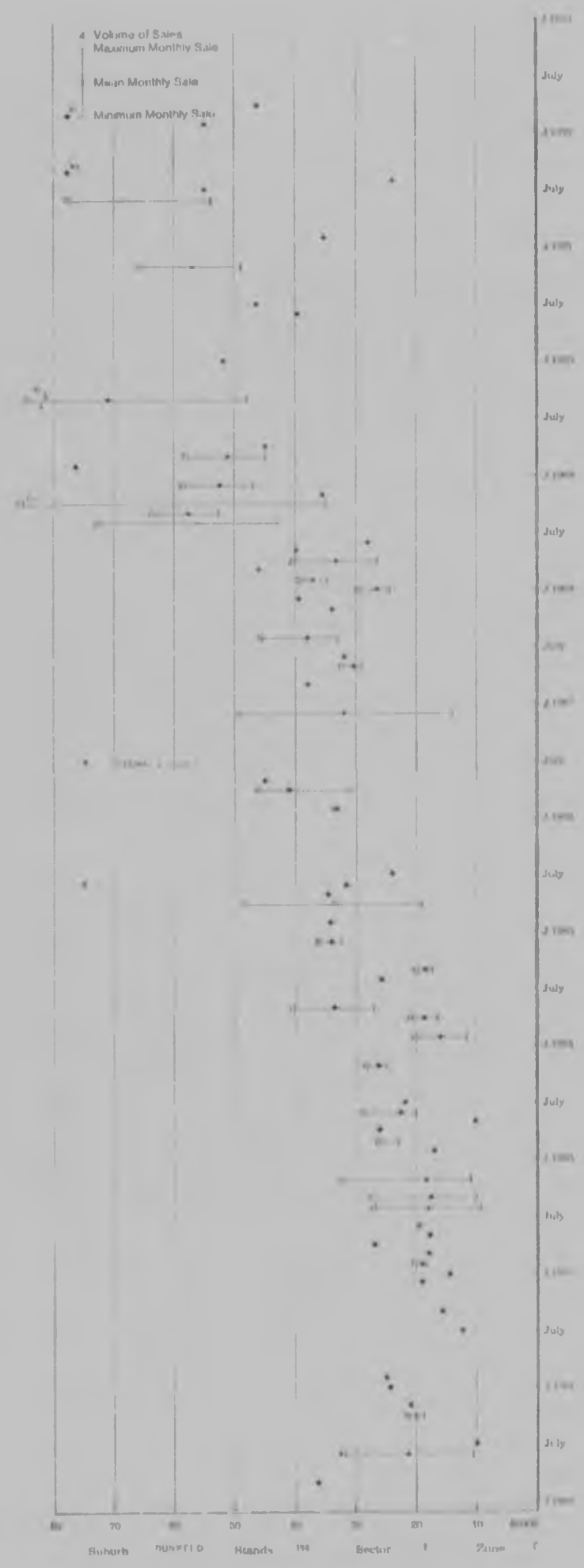

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale

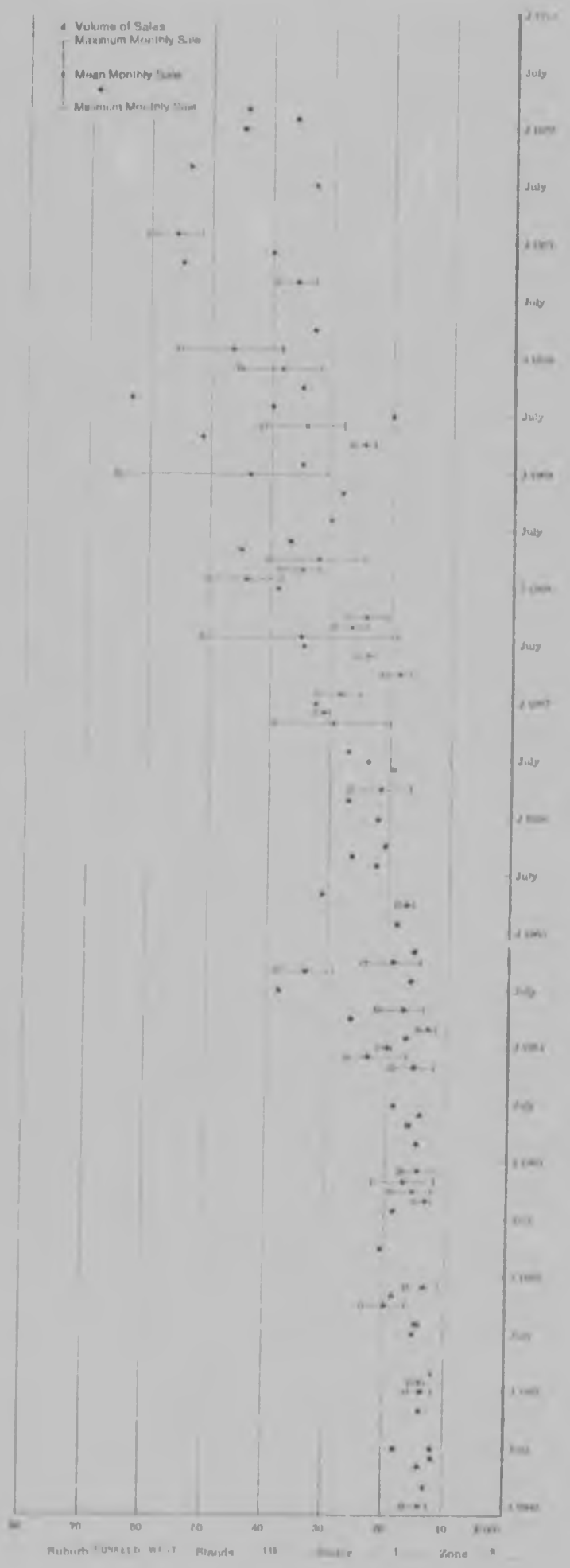

Mean Monthly Sale
Minimum Monthly Sale
Suburb
Sector
Zone

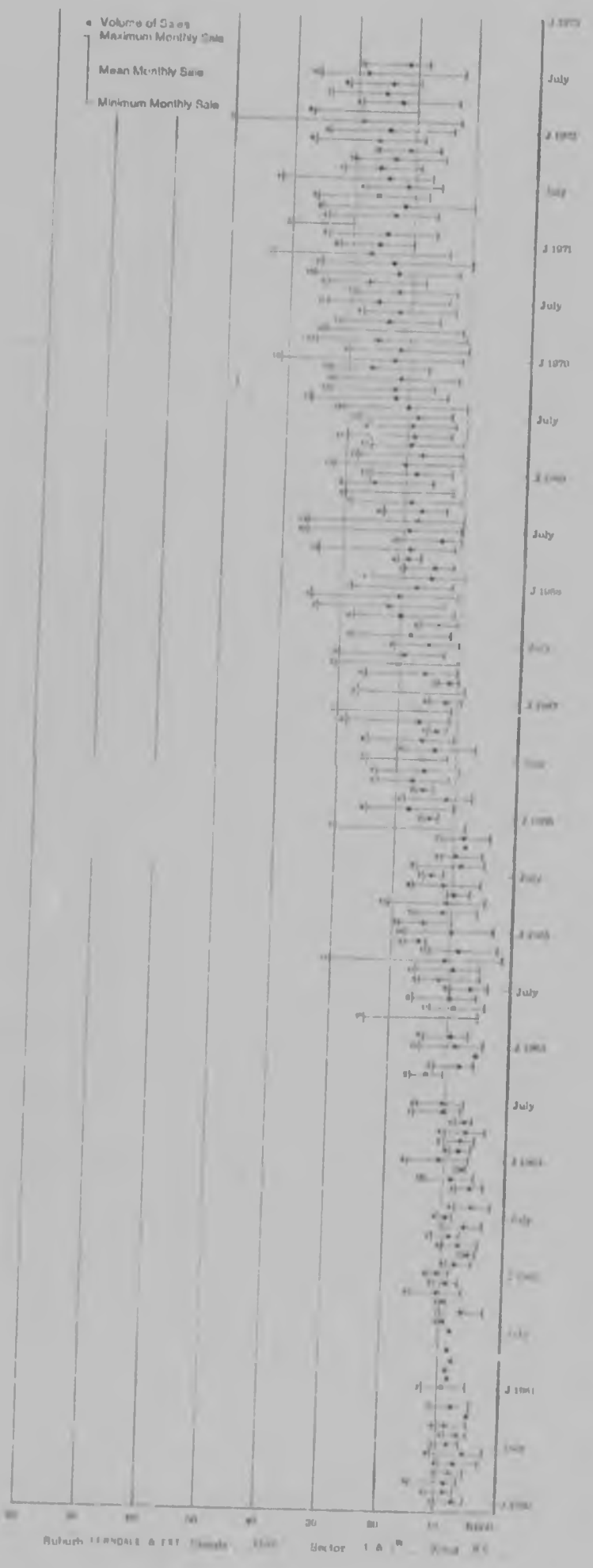

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
J 1977
July
J 1976
July
J 1975
July
J 1974
July
J 1973
July
J 1972
July
J 1971
July
J 1970


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
Auburn
Ryde
C

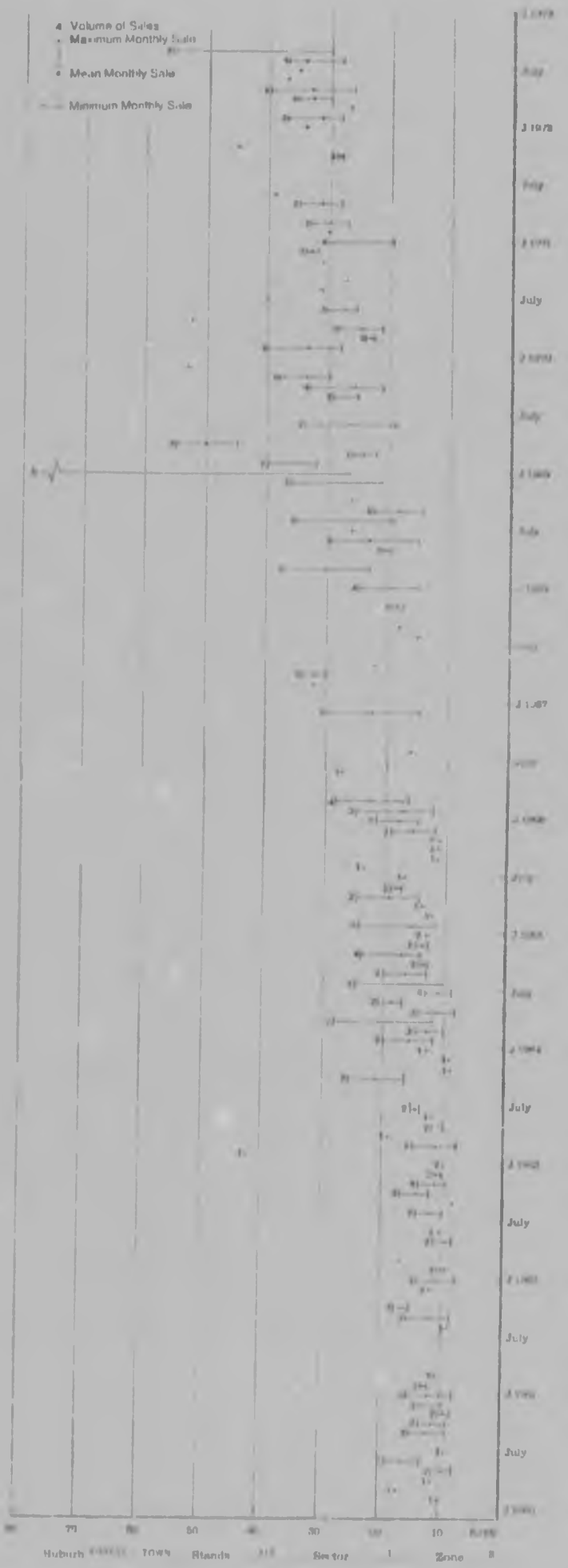

Volume of Sales
Minimum Monthly Sale
Mean Monthly Sale
Maximum Monthly Sale
July
July
July
July
July

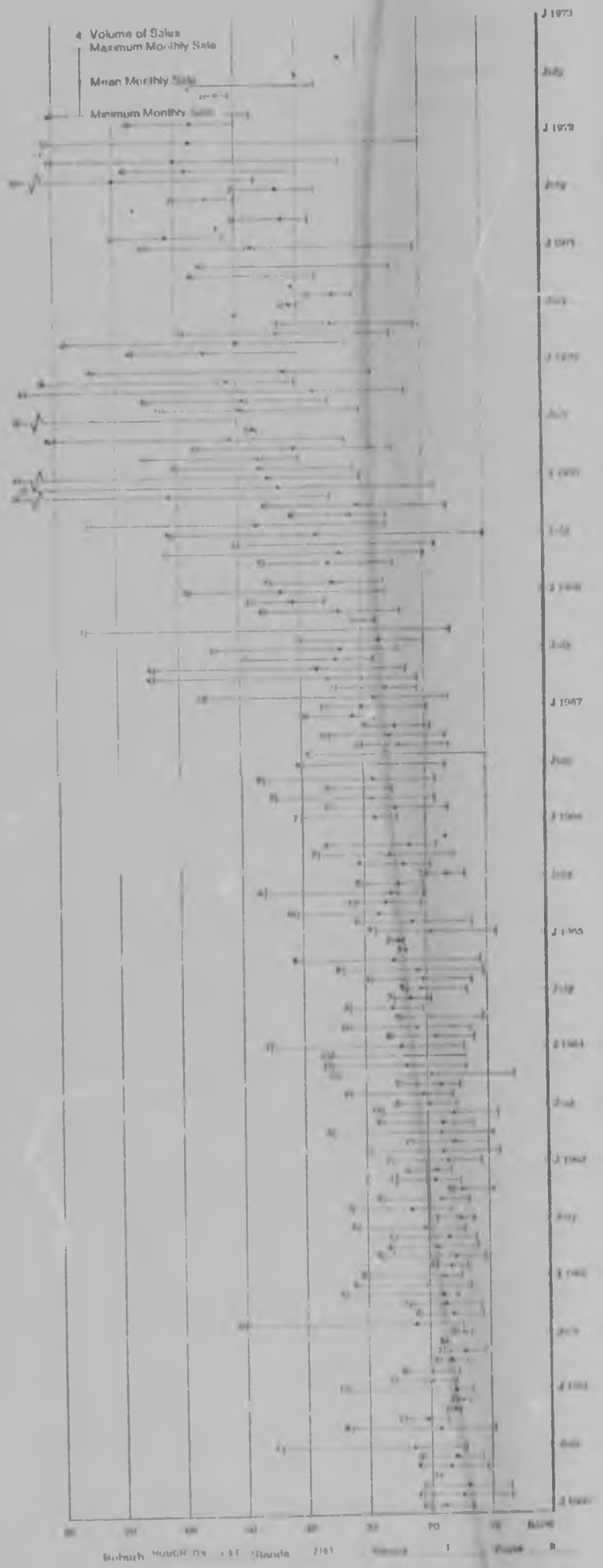

Volume of Sales
Maximum Monthly Sale
Minimum Monthly Sale
July
July
July

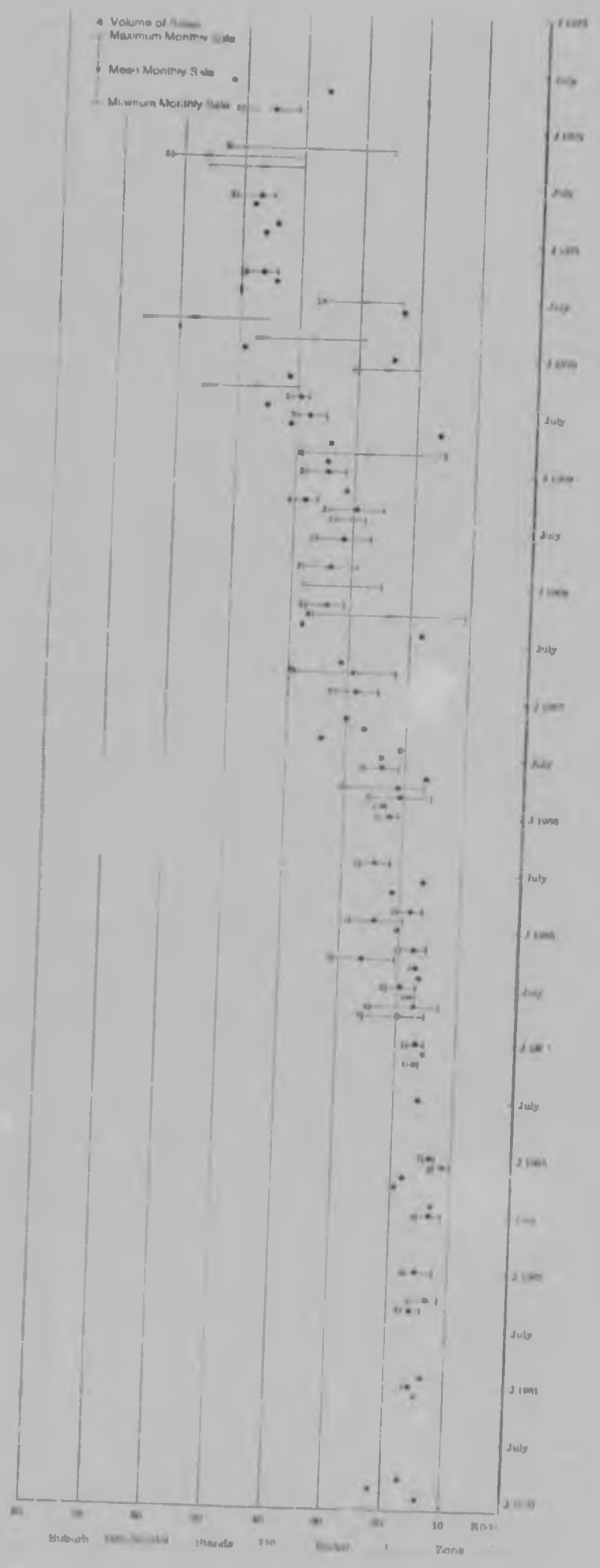

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
July
July
July
July
July
July
July
July
July
July
70
80
70
40
30
10
Zone

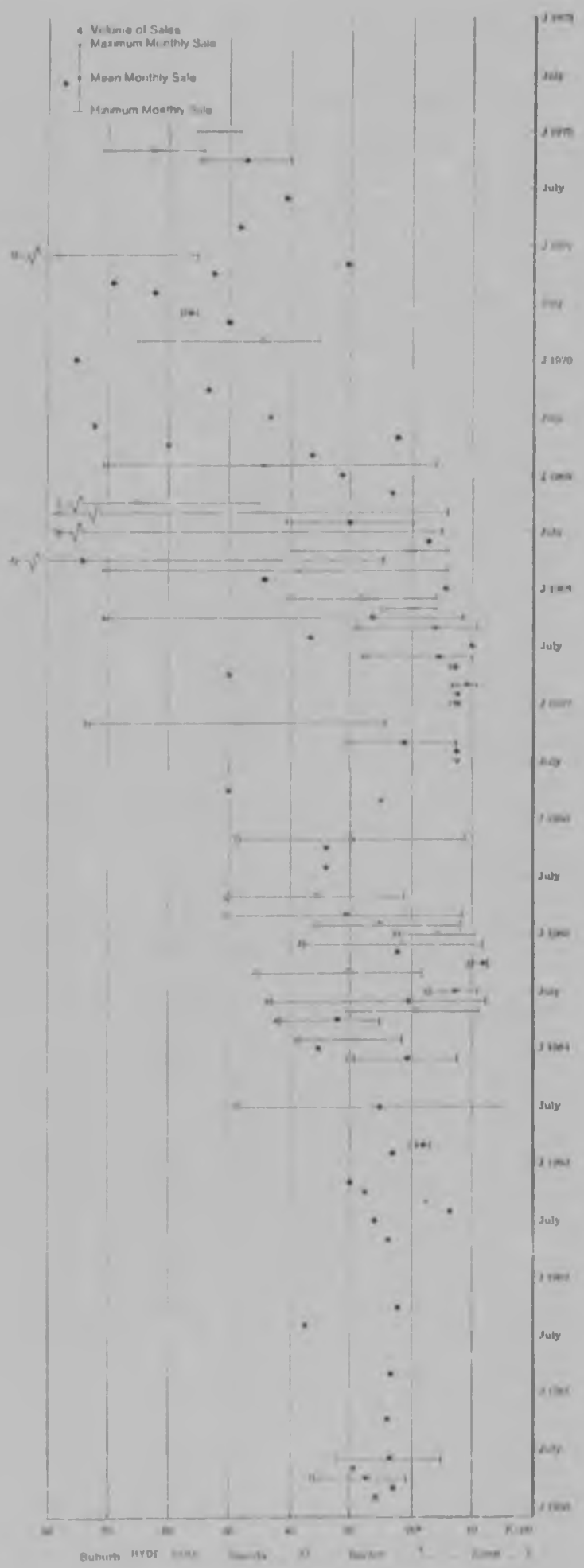

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July

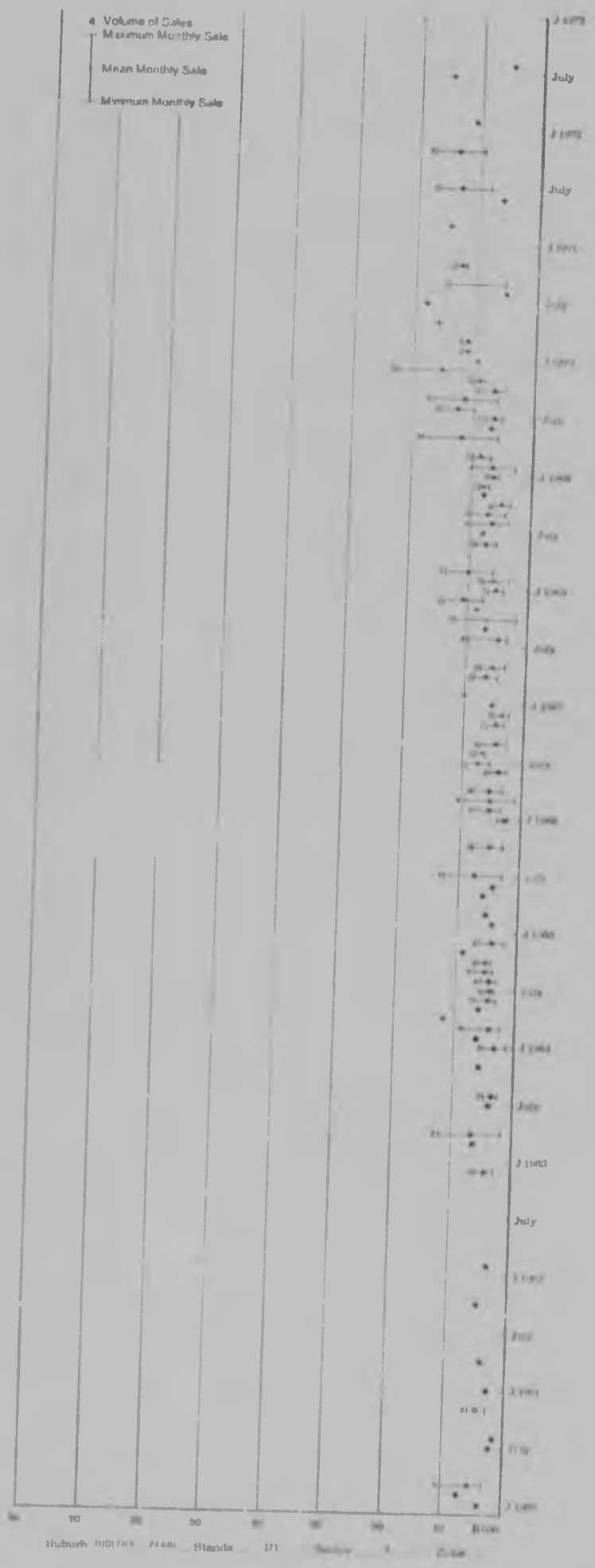

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
J 1970
July
J 1971
July
July
J 1972
July
J 1973
July
J 1974
July
J 1975
July
J 1976
July
J 1977
July
J 1978
July
J 1979
July
J 1980
July
Suburb FOREST HILL

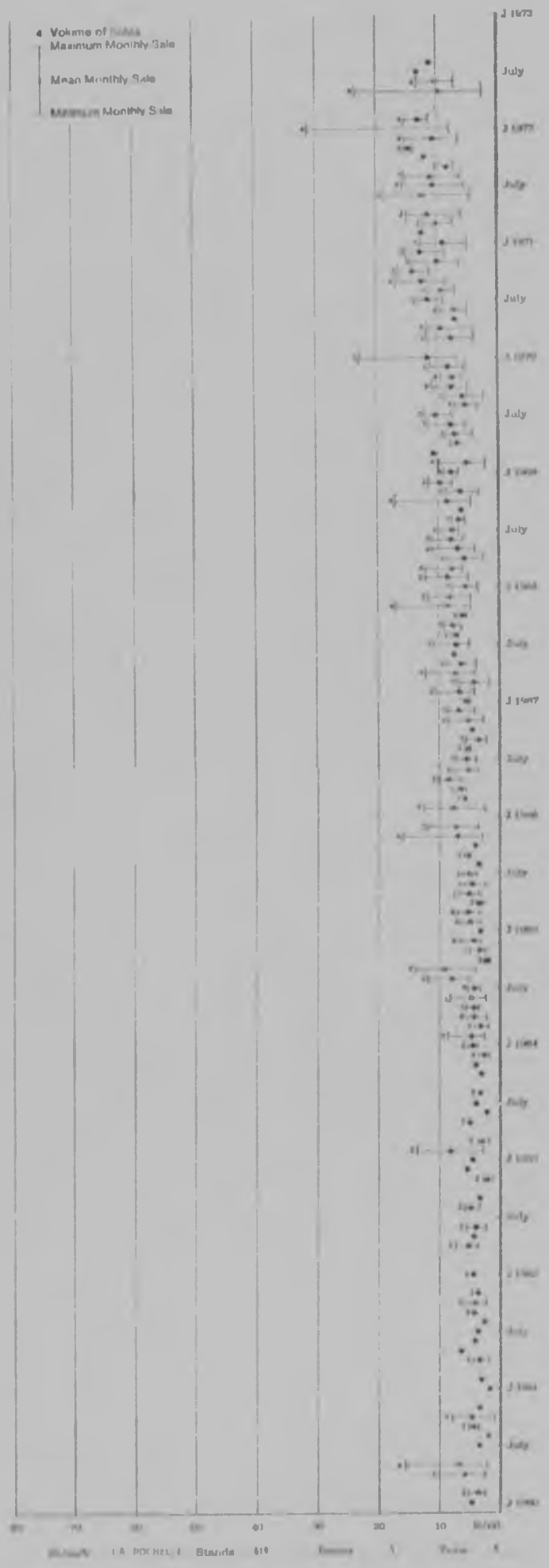

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July
Suburb
Town
Stands
Sector
Zone


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale

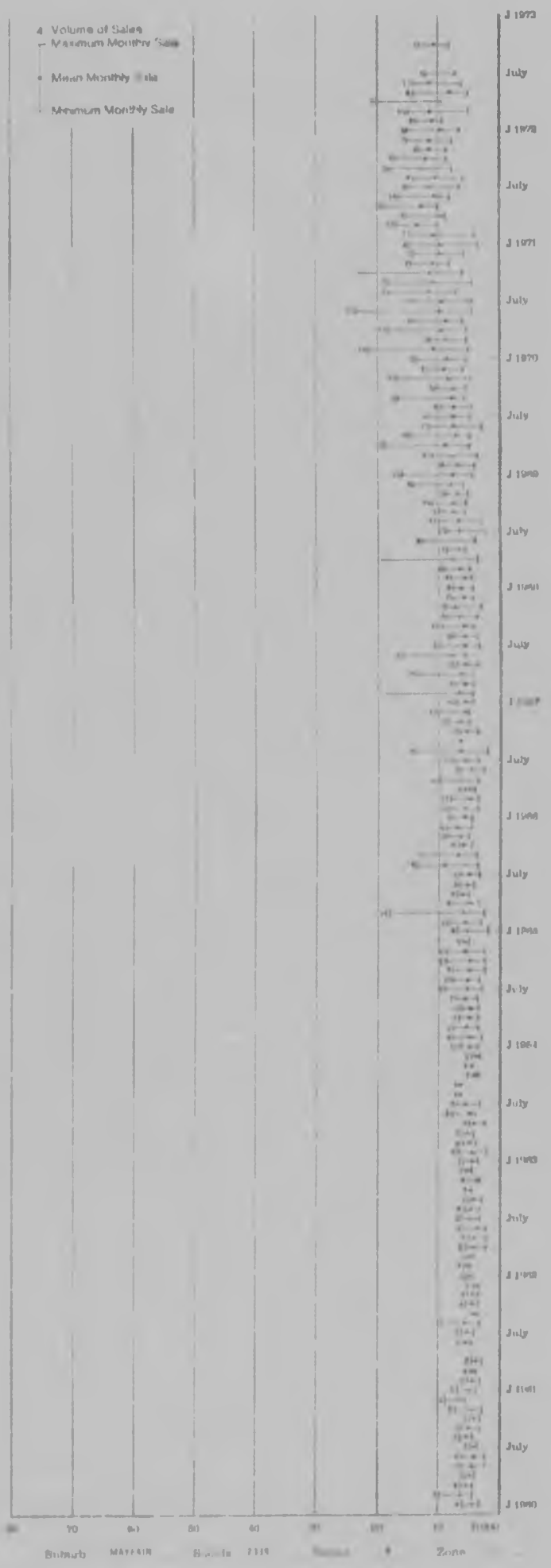

Volume of
Maximum Monthly
Mean Monthly Sale
Minimum Monthly Sale
July
July
July


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July
July
July


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
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July
July
July
July
30
10
Suburb
Sector

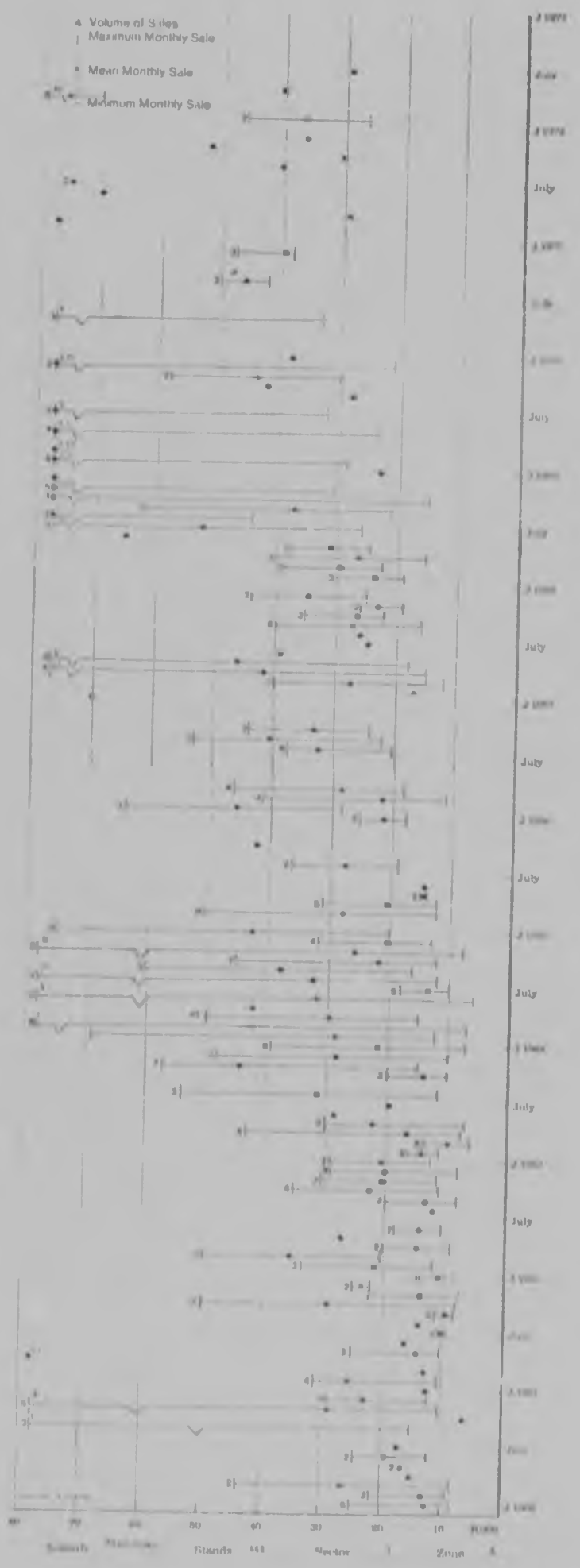

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
J 1972
July
J 1971
July
J 1970
July
J 1969
July
J 1968
July
J 1967
July
J 1966
July
J 1965
July
J 1964
July
J 1963
July
J 1962
July
J 1961
July
J 1960

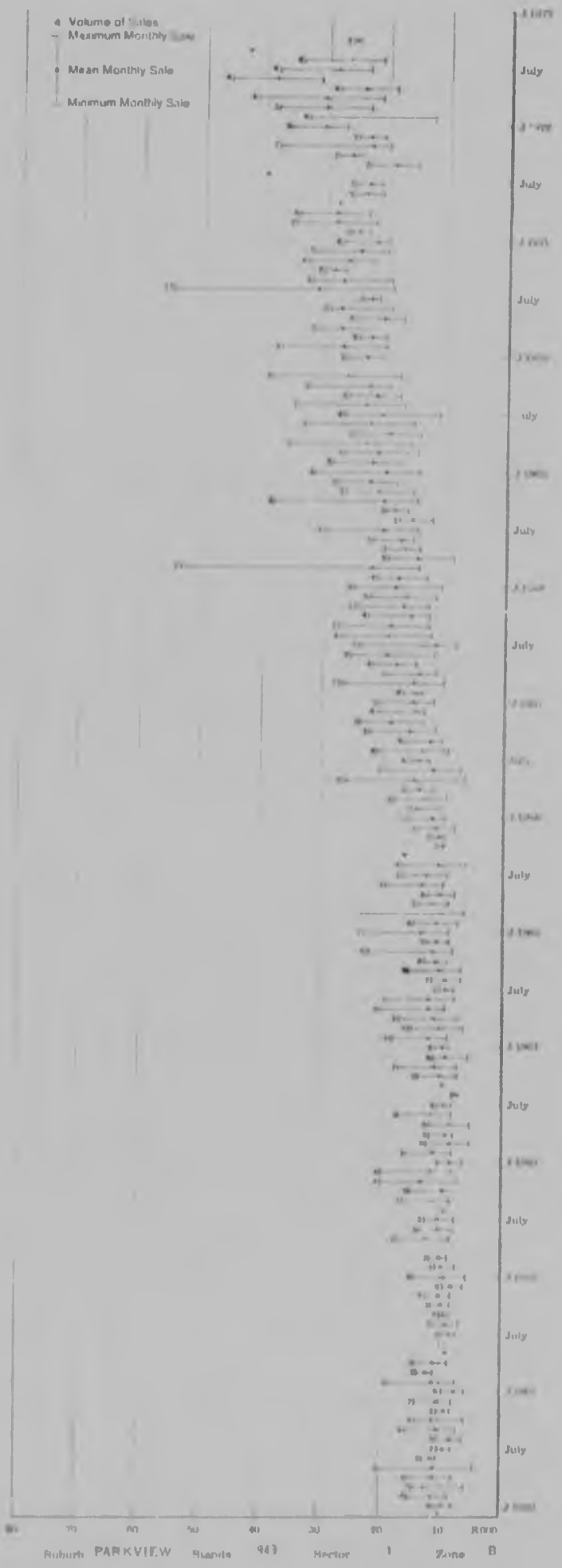

Volume of Sales
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July
July
July
July
July
July
July
July
July

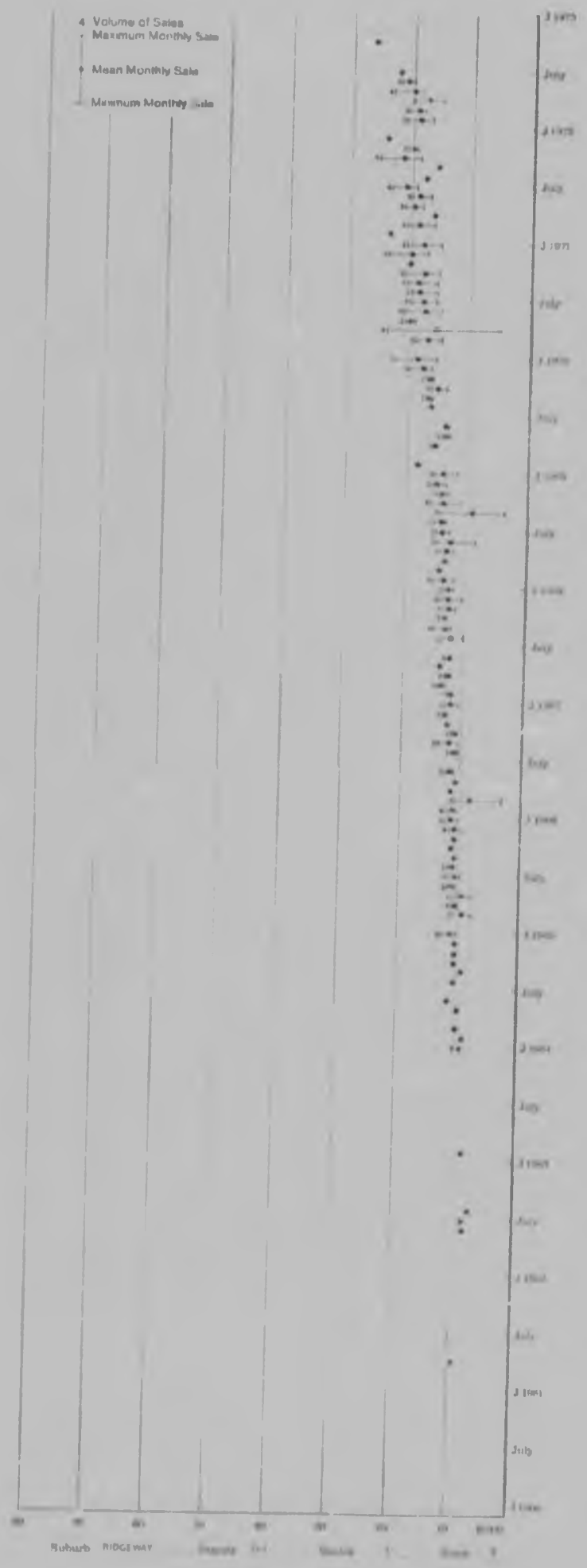

4 Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July


Volume of Sales
Mean Monthly Sale
July
July
July

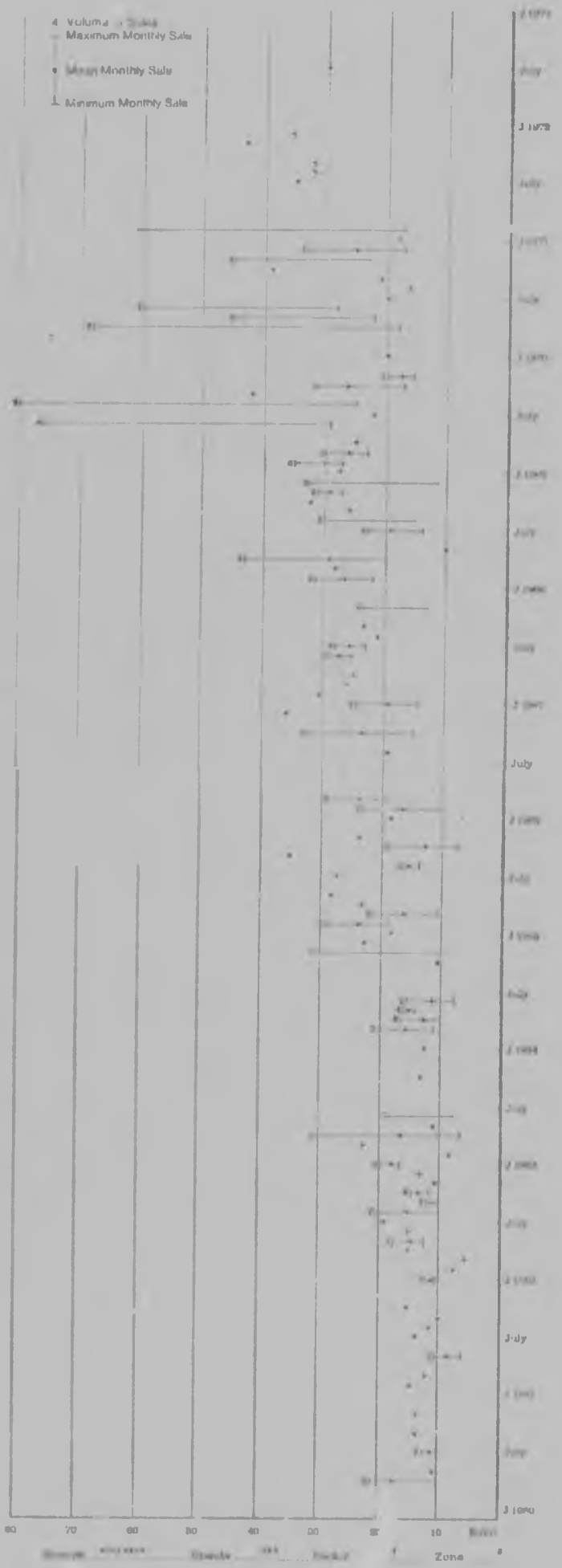

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July

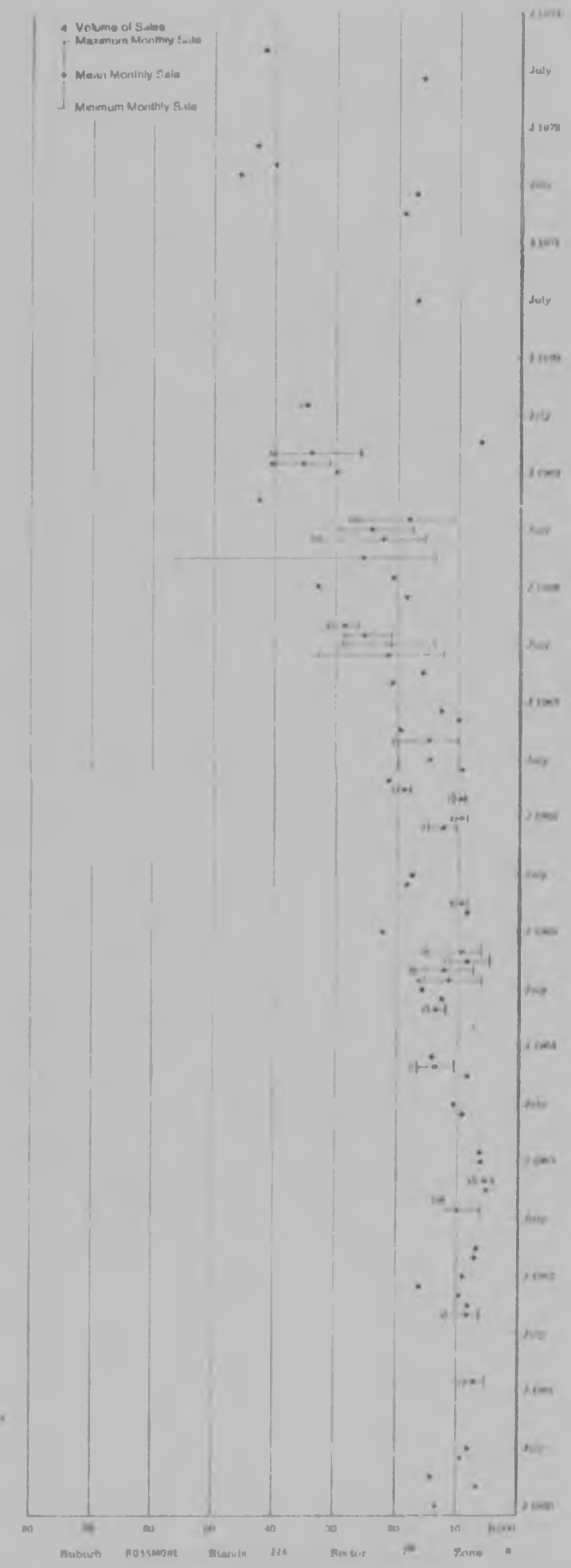

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July

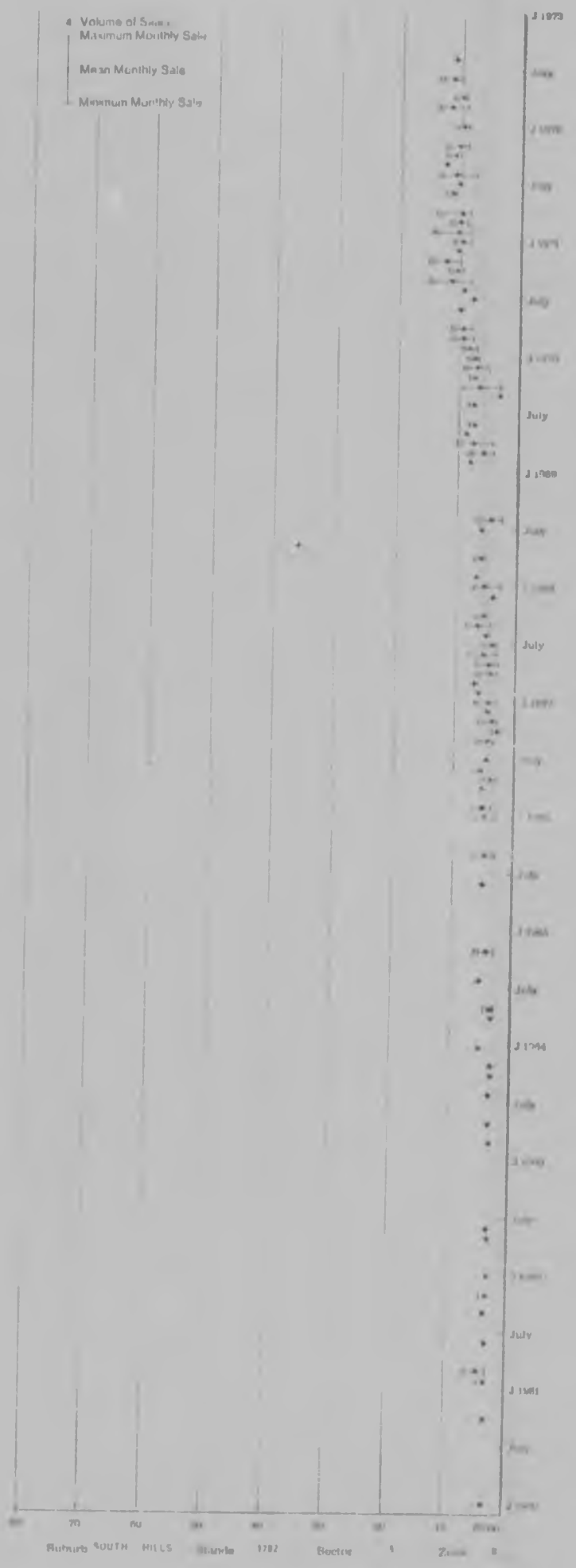

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July
July
July
July
July
Suburb PARKVIEW Stands 943 Sector 1 Zone B


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
Suburb
RIDGEWAY


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July


Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
Zone


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
Suburb
Rossmoyne
Statute
Zone

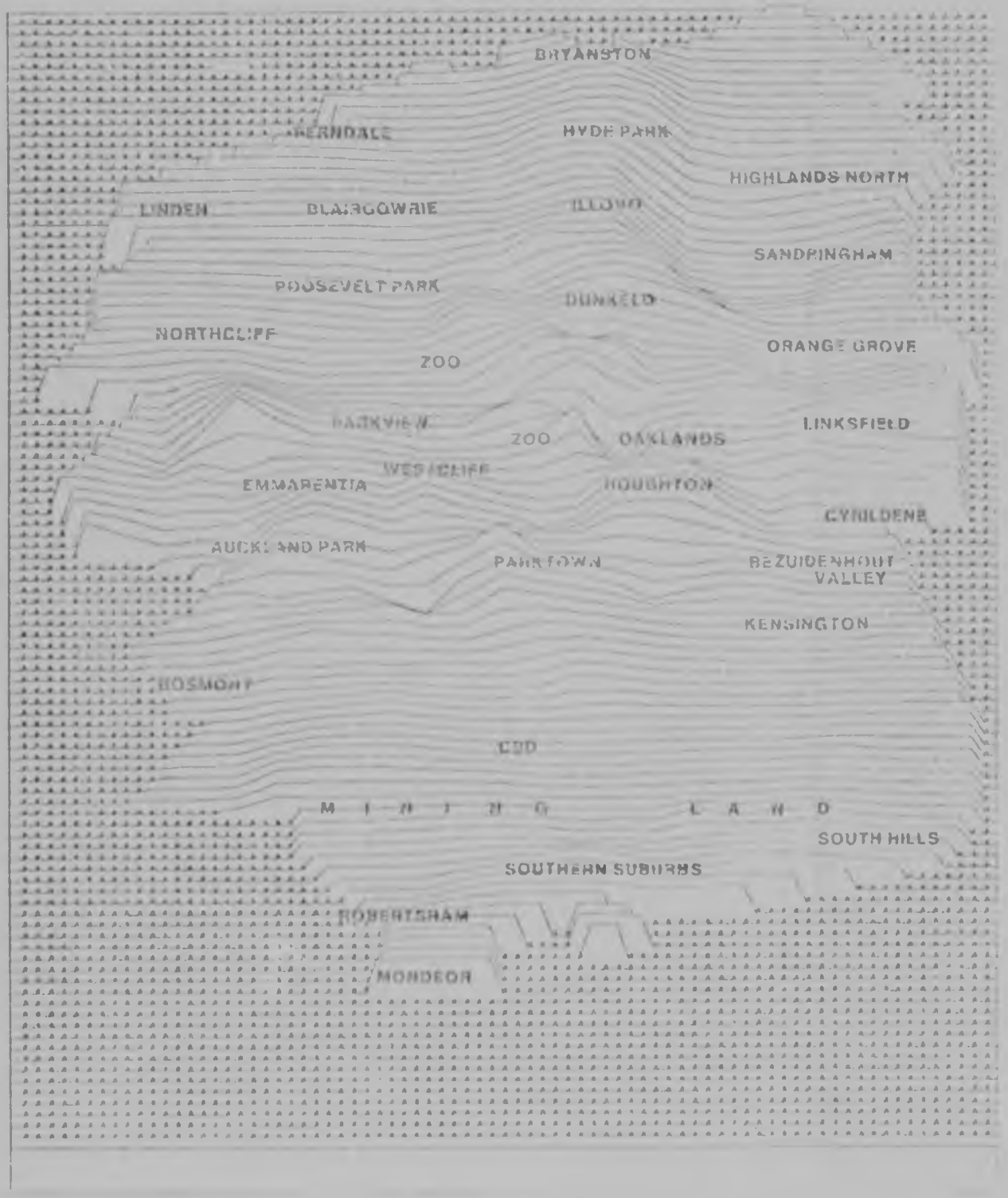

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
J 1973
July
J 1979
July
J 1985
July
J 1991
July
J 1997
July
J 2003
July
SOUTH
HILLS


Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July
July
July
July
July
July
July
Suburb
Zone

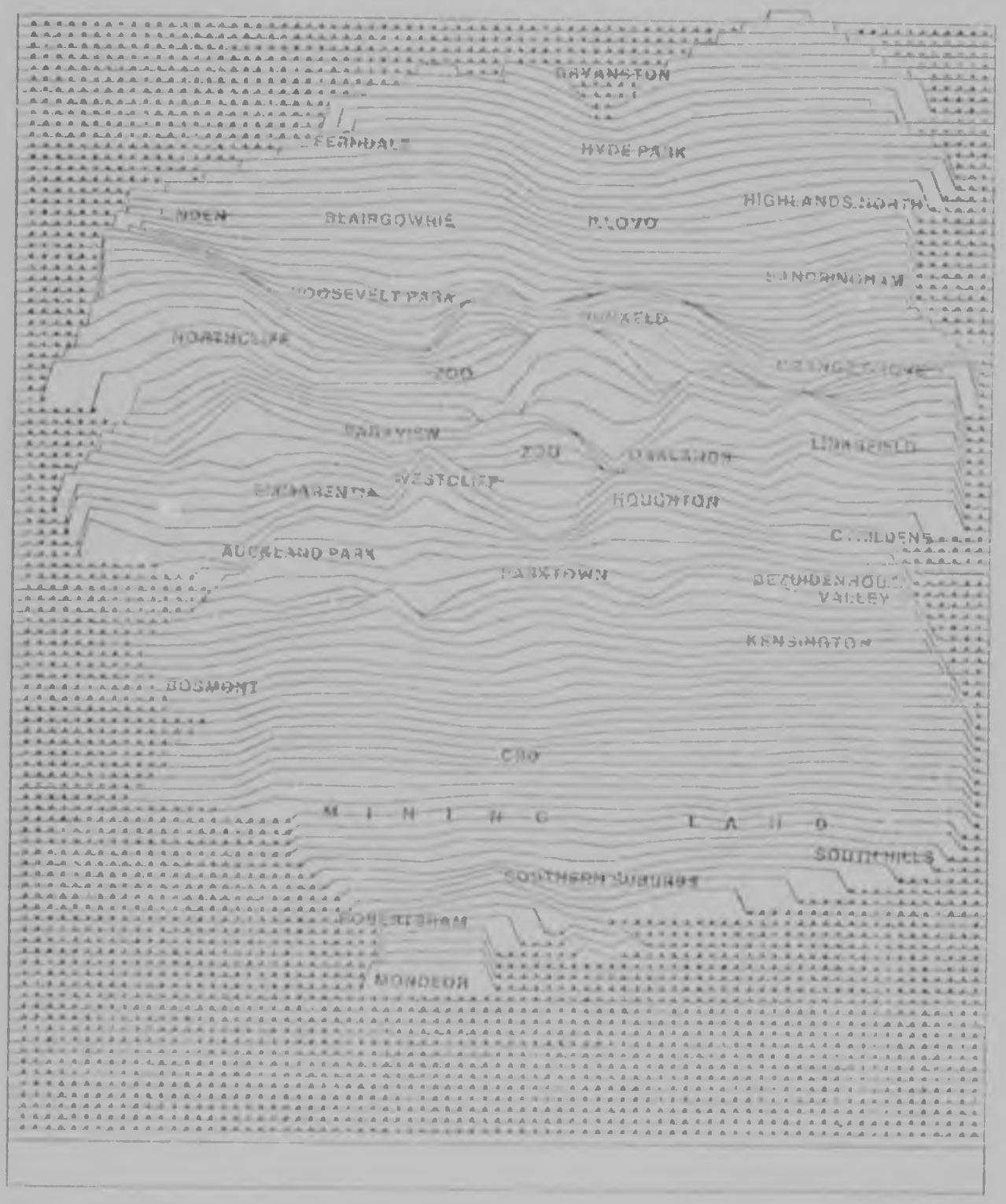

Volume of Sales
Maximum Monthly Sale
Mean Monthly Sale
Minimum Monthly Sale
July
July
July
July
July
July
July
July
July
July
Suburb
Stands
Zone

APPENDIX D

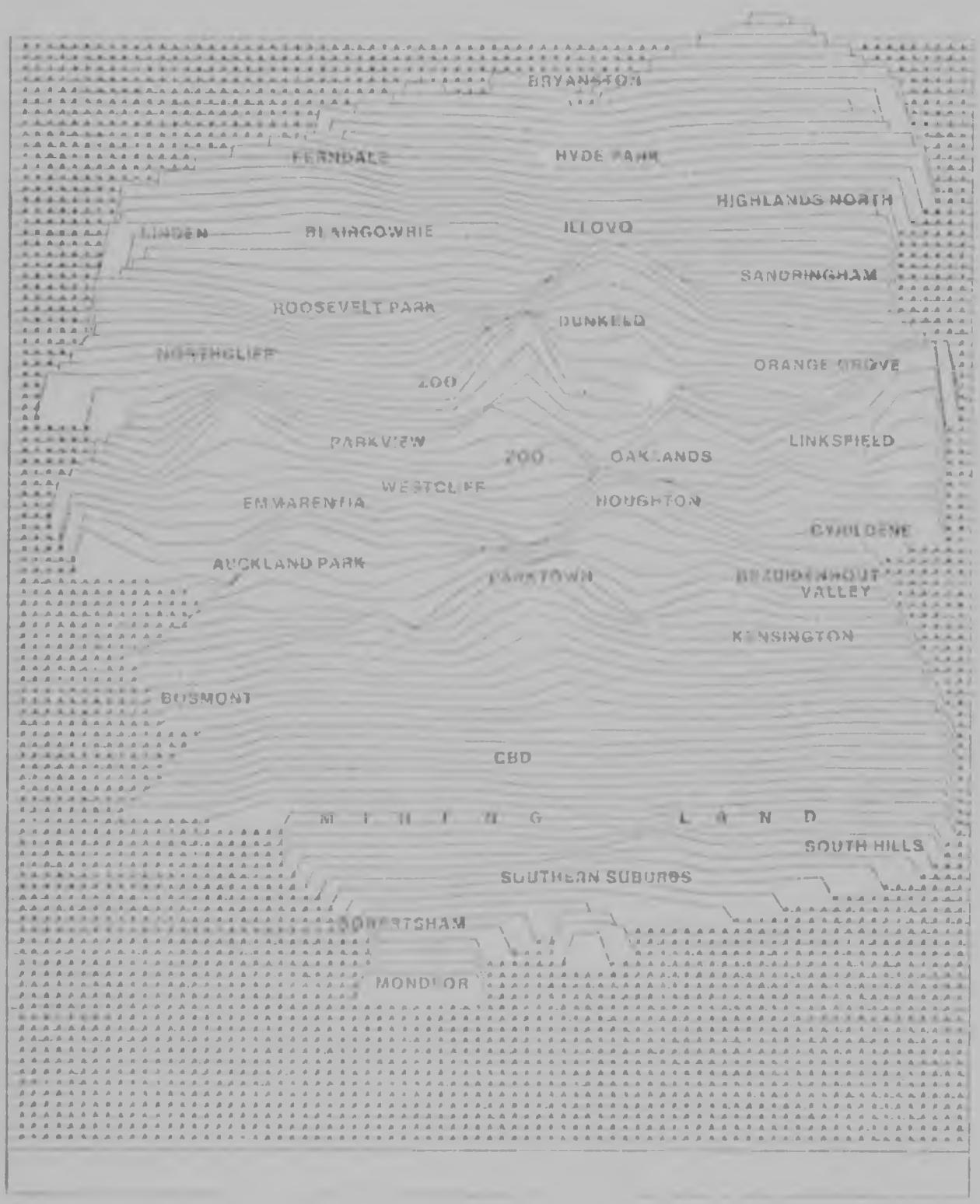
SYMVU Maps of January Mean Housing Prices
in Metropolitan Johannesburg in Even Years
1960 - 1972
(Record of Transfers)



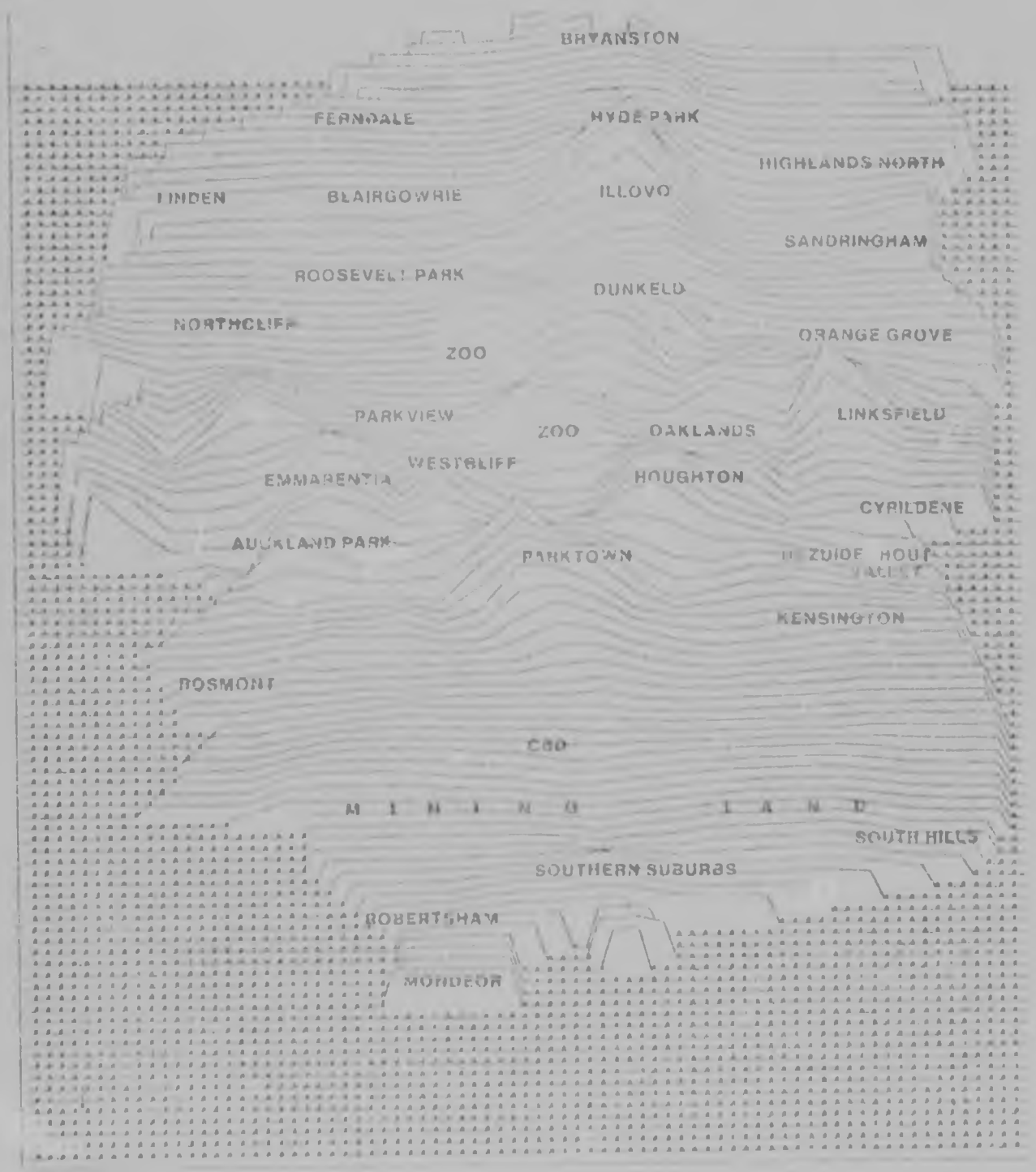
January, 1960



January, 1962.



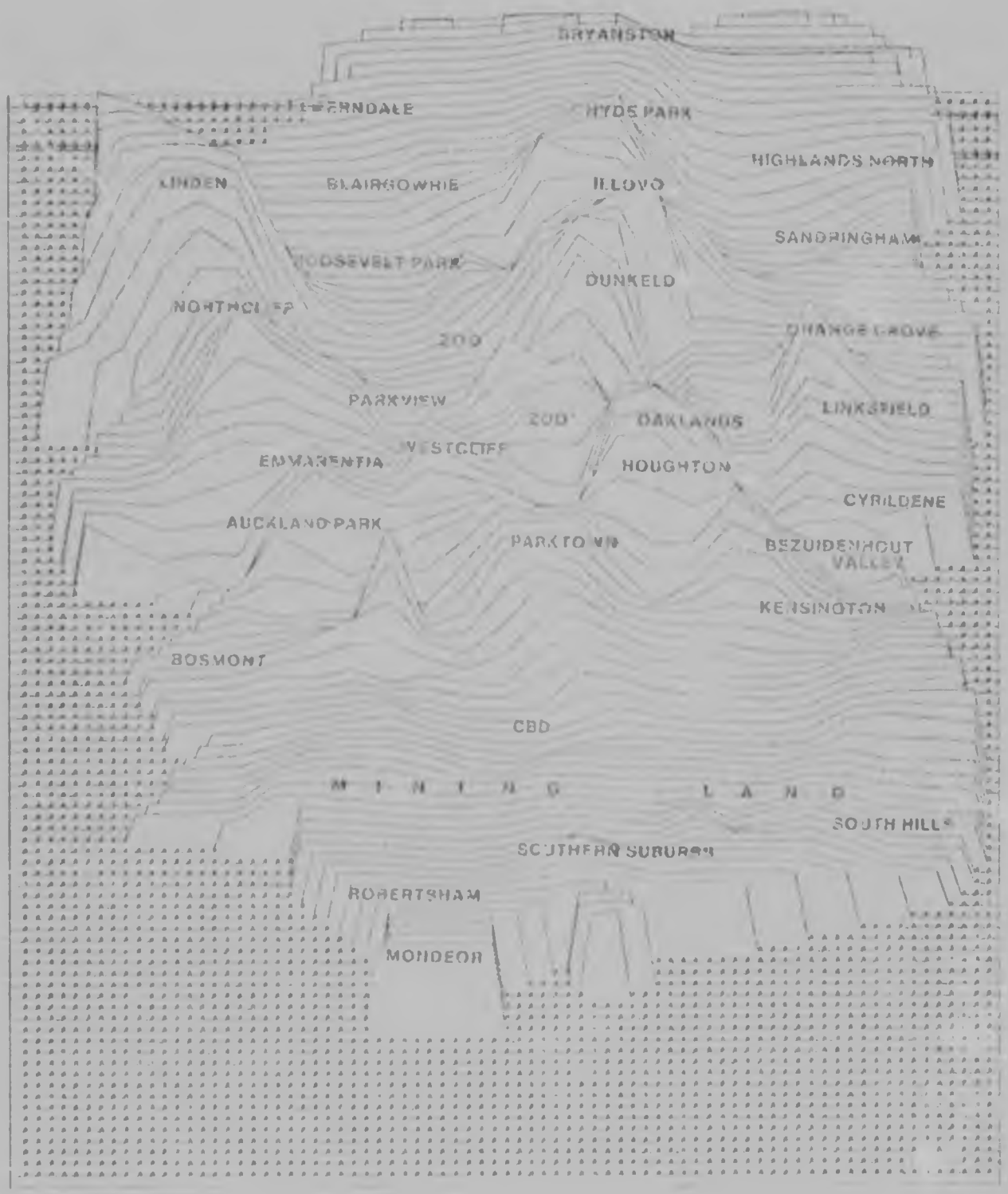
January, 1964.



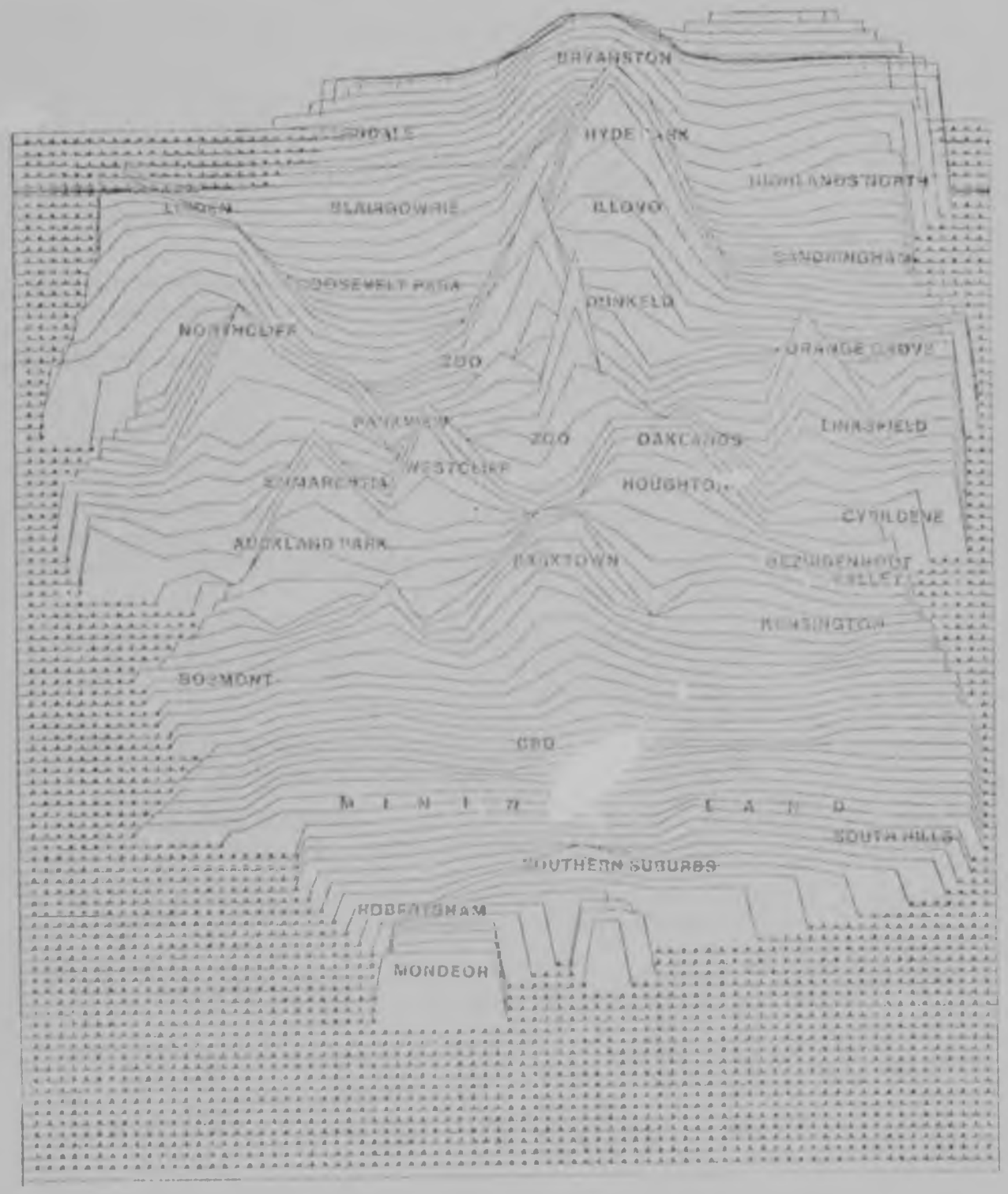
January, 1966.



January, 1968.



January, 1970.



January, 1972.

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