

AN ANALYSIS OF DEVELOPMENT COSTS
IN RESIDENTIAL SUBDIVISIONS

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CONTENTS

CHAPTER	PAGE
I. INTRODUCTION	1
II. LAND COSTS	6
Amenity	6
Utility	8
General	9
Summary	10
III. DEVELOPMENT	12
Enabling Legislation	12
Preliminary Considerations	14
Development Agreement	15
Development Financing	16
Professional Services	17
Public Dedication	20
Direct Expenses to Developer	21
Utility Construction	22
Maintenance	24
Summary	25
IV. WESTWOOD RURAL MUNICIPALITY OF ASSINIBOIA	26
I. Development Agreement	26
General	26

CHAPTER	PAGE
Financing	27
Miscellaneous	29
II. Servicing Standards	32
Sanitary and Storm Sewers	32
Watermains	32
Pavement	33
Sidewalk	33
III. Summary	33
V. PULBERRY, ST. VITAL	40
I. Development Agreement	40
Trunk Services	40
Lateral Services	41
Financing	41
Private Property	42
Miscellaneous	42
II. Servicing Standards	43
Sanitary and Storm Sewers	43
Water Lines	43
Sidewalks	44
Pavement	44
III. Summary	44

CHAPTER	PAGE
VI. TUXEDO PARK, TOWN OF TUXEDO	52
I. Development Agreement	52
General	52
Miscellaneous	54
II. Servicing Standards	55
Sanitary Sewers	55
Storm Sewers	56
Watermains	56
Backfill	56
Concrete Pavement	56
III. Summary	57
VII. WINDSOR PARK, CITY OF ST. BONIFACE	64
I. Development Agreement	64
General	64
Trunk Services Required	65
Miscellaneous	65
Municipal Services Required	66
Financing	67
II. Servicing Standards	68
Sewers	68
Watermains	69
Pavement	69

CHAPTER	PAGE
III. Summary	69
VIII. COMPARISONS	76
Trunk Costs	76
Lateral Costs	77
Maintenance	77
Selling Prices of Lots	79
Reducing Servicing Costs	80
Reducing Housing Costs	83
Summary	84
IX. CONCLUSIONS	87
BIBLIOGRAPHY	90

TABLES

TABLE		PAGE
I.	Trunk Services Westwood	35
II.	Other Services Westwood	36
III.	Trunk Services Pulberry	47
IV.	Other Services Pulberry	48
V.	Trunk Services Tuxedo Park	59
VI.	Other Services Tuxedo Park	60
VII.	Trunk Services Windsor Park	71
VIII.	Other Services Windsor Park	72
IX.	Subdivision Calculations	85
X.	Summary of Tables I to VIII	86

ILLUSTRATIONS

ILLUSTRATION		PAGE
1.	Local Detail Westwood	37
2.	Typical Cross-Section Westwood	38
3.	Plan of Subdivision Westwood	39
4.	Local Detail Pulberry	49
5.	Typical Cross-Section Pulberry	50
6.	Plan of Subdivision Pulberry	51
7.	Local Detail Tuxedo Park	61
8.	Typical Cross-Section Tuxedo Park	62
9.	Plan of Subdivision Tuxedo Park	63
10.	Local Detail Windsor Park	73
11.	Typical Cross-Section Windsor Park	74
12.	Plan of Subdivision Windsor Park	75

CHAPTER ONE

INTRODUCTION

How much does a serviced building lot cost? Does the price vary from neighbourhood to neighbourhood? How can we reduce costs? These are questions which this thesis will attempt to answer with particular attention to municipal services such as sewers, roads and watermains.

The information contained herein should be of value to any municipality, developer, engineer, or planning official involved in the development of residential subdivisions since it brings together data which is not normally available to all those concerned. Each of the aforementioned may be an expert at some particular phase of development but none are completely familiar with all of the components. Each has separate interests and hence distinct prejudices when attacking common problems, the result of which is, of course, to produce divergent solutions. Perhaps this thesis will help towards increased understanding.

Emphasis has been placed on utilities servicing since, economically speaking, this is the most important single aspect of development as will be shown in the following chapters. Most development costs have been considered but not all are detailed herein. Obviously some costs vary without apparent reason,

such as those applying to raw land, and no attempt has been made to assess these because any assessment would have little meaning, even if such information were readily available. Servicing costs are more important, more easily determined and more meaningful, hence, it is with utilities servicing that this thesis is primarily concerned.

Four actual case histories are presented from the Metropolitan Winnipeg area, as follows:

1. Westwood in the Municipality of Assiniboia.
2. Pulberry in the City of St. Vital.
3. Tuxedo Park in the Town of Tuxedo.
4. Windsor Park in the City of St. Boniface.

These examples of contemporary subdivisions in Winnipeg represent a cross-section of suburban development for the following reasons:

1. They are located in different sections of the city and are administered by different municipal governments.
2. The engineering design, layout and construction supervision was performed by various consulting engineering firms.
3. The developments represent the efforts of three of the largest land developers in the Winnipeg area.

4. The four types of development are different, ranging from relatively economical to expensive.

Information concerning these developments has been obtained from the respective municipalities, consulting engineers, and developers involved. It should be noted that much of this information is of a rather confidential nature since the aforementioned groups are in direct competition.

Actual contract costs have been used and pro-rated according to the Engineering News Record construction cost index to the year 1964. This was necessary to make the costs comparable for the four subdivisions, all of which were planned and constructed during sometimes overlapping but generally different periods of time. Where actual costs were not available, similar installations in the same area were studied and these unit costs used.

Each subdivision has been simplified slightly in order to facilitate cost calculations. This was necessary to more clearly define the subdivision boundaries and hence to assess more rationally the costs therein. In most cases services lying outside the boundaries and essential to the area, have been considered as trunk services and their cost assessed on the basis of the ratio of the total area serviced to the area lying within the boundaries.

In other instances, where this was not the policy of the municipality, the total cost of the trunk services was wholly applied to the subdivision whether a larger area was serviced or not. Any services larger, or of higher design, than strictly necessary to service the subdivision, and lying within the boundaries, were also considered trunk services and estimated the same way.

Services which have been assumed to be trunk services are as follows:

1. Storm sewers 30 inches and larger.
2. Sanitary sewers 12 inches and larger.
3. Watermains 10 inches and larger.
4. Any extra width of pavement larger than the usual twenty-four foot residential street.

Lateral services, that is, all municipal services which are not trunks, were within the boundaries considered. Average costs for lateral services were determined and applied to the slightly simplified examples and scaled quantities. These average costs were determined using actual contract records which simplified the problems of calculating the costs of different sizes of different pipe classes at different depths. These unit costs therefore, may not be accurate when considering any particular location, but will be representative of the subdivision as a whole.

This study is by no means complete and so it is difficult to make particular comparisons or to draw detailed conclusions. Some trends are obvious however, and the last two chapters are an analysis and discussion of them.

CHAPTER TWO

LAND COSTS

Factors which affect the final cost of development on virgin land include not only the physical utilities which must be installed to service the area, but also a number of others, any one of which can make the development of the area profitable, or completely unfeasible.

Amenity

Land cost is the first consideration of developers contemplating new subdivisions since it is his first major expenditure. The price he pays for land will vary according to general principles, including the following:

1. Ease of access to centres of business, education or entertainment.
2. Natural amenities, such as rivers, lakes, wooded areas, and other advantages of relief or scenic view.
3. Proximity to other fashionable or prestigious development.

If the area has these advantages, the seller knows there will be fewer problems disposing of the lots. He will probably ask more for the land although he will always be governed by the

laws of supply and demand. The amount the price will rise or fall is not easily determined since these considerations involve amenity or convenience - difficult items to appraise. Some other items which might be considered in the same light are:

1. Zoning of the particular parcel and of adjacent land.
2. Location of heavy traffic arteries.
3. Nuisances such as smoke or offensive odours.
4. Periodic flooding of nearby rivers or streams.
5. Fire hazards.
6. Fire and police protection.
7. Schools.
8. Recreational facilities.
9. Church, hospital and commercial facilities.
10. Municipal services such as snow clearance and garbage collection.
11. Municipal taxes.

Another important consideration for a prospective land developer is the Central Mortgage and Housing Corporation's mortgage acceptance. If C. M. H. C. will not accept land for mortgage purposes, or at only a reduced rate, its undeveloped value will diminish. This might be the case with property located near main line railways, transmission line rights-of-way or within airport flightways.

Utility

Most other considerations affecting the cost of raw land involve servicing in some way. Any feature of the raw land which makes it more easily serviced will also make it more expensive. The developer can afford to pay a higher price for it if he is able to save money in servicing. The alert seller is aware of this, and the price rises, once again according to the laws of supply and demand. Some of the desirable features of undeveloped land would be:

1. Natural watercourses or existing storm trunks which would provide easy storm water disposal.
2. Sanitary sewage disposal facilities or sanitary trunk services nearby.
3. Accessible water feeder mains.
4. Moderately sloped compactly shaped land which would simplify sewer design.
5. Highways or other traffic routes which the developer could use to advantage for access purposes.

Some of the undesirable features probably reflected in a lower raw land price, might be:

1. Bedrock at a shallow depth requiring a considerable amount of blasting and rock excavation.

2. Sub-surface water conditions making foundations difficult.
3. Excessive slope to the land which might require the installation of additional sewage pumping stations, and higher strength watermains.

General

Land costs in the Metro area vary considerably. On the fringe of present development the prices may vary from \$500 per acre to \$5,000 per acre depending on the effects of the factors just discussed, and the laws of supply and demand. Even within a proposed development, the costs of obtaining identical pieces of private land might vary by 100 percent. As an illustration, during an expropriation case in Winnipeg where arbitration was necessary, three qualified land assessors submitted final estimates of the worth of the same piece of land which were \$26,000, \$45,000 and \$63,000 respectively. Hence, we see that there is no way to accurately predetermine land cost since the selling price is contingent on what the seller thinks he can get for it, and what the buyer is prepared to pay. The laws of supply and demand do not operate fully, however, since the supply is fixed.

Land speculation is an important consideration because the supply of land on the periphery of development is limited. Speculators are free to take out options on, or purchase all available peripheral land, and ransom it to the public. One authority states: "The general public is hardly aware of the extent to which it pays tribute, in the form of increased land prices, to people who have contributed nothing to the communal good in return for their gains."¹ The same author suggests various solutions to this problem which have been implemented in some European countries, but these are not applicable to North America where land speculation is a deeply entrenched feature of life. "Most North Americans have not yet reached the point of seeing anything immoral or improper, in making profit out of land deals."²

Summary

It can be seen that many factors have an influence on land costs, many of which are abstract by nature and impossible to assess. It should be equally obvious that they need not be assessed, for the sale price of land will never exceed what the market will bear. It may be concluded therefore, that the marketability

¹ G. W. R. Bryant, "Land Speculation: Its Effects and Control," Plan Canada, Vol. 5, No. 3, 1965, p. 109.

² Ibid.

and capacity of the prospective home purchaser to meet down-
payment and mortgage payment will determine what a developer
can and will pay for the land.

CHAPTER THREE

DEVELOPMENT

Enabling Legislation

Under the Municipal Act 1954,³ and the Town Planning Act 1954,⁴ the responsibility for planning and development rests with the municipal council concerned. Within the Metropolitan Winnipeg area, however, the Town Planning Act and any by-laws passed under the Act, together with any parts of the Municipal Act relating to planning, were repealed in 1960 under the Metropolitan Winnipeg Act. All developments started within the Metro area before 1960, were subject to the full authority of the municipal council and any developments after 1960 were the responsibility of the Metro Council. The responsibilities were much the same in both instances except that the Metropolitan Corporation has no jurisdiction over the engineering aspects of any development. Each municipality continues to control the engineering design, layout, and plans of local utilities within the municipal boundaries.

³ Province of Manitoba, Revised Statutes of Manitoba 1954, Volume 4, Chapter 173.

⁴ Ibid., Chapter 267.

Since municipal councils often alter considerably from election to election, the developer found it necessary prior to 1960 to guarantee that the regulations imposed on him did not also change. By the same token, the municipality required a guarantee that any development which took place was a credit to the municipality at large. These aims were and continue to be achieved through the Development Agreement.

The Development Agreement was the sole responsibility of the municipality prior to 1960, but since that time it has technically become the responsibility of the Planning Division of the Metropolitan Corporation. The Metropolitan Winnipeg Act states that "the Metropolitan Council has exclusive authority and may enact by-laws (in Metro area) with respect to requirements with which persons establishing and developing, or proposing to establish and develop, a subdivision of an area of land, shall comply."⁵ Metro has chosen not to enforce this section, so that in practice the developer still enters an agreement with the municipality. The developers have continued the old procedures - not for any legal reason - but because they usually transact a considerable business within these areas, and wish to remain on good business terms with the municipalities concerned.

⁵
The Metropolitan Winnipeg Act and the Procedure By-Law of The Metropolitan Corporation of Greater Winnipeg, Part IV, Section 83, page 83.

For purposes of clarity, development agreements will henceforth be discussed as though they were the sole responsibility of the municipality both before and after 1960.

Preliminary Considerations

Before a development agreement is signed, a plan of subdivision must be agreed upon by the developer and the municipal authority. This plan is subject to the influence of a number of bodies which include the following:

1. Municipal Planning Committee.
2. Municipal Parks Board.
3. Municipal engineers.
4. School Board (elementary schools).
5. School Division (secondary schools).
6. Metro Planning Commission.
7. Waterworks and Waste Disposal.
8. Streets and Transit.
9. Rivers and Streams Authority.
10. Manitoba Hydro.
11. Manitoba Telephone.
12. Manitoba Department of Public Works, Highways
Branch.
13. Central Mortgage and Housing Corporation.

The authority exercised by these agencies is discretionary since in extreme cases they may withhold or threaten to withhold essential services unless their interests are protected. In practice this is seldom done.

Development Agreement

The Development Agreement normally includes the following:

1. A plan of subdivision previously agreed upon in principle by the developers and the municipal authority.
2. Provisions for the installation of trunk services required by the area.
3. Provisions for the other municipal services required.
4. Methods of financing these services.
5. General engineering specifications.

The manner and terms of each agreement may vary depending upon:

1. The municipality and the policies of the municipal council.
2. The original ownership of the land, whether it belonged to the municipality, a developer, private parties, or any combination of these three.
3. The party initiating the development (who is frequently at a bargaining disadvantage).

Development Financing

The financial arrangements contained in the agreement are usually different for every development. The municipality may install all utilities and finance them by means of municipal local improvement debentures. In this case the property owners would pay for the improvements on a frontage foot basis over the term of the debentures. Any trunk or oversize facilities would be applied to the particular trunk district as a whole, on a mill rate basis, with the mill rate being applied to the land assessment only, and not the assessment of structures thereon. Conversely, the developer could pay the municipality in cash for all such improvements.

In a case where a developer is responsible for installing services, the developer would make a financial arrangement with the contractor performing the work and recover the cost through the sale of building lots. Any private land serviced by the developer would be subject to the same local improvement and taxation provisions mentioned previously.

Finance or interest costs are borne by the purchaser of the land whether serviced by a developer or a municipality. In the case where a developer paid for the services, the interest on the capital expended would be added to the purchase price of the land.

When the municipality pays for the servicing, these financing costs are added to the annual amortization payments of the local improvement debentures and not the purchase price. Privately owned land presents the same situation in either case.

Professional Services

The costs of servicing, paid for either by municipality or developer as mentioned in the preceding paragraphs, would include the costs of engineering surveys, design, construction supervision and legal expenses. These associated costs would be identical in most cases, whether the developer or the municipality installed and paid for the services, because the engineers and lawyers would be the same. (The agreements studied always specified that the municipalities' consulting engineer and municipal solicitor were to be used whenever work of this type was required.)

Survey costs can be estimated by consulting The Association of Manitoba Land Surveyors Tariff of Fees. This is a gentleman's agreement among surveyors of the minimum fees to be charged for services during the summer months. Winter work or work involving special difficulties, of course, would necessitate extra fees. Surveys of subdivisions such as those studied in the following chapters would have been performed for about \$20

per lot. Additional surveys of residential building lots would add \$20 so that the total survey costs would be approximately \$40 per lot.⁶

Design and construction supervision costs are not so easily determined as survey costs. The Professional Engineers Association of Manitoba has a standard schedule of minimum fees to be charged by consulting professional engineers. These charges vary with the size and total cost of the development and the period over which the development takes place. For a project costing between \$200,000 and \$1,000,000, the cost of complete design and supervision would be seven percent (7%) of the cost of work. Services provided, as listed in the Schedule of Minimum Fees,⁷ would be as follows:

1. Analysis of data for design.
2. Preparation of preliminary sketches and development specification notes.
3. Preparation of working drawings and specifications.
4. A call for tenders.

⁶ The Association of Manitoba Land Surveyors' Tariff of Fees, adopted by the members in private practice of the Association of Manitoba Land Surveyors, 25th April, 1963.

⁷ Association of Professional Engineers of the Province of Manitoba, Schedule of Minimum Fees to be charged by Consulting Professional Engineers.

5. Office and file supervision.
6. Testing of materials.
7. Final record drawings.

Legal fees for a development are not related to the cost of the utilities as are engineering fees. The solicitor charges on the basis of:

1. An hourly record of the time consumed by office staff and lawyers attending the business of his client. An illustration of this type of expense would be negotiations conducted with such agencies as hydro or telephone companies.
2. Land sales to builders requiring mortgages or building restriction caveats.
3. Title transfers from the developer to purchaser.

These are a few examples of the type of legal services that are usually necessary in land development but more or fewer services may be required depending on the development. The average legal cost would be 1% of the sale price, or approximately \$25.00 per lot.

Public Dedication

A factor which is most significant to the developer in economic terms is the percentage of land alienated in a subdivision as compared to that which is available for development purposes. Alienated land refers to that dedicated for streets and lanes, public reserve and public rights-of-way. Available land is that for which there is a net return to the developer through lot sales.

The above factor is a measure of layout efficiency and obviously some types of layout are more efficient than others. A high proportion of wide arterial or major streets within a development will reduce the efficiency. Likewise, the percentage of public dedication required by the municipality for parks and schools will affect the efficiency. For instance, some municipalities require a 10% dedication for parks and schools while others are satisfied with $7\frac{1}{2}\%$ or less. In some areas, i. e. Calgary, the city compensates the developer for any alienation of land in excess of 40% of the total. This is not the case, however, in any of the examples in this thesis.

Direct Expenses to Developer

Development administration and raw land accounts for approximately 40% of the final cost of a residential building lot. This amount has been determined by comparing the selling prices of lots with the servicing costs contained in Table X. Some of the expenses which a development company might have, excluding raw land and servicing, are:

1. Clearing and grading of land.
2. Property taxes while the lots remain unsold.
3. Advertising.
4. Interest on borrowed and invested capital.
5. Mortgage fees on undeveloped land.
6. Legal fees, title transfers, and similar expenses.
7. Sales commissions which are usually 5% of the sale price of the land.
8. Necessary utility repairs (the developer is usually required to guarantee the development for one year following construction).
9. Repairs to grass and boulevards (for the same reason).
10. Accounting and bookkeeping including audit.
11. Administration salaries.

12. Office expenses (telephones, heat, light, rent, and other related items).
13. Donations.
14. Corporation income tax.

Profit is the amount remaining after deducting all expenses, as indicated above. Information obtained from the developers in Winnipeg indicates that their gross profit and net profit margins may be expected to be in the regions of 35% to 45%, and 5% to 15% respectively. More specific information of this type is not available from development companies because of the necessary security precautions against competitors, but it can be fairly accurately assumed that the net profit should be in the range of \$300 per lot.

Utility Construction

The most costly single item in the development of residential land is the installation of municipal services. As well as being the most costly, these services are the most predictable.

Most of the aforementioned factors affect development costs because of their relation with servicing. These items would include the terrain, the availability of trunk services and the subsurface conditions, to name a few.

The relation and effect should be obvious. Moreover, in a given location, with all these conditions being equal, the design of the services also has a considerable effect on the overall cost. Design of municipal utilities is the responsibility of the municipal engineer, who usually engages one of the four major consulting firms in the city to perform the actual design work which then submitted to the engineer and municipality for approval. The Metropolitan Winnipeg Act states that metropolitan authority and jurisdiction does not include engineering aspects of any design, layout or plan. The result is that the municipal engineer and the consulting engineer control utility costs through the vehicle of design.

The engineer controls utility costs through the following features:

1. The economy of layout.
2. The material specifications.
3. The construction methods used.

The layout is important since footage of streets can be changed by as much as 24% from one design to another.⁸ Quantities of other utilities can also be altered similarly although not to the same degree. The material specified for use can be

⁸ V. Joseph Kostka, Neighborhood Planning (Published by author, 1957), p. 80.

varied as well. The different classes, strengths and types of pipes, for instance, or the strength and quality of concrete specified, can change costs appreciably. The construction methods can be different too. Some engineers prefer concrete pavement with 5 inches of gravel beneath. Others require none. Some engineers require sand bedding and stainless steel valve stems for their watermains while others do not. The initially cheaper installation is not necessarily the more economical however, for time might show that the cheaper installation was twice the total cost of a more expensive alternate once the maintenance costs have been considered.

Maintenance

Municipalities have a very strong interest in maintenance since they pay for it. As a result, any municipality would prefer not to have to maintain their services for fifty or more years if possible, but this type of installation is considerably more expensive initially. The municipalities do not pay for the initial installation; the future residents of the development bear the cost, as is shown by the development agreements in Chapters Four to Seven. The expensive services may force the serviced land costs up and eventually the price of housing erected, but this is acceptable. A higher priced

development will dictate a financially higher class of residence which would be welcomed in any municipality. Hence, it is evident that by forcing higher servicing standards, a municipality would actually lower its annual maintenance expenditures and elevate the general level of servicing and structures.

Consequently, the municipality tends to force a better class of development than that which already exists within the municipality. The municipal engineer, who is in the employ of the municipality tends, in turn, to require a higher class design, specification, and construction than, in some cases, might be necessary. The effect of this, of course, is to raise servicing costs generally.

Summary

Servicing cost in contemporary neighbourhoods accounts for approximately 60% of the final price to the lot purchaser. A change in servicing costs, therefore, affects the sale price of a building lot more directly than any other item. For this reason this thesis will explore in considerable detail the various types and methods of servicing as practiced in recent residential subdivisions, and will assess them, using the examples contained in the following chapters.

CHAPTER FOUR

WESTWOOD, R. M. OF ASSINIBOIA

The developer owned almost all the land in the area now known as Westwood, and wished to develop it as a residential area. Certain municipal services were essential, consequently the developer sought the agreement and co-operation of the municipality. After the municipality approved the subdivision plan, the two parties entered a development agreement.⁹

I - DEVELOPMENT AGREEMENT

General

The developer agreed to perform the following installations:

1. The storm trunk to the Assiniboine River.
2. All storm and sanitary laterals.
3. Watermains and fire hydrants.
4. Concrete pavements, curbs and sidewalks.
5. Driveways to the property lines of company owned lots.
6. Graded and gravelled lanes where required.
7. Ornamental lights.

⁹Agreement between the Rural Municipality of Assiniboia and The Winnipeg Supply and Fuel Company Limited, June 28, 1960, and Amendment, June 13, 1961.

8. Sodded boulevards.

Since the trunk sanitary sewer was existing, the developer agreed to pay the municipality \$4.00 per foot for all his land abutting or fronting the trunk. He also agreed to:

1. Turn over all installations at no cost to the municipality.
2. Turn over 7½% of the land to the municipality for schools, parks and recreation areas.
3. Transfer title of street and lane rights-of-way to the municipality.
4. Guarantee installations for one year.

Financing

With respect to general financing, the developer agreed to:

1. Pay for all preliminary work including design, surveys and legal fees.
2. Pay for supervision of installations by the engineer.
3. Post surety bonds to guarantee construction of all services.
4. Pay the cost of expropriating land required for new rights-of-way.

The method of financing the trunk services was as follows:

1. Owners of the land fronting or abutting the trunk storm sewer were required to pay \$6.00 per foot. The net cost of the sewer, after deducting this amount was levied against all of the land, (excluding structures), in the sewer district on a mill rate basis.
2. As mentioned previously, the trunk sanitary sewer existed. Both private owners and the developer were charged \$4.00 per foot for all of their land fronting on or abutting the sanitary trunk.
3. The developer assumed the full cost of water feeders, (up to 8 inches in diameter), abutting or fronting his land. The negotiated price was agreed to be \$3.00 per foot. The balance of feeder watermain cost, after levies against any private land, was distributed over the district on a mill rate basis.
4. Of the two 24-foot pavements on Westwood Drive, the developer paid for one pavement; the owners of the land fronting the second pavement paid for a 12 foot width, and the remainder was distributed on a mill rate basis. To the south of Leacock Avenue, the pavement narrowed to 32 feet and the full cost of this was borne by the developer.

In order to finance services benefitting private land, the municipality agreed to effect local improvement levies to be amortized over the following periods:

Feeder watermains and trunk storm sewers	20 years
Pavements	10 years
Lateral storm and sanitary sewers	5 years
Lateral watermains and street lighting	3 years

Portions of the costs of trunk sewers and the feeder watermains were levied on a mill rate basis over the entire area and all other services were levied on a frontage foot basis. The municipality then paid the developer for all services which benefited municipal or privately owned land. The municipality made payment with local improvement debentures for all improvements levied on a basis of more than five years and paid in cash for all improvements financed for less than five years.

Miscellaneous

The municipality also agreed to:

1. Transfer title of rights-of-way on the original subdivision plan to the developer. If the developer acquired more land in this way than he conveyed to the municipality in new rights-of-way, an adjustment was to be made by negotiation. The maximum to be paid by the developer was set at \$7,500. (The \$7,500 was paid.)

2. Forward any cash payments of levies by private owners to the developer.
3. Pay the developer in cash for any services installed outside the area which were required by the municipality.
4. Allow the developer to supply all concrete from a materials division of the developer's company.
5. Levy a frontage charge of 350 feet against any public school in the area. There was no levy on the remaining publicly owned land.
6. Apply any winter works contribution to the cost of the storm sewer trunk.

Some of the other requirements of the agreement were that the developer: (See layout plan - Westwood)

1. Pave Rouge Road between Portage Avenue and Assiboine Drive and assume one half the cost of the full width of the pavement fronting on the developer's land.
2. Purchase debentures to help finance lateral storm sewers on Lincoln Avenue from Portage Avenue to Grove Avenue and on Kirkfield Road from Portage Avenue to Byron Bay.

3. Pay for sewer pipe but allow the municipality to make all purchases of same.
4. Supply 1,000 cubic yards of crushed stone for the use of the municipality on Kirkfield, Lincoln and Grove Avenues.
5. Gravel and maintain unpaved streets which serviced occupied homes.
6. Deny occupancy of any building which was not serviced with sewer and water.
7. Pay a fee of \$25,000, (\$40 per lot), for administration and other costs attributable to the development of the lands within the district. (Westwood Collegiate).
8. Insure the municipality against any legal claims during construction of services.
9. Transfer four lots in one parcel in area 3 to the municipality. (Fire Hall).

During development, a minimum floor area requirement was enforced by mutual agreement. In areas 1 and 2, the minimum was 1050 - 1200 square feet and in areas 3 and 4, the minimum of 1100 - 1250 square feet.

After completion of areas 1 and 2, the municipality installed chain link fences along walkways bordering private property and made this a requirement in areas 3 and 4. The municipality also paved the lanes in areas 1 and 2 when the residents found the gravel lane to be unsatisfactory.

II - SERVICING STANDARDS

Westwood was serviced under sixteen separate contracts during a period of five years. Engineering standards varied during this time but essentially they were as follows:

Sanitary and Storm Sewers

Clay tile pipe, C278-57T extra strength, or C261-59T standard strength, and concrete pipe, ASTM C14 or ASTM C76-62T, were bedded on sand, then hand packed clay fill placed to one foot above the sewer.

Watermains

Cast iron watermain, A. W. W. A. Class 22, was bedded on clay trench bottom and hand packed clay fill placed around pipe.

Asbestos cement watermain, A. W. W. A. Class 150, was bedded on sand which extended from four inches below the pipe to the top of the pipe.

Pavement

Residential streets were 24 feet wide, concrete 6 inches thick, with 5 inches of base and bar mat reinforcing.

Collector streets were 32 feet wide, concrete 7 inches thick, with 5 inches of base and bar mat reinforcing.

Sidewalk

Sidewalks along collector streets were 5 feet wide and 4 inches thick, using 2,500 p. s. i. air entrained concrete.

III - SUMMARY

Westwood is primarily a white collar development. The great majority of residents are professional people, office managers, or are employed in a similar capacity. Of the homes in the development, about 35% are over \$20,000 in value, and 10% over \$30,000. The average family income is estimated to be about \$7,500 per annum. It is definitely one of the higher class developments.

The servicing of Westwood proved to be the least expensive of the four developments studied. This was in spite of the fact that it was of a fairly high standard and that it was serviced in rather small sections of roughly 200 lots per year for five years; factors which would be inclined to raise costs rather than lower them.

The economy was contingent on the low trunk costs which were a mere 18% of the total. (See Table I.) The sanitary trunk sewer already existed, and only a small storm sewer was required.

The selling price of lots in Westwood has been about \$80 per front foot. The cost of development excluding raw land, developer's overhead and profit, was estimated to be roughly 50% of that amount. (See Table IX.)

Westwood was the first subdivision in the area, and as a consequence, had the effect of introducing the municipality to development. For example, the initial development agreement took 18 months to negotiate. The developer's risk was higher than usual because Westwood was considered at that time to be located too far from the city centre to be very popular and there was also a problem of an inadequate water supply. It was nevertheless a success and since its beginning has been followed by a number of similar developments.

TABLE I

TRUNK SERVICES WESTWOOD

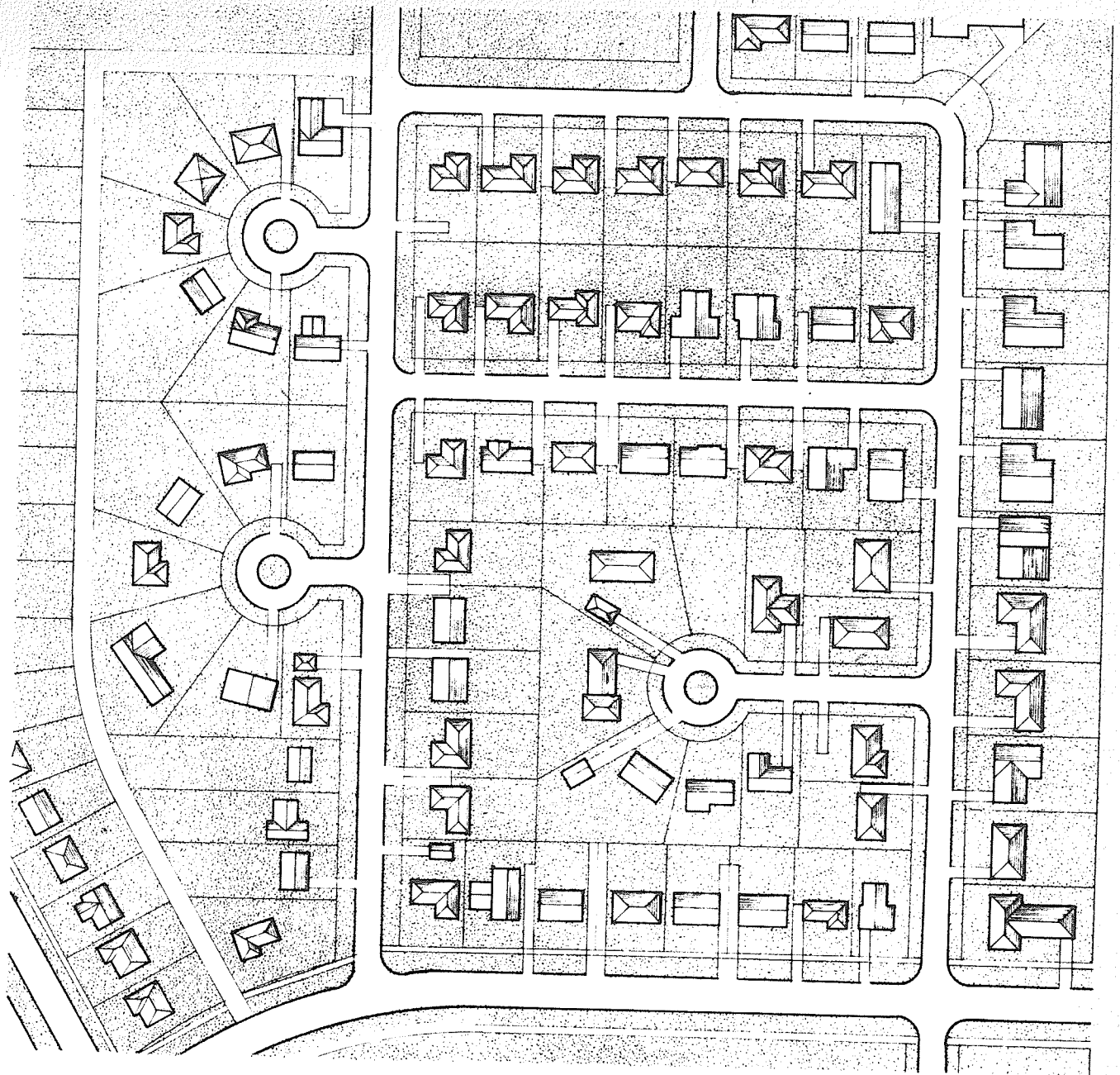
Description	Proportion Charged	Total Cost (1964 base) +15% engineering, legal & survey fees	Cost per acre	Cost per frontage foot
STORM				
.. storm sewer 30" and over 7920 ft. of 36" to 72" pipe	61.5%	\$36.20/ft. x 7920 x 61.5% + 15% = 203,000	\$ 864	\$ 3.38
SANITARY				
.. sanitary sewer larger than 10" 3330 ft. of 12" to 18" pipe	100%	\$ 9.77/ft. x 3330 + 15% = 37,400		
.. plus charge of \$4.00/ft. on land fronting existing 36" trunk		\$ 4.00/ft. x 4,550 = 18,200 55,600	242	0.93
WATER				
.. watermains over 8" diameter 6910 feet of 12" asbestos cement	100%	\$ 9.00/ft. x 6910 + 15% = 71,000	304	1.19
PAVEMENT				
.. excess over standard 24' concrete roadway on Westwood Drive and Sansome Avenue 14,820 sq. yds.	100%	\$ 6.56/sq. yd. x 14,820 + 15% = 112,000	476	1.86
TOTALS			\$ 1.886	\$ 7.36

TABLE II

OTHER MUNICIPAL SERVICES WESTWOOD

Description	Total cost (1964 base) + 15% engineering, legal and survey fees (where applicable)	Cost per acre	Cost per frontage foot
Lateral storm sewers .. 23, 320 ft. of 8" to 24"	\$ 5. 45/ft. x 23, 320 + 15%	\$ 635	\$ 2. 43
Lateral sanitary sewers .. 32, 160 ft. of 8" & 10"	\$ 3. 60/ft. x 32, 160 + 15%	578	2. 22
Lateral watermains .. 34, 790 ft. of 6" & 8"	\$ 6. 52/ft. x 34, 790 + 15%	1, 130	4. 34
Concrete pavement & curb .. 40, 800 ft. of 6" & 7" thick and 24' wide	\$18. 50/ft. x 40, 800 + 15%	3, 770	14. 45
.. 3, 700 ft. of 6" thick and 16' wide in back lanes	\$11. 85/ft. x 3, 700 + 15%	222	0. 85
House connections .. 954 sanitary & water	\$200 ea. x 954 + 15%	957	3. 66
Sidewalks along main roads .. 14, 900 ft. 5'wide 4"thick	\$2. 23/ft. x 14, 900 + 15%	166	0. 64
Driveways servicing all lots without lanes .. 834 - 6"thick & 20 sq. yd.	\$87. 00 ea. x 834 + 15%	363	1. 39
Landscaping boulevards .. 188, 000 sq. yd. sodding	\$ 0. 45/sq. yd. x 188, 000	368	1. 41
Street lighting ornamental .. 260 standards	\$150 ea. x 260	170	0. 65
Hydro underground* monthly charge by Hydro			
Telephone underground*	\$25/lot x 954	104	0. 40
TOTALS		\$8, 463	\$32. 44

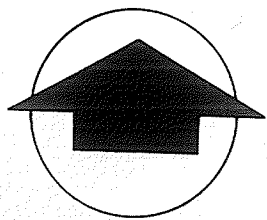
*All installations were assumed to be underground.
This was actually the case only in part of the sub-
division.



l o c a l d e t a i l

WESTWOOD

r . m . o f a s s i n i b o i a



s c a l e



t y p i c a l c r o s s s e c t i o n

WESTWOOD

r . m . o f a s s i n i b o i a

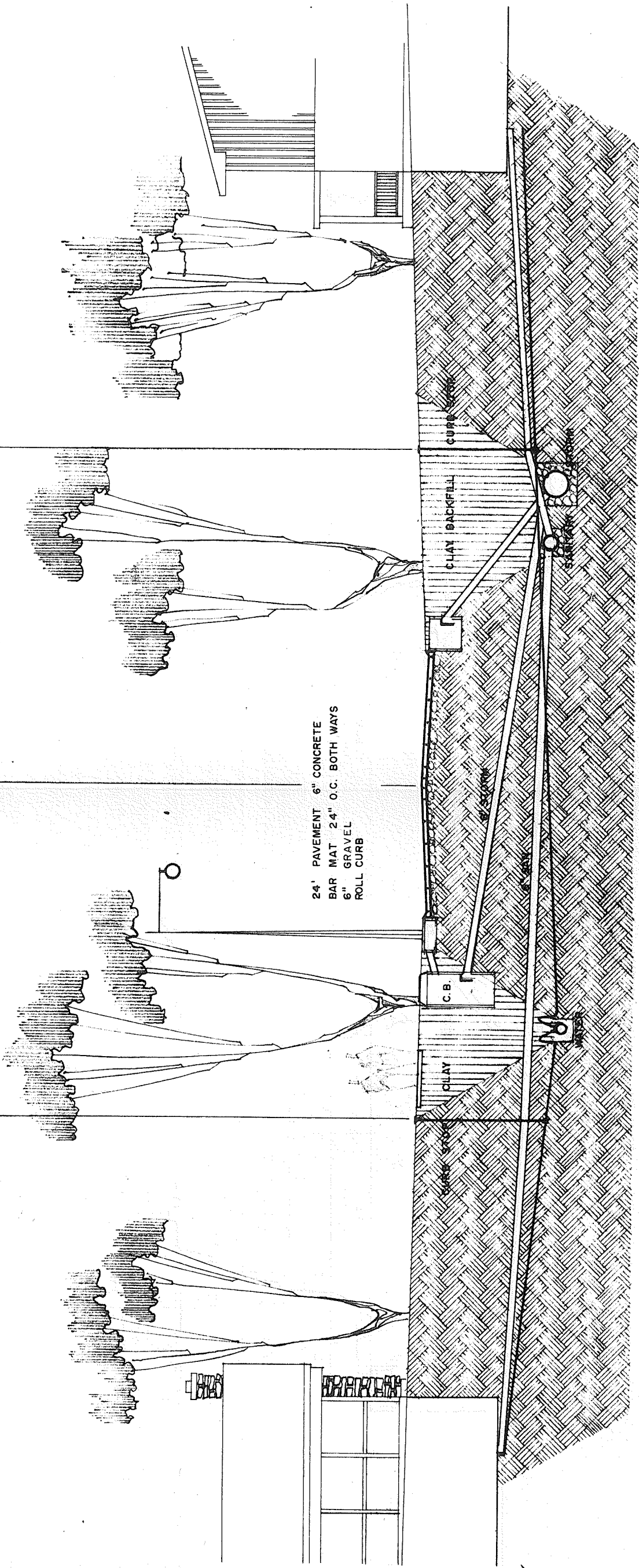
s c a l e : o n e i n c h e q u a l s t e n f e e t

60' R.O.W.

R

Q

R



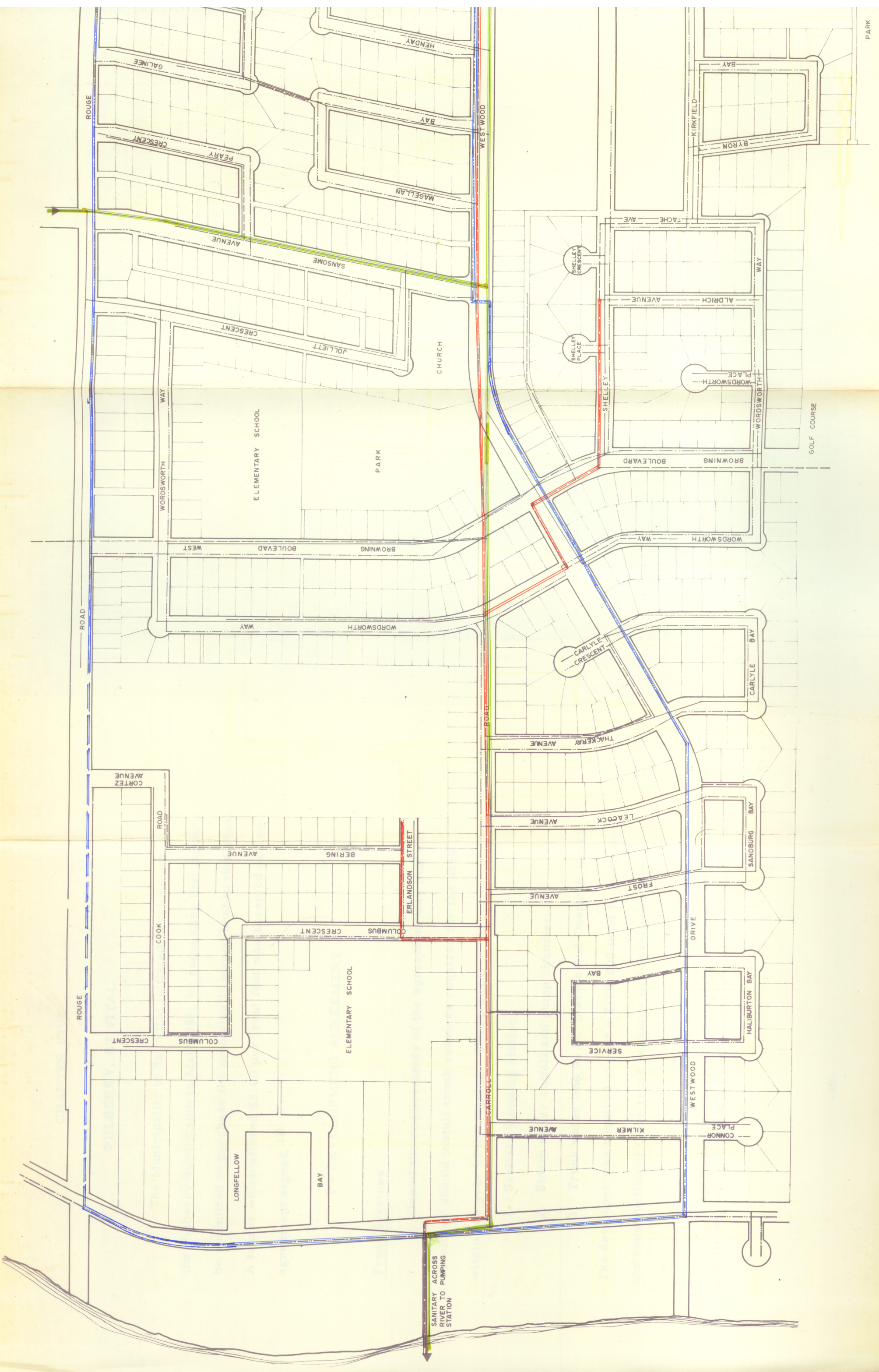
24' PAVEMENT 6" CONCRETE
BAR MAT 24" O.C. BOTH WAYS
6" GRAVEL
ROLL CURB

CURB

CLAY BACKFILL

C.B.

CLAY

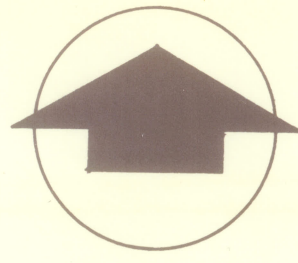
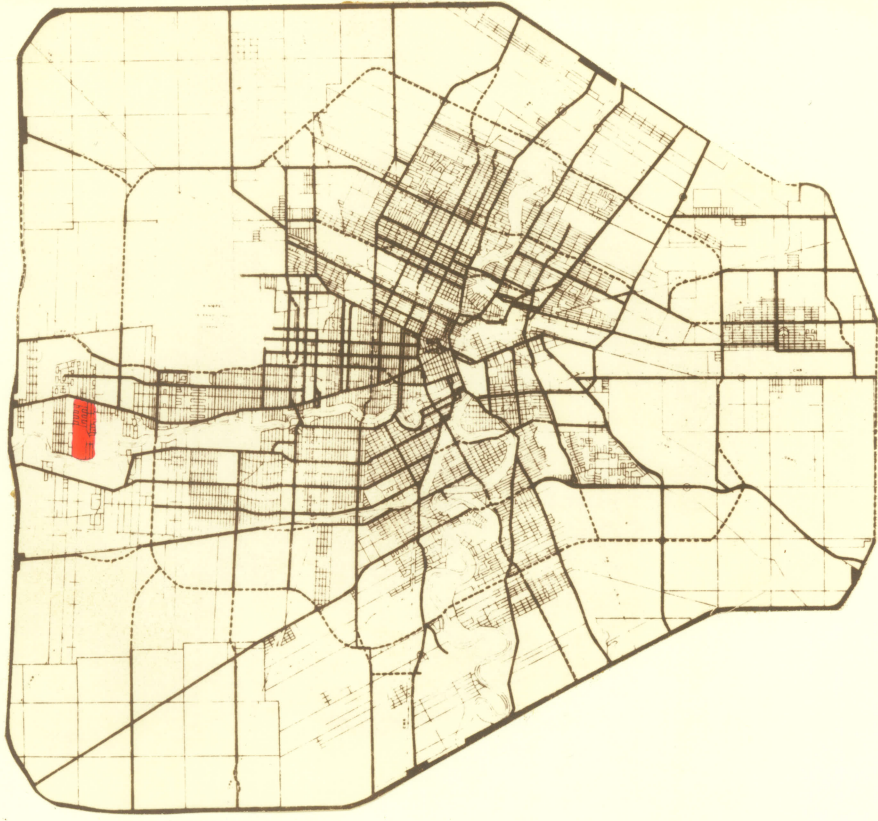


SANITARY ACROSS RIVER TO PUMPING STATION

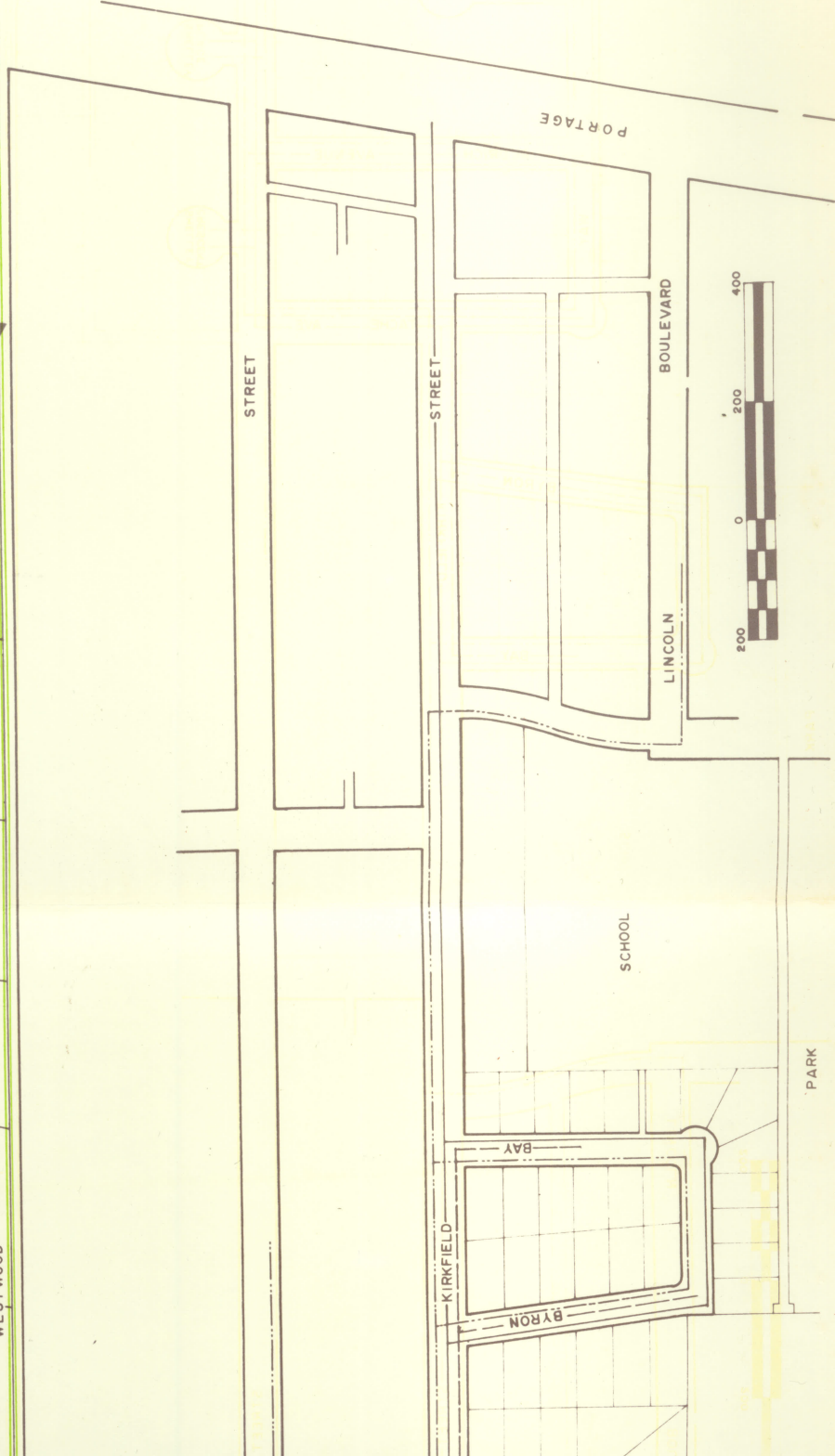
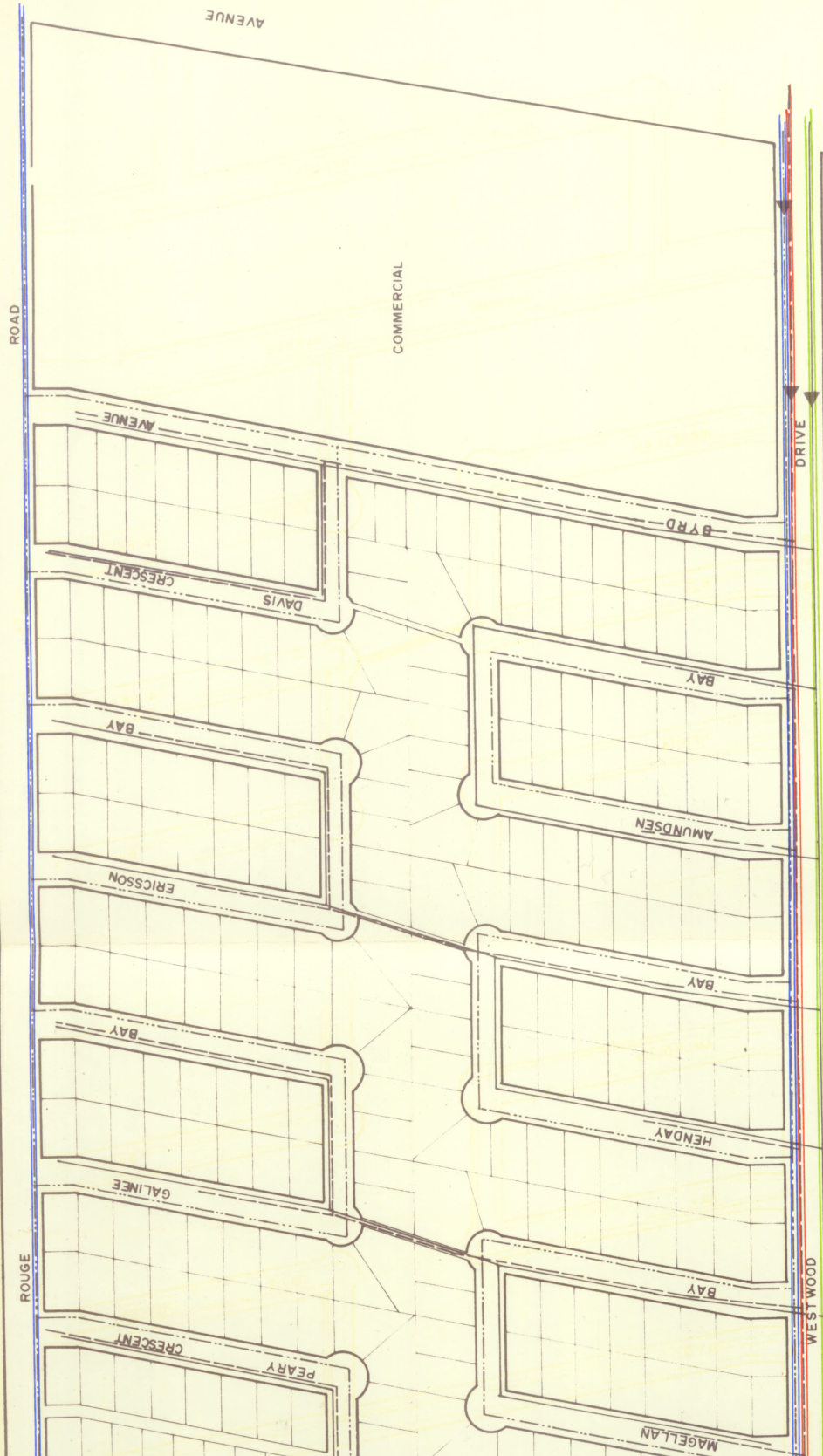
plan of subdivision with services

WEST WOOD

P. M. of Assiniboia



————— sanitary sewer
 - - - - - water main
 - - - - - storm sewer



CHAPTER FIVE

PULBERRY, ST VITAL

The Municipality of St. Vital initiated development of the Pulberry subdivision in May 1958, by requesting that tenders be submitted to purchase the municipally owned land in this area. A tender which offered \$2.00 per front foot was accepted and an agreement signed.¹⁰

I - DEVELOPMENT AGREEMENT

Trunk Services

One of the requirements of the agreement was that the developer should install trunk services required for the area within one year of the signing. These were:

1. Sanitary pumping station.
2. Storm sewer outfall and pump chamber.
3. Trunk water line on St. Mary's and Oustic Avenues.

The developer was required to post a \$100,000 bond to guarantee the construction of these trunk services within the time limit.

¹⁰ Agreement between The Rural Municipality of St. Vital and British-American Land Development Co. Ltd., November 1958.

Lateral Services

The developer was also required to install:

1. All sanitary and water laterals with house connections to the property lines.
2. All storm laterals.
3. Concrete pavement and curbs.
4. Sidewalks 4 feet in width.
5. Ornamental street lighting.

All services were to become the property of the municipality as soon as they were installed.

Financing

As well as installing these services on a prepaid basis, the developer was required to:

1. Finance the services required for privately owned land over a ten year period at $5\frac{1}{2}\%$ interest.
2. Pay the municipality for actual costs of legal services, legal survey, expropriation proceedings and engineering. A deposit of \$25,000 was also required.
3. Pay taxes on all lands which were purchased from private landowners.
4. Pay taxes on all land which was purchased by the developer from the municipality from the time of transfer of the deed.



5. Pay taxes on all land obtained from the municipality which remained undeveloped five years after the agreement was signed.

Private Property

The municipality enacted a local improvement by-law which levied private property for the services at a uniform rate.

Sanitary Sewers	\$ 3.50
Water Lines	3.50
Storm Sewers	4.50
Sidewalks	1.50
Concrete Pavement	9.00
Ornamental Street Lighting	1.00
TOTAL	\$23.00 per front foot

These charges were payable in cash or were amortized by the municipality over a ten year period at 5½%. This was accomplished by the sale of local improvement debentures guaranteed by the developer.

Miscellaneous

The developer was also responsible for any additional work in the immediate vicinity which the municipality deemed necessary - to a maximum of \$500,000. As payment, the developer agreed to accept ten year debentures at 5½%. No extra work was required of the developer.

Options on the municipal land surrounding the area were obtained by the developer to protect his investment. The agreement gave the developer a five year option to purchase this land at the market price. The options were not exercised during the five year period.

II - SERVICING STANDARDS

The following are the servicing standards which were used for the Pulberry development, and which formed part of the agreement.

Sanitary and Storm Sewers

Asbestos cement (CGSB 34GP-SA), salt glazed vitrified tile (CSA A60-1S53), 6 and 8 inch concrete (ASTM C14-57 extra strength), and reinforced concrete storm sewer (ASTM C76-57 Class II or III), deeper than fourteen feet were bedded on sand from three inches under to one foot over pipe. Sewers shallower than fourteen feet were bedded on sand from three inches below to the springline of the pipe with hand packed earth fill one foot above the pipe.

Water Lines

Asbestos cement watermains, classes 150 and 200 (10 inches or larger and 8 inches or smaller respectively), specification CGSB 34GP-1, had the same bedding requirements as sanitary

and storm sewers. Universal cast iron pipe, class 150, was bedded using hand tamped clay instead of sand.

Sidewalks

Sidewalks were 4 feet wide and 4 inches thick and constructed using 3000 p. s. i. air entrained concrete.

Pavement

Residential streets were constructed 24 feet wide, 6 inches thick, using no gravel base and with perimeter reinforcing steel only.

Collector streets were required to be 30 feet wide, 8 inches thick, with bar mat steel and 6 inches of gravel base.

III - SUMMARY

The Pulberry development was planned and initiated by the municipality for the reason that 79% of the land in the area was municipally owned. The remaining 21% was privately owned. The developer submitted an offer, upon invitation, to buy the municipally owned portion and did not participate, in the usual manner, in planning the development.

The cost of servicing Pulberry was \$40.18 per frontage foot, but the average recovery from the private owners was only \$22.60, (1964 basis). This meant that the difference had to be paid by the developer and then applied to the cost of servicing the remainder.

The net effect was to increase the servicing cost of the purchased land from \$40.18 to \$47.07 per frontage foot.

Trunk services accounted for 32% of the total servicing costs. This relatively large proportion was a consequence of:

1. The necessity for the storm pumping chamber.
2. The construction of oversize storm trunks necessary to service a large area between Pulberry and the river.
3. The requirement for a sanitary pumping station.
4. The construction of the extension to the water trunk (4000 feet), required to bring a water supply to the edge of the area, and which was intended to service eventually, a larger neighbourhood of which Pulberry will be only a part.

The design of the Pulberry subdivision is simply a modification of the common grid system, long loops or crescents without back lanes, utilizing 50 foot rights-of-way. The servicing standards were the lowest of the four studied.

The overall economy of the development may be attributed to the following:

1. There was only slightly over 3% of the total area provided for public open space within the development. (See Table IX). The river was nearby, (though isolated by private property), and a large park was located about one half mile away.
2. There was no landscaping done by the developer or the municipality.
3. There was no easily accessible commercial outlet.
4. The servicing standards, particularly the concrete pavement, were lower than the other subdivisions studied.
5. The density of development was the highest of the four subdivisions studied.

The residents of Pulberry have a wide range of incomes and the housing, reflects this. The average cost of a home would be approximately \$17,000 and the average annual income \$6,000.

The average selling price of a lot in Pulberry, based on 1964 prices, is estimated to be \$70 per front foot.

TABLE III

TRUNK SERVICES PULBERRY

Description	Proportion Charged	Total Cost (1964 base) +15% engineering, legal & survey fees	Cost per acre	Cost per frontage foot
STORM				
.. 4650 ft. of 30" to 54"	100%	\$28.35/ft. x 4650 +15% = 151,000		
.. pumping chamber and 42" outfall	100%	\$27,800 + 15% = <u>32,000</u> 183,000	\$ 1980	\$ 6.45
SANITARY				
.. pumping station	100%	\$51,500 + 15% = 59,200		
.. 2350 ft. of 12" outfall	100%	\$39,800 + 15% = <u>45,800</u> 105,000	1135	3.70
WATER				
.. 4,220 ft. of 10" and 12" water-main outside subdivision	100%	\$14.02/ft. x 4220 + 15% = 68,000	735	2.39
PAVEMENT				
.. extra width over 24' concrete roadway				
.. 1350 sq. yd. on River Road* and St. Vital Road*	100%	\$ 5.81/sq. yd. x 1350 + 15% = 9,020	97	0.32
TOTALS			\$3,947.	\$12.86

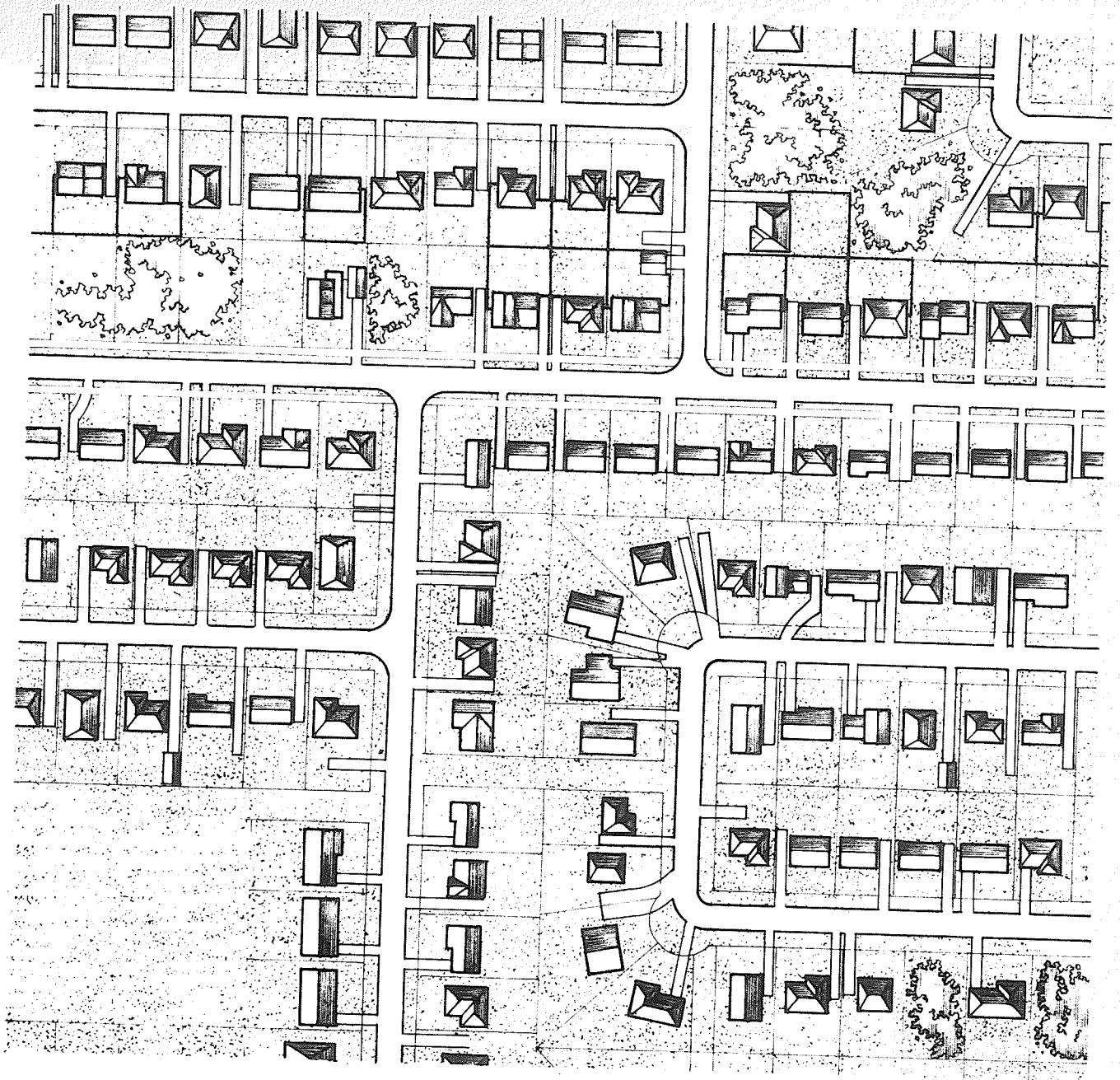
*(River Road and St. Vital Road were not actually paved during the period of development but for purposes of comparison it was assumed they were.)

TABLE IV

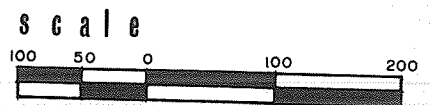
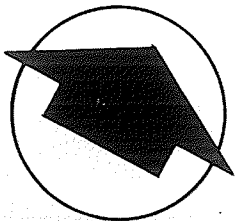
OTHER MUNICIPAL SERVICES PULBERRY

Description	Total cost (1964 base) +15% engineering, legal and survey fees (where applicable)	Cost per acre	Cost per frontage foot
Lateral storm sewers .. 9,000 ft. of 12" to 24"	\$9.63/ft. x 9,000 + 15%	\$1,075	\$ 3.51
Lateral sanitary sewers .. 14,240 ft. of 8" and 10"	\$6.08/ft. x 14,240 + 15%	1,075	3.51
Lateral watermains .. 19,420 ft. of 6" and 8"	\$6.97/ft. x 19,420 + 15%	1,680	5.47
Concrete pavement & curb .. 18,110 ft. of 6" thick and 24' wide .. no back lanes	\$16.15/ft. x 18,110 + 15%	3,630	11.82
House connections .. 484 sanitary and water	\$71.80 ea. x 484 + 15%	433	1.41
Sidewalks along main roads .. 12,900 ft. 4' wide 4" thick	\$1.82 x 12,900 + 15%	292	0.95
Driveways constructed by builder			
Landscaping done by builder or homeowner			
Street lighting ornamental .. 123 standards	\$150 ea. x 123	200	0.65
Hydro standard overhead .. no extra cost			
Telephone standard overhead .. no extra cost			
TOTAL		\$8,385	\$27.32

(Note that the average recovery from private land, 1964 basis, was \$22.60/front foot in compliance with St. Vital by-law. Cost of servicing was \$27.32 plus \$12.86 for trunks = \$40.18. Remaining lots were required to make up the difference.)



local detail
P U L B E R R Y
city of st. vital



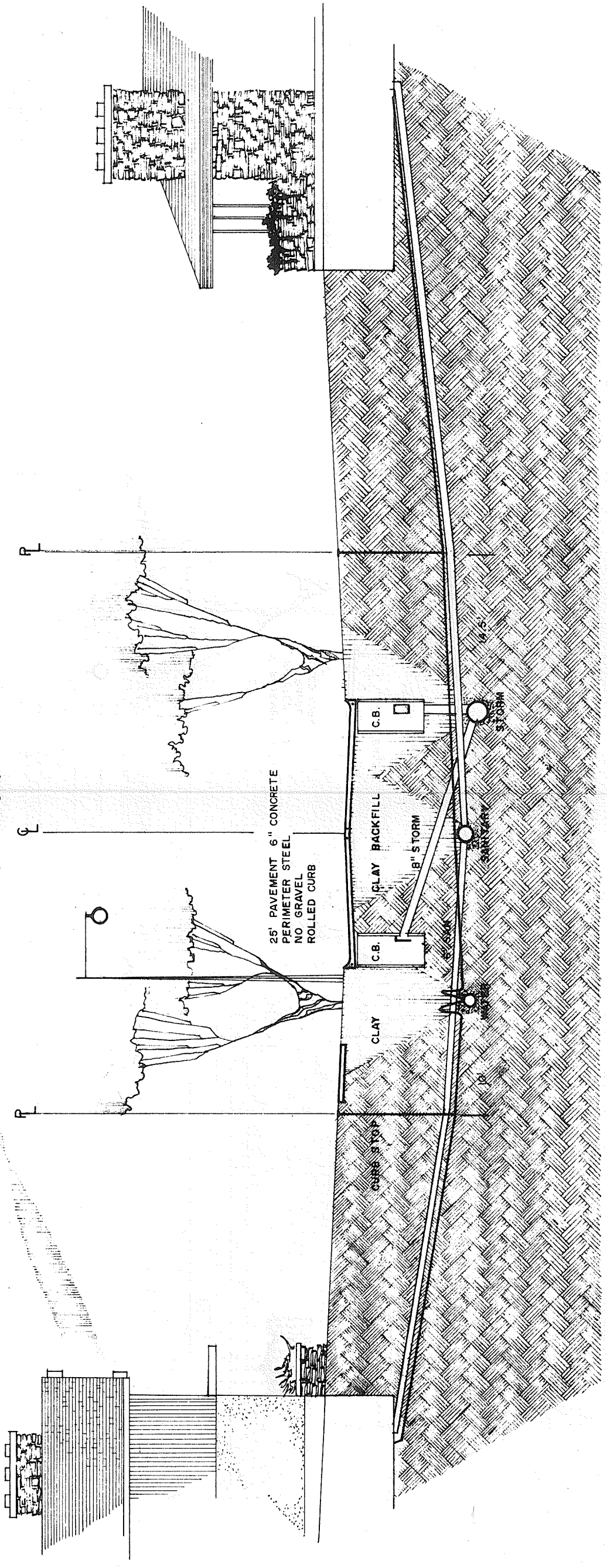
t y p i c a l c r o s s - s e c t i o n

P U L B E R R Y

c i t y o f s t . v i t a l

s c a l e : o n e i n c h e q u a l s t e n f e e t

50' R.O.W.



ROAD

AVENUE

WAKEFIELD

AVENUE

CROFTON

CROFTON

WEAVER

DRIVE

STREET

FLYNN

CRESCENT

CABOT

BARRINGTON

TALON

BAY

MOORE

TRITON

BAY

CRESCENT

CABOT

ST. VITAL

ROAD

BAY

TRITON

PARKVILLE



GATE & PUMP CHAMBER



TRITON RIVER

CHAPTER 12

ROAD

1 - DEVELOPMENT AGREEMENT

General

Tussock Land Area

necessary public services to provide

Both parties subsequently approved

Special plan was approved by

including Tussock Land Area

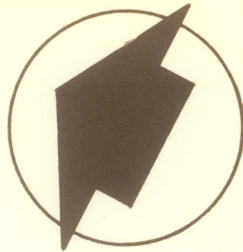
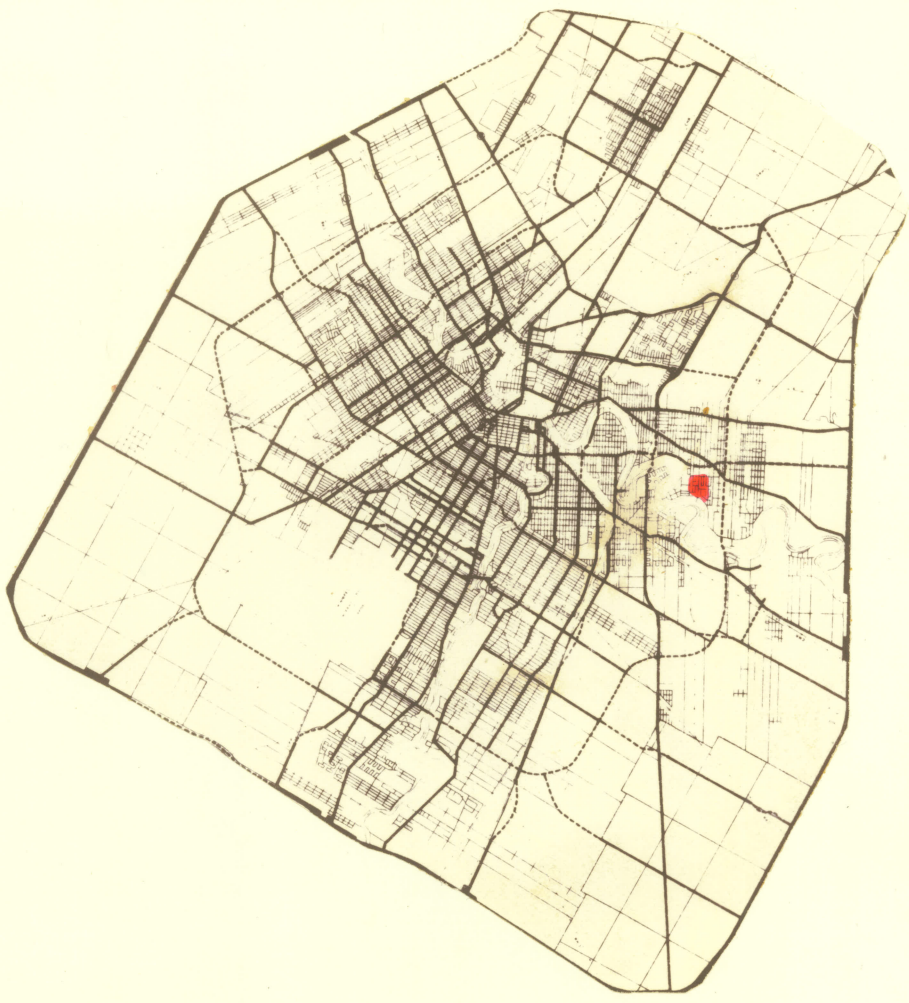
November 1962

TUBAS

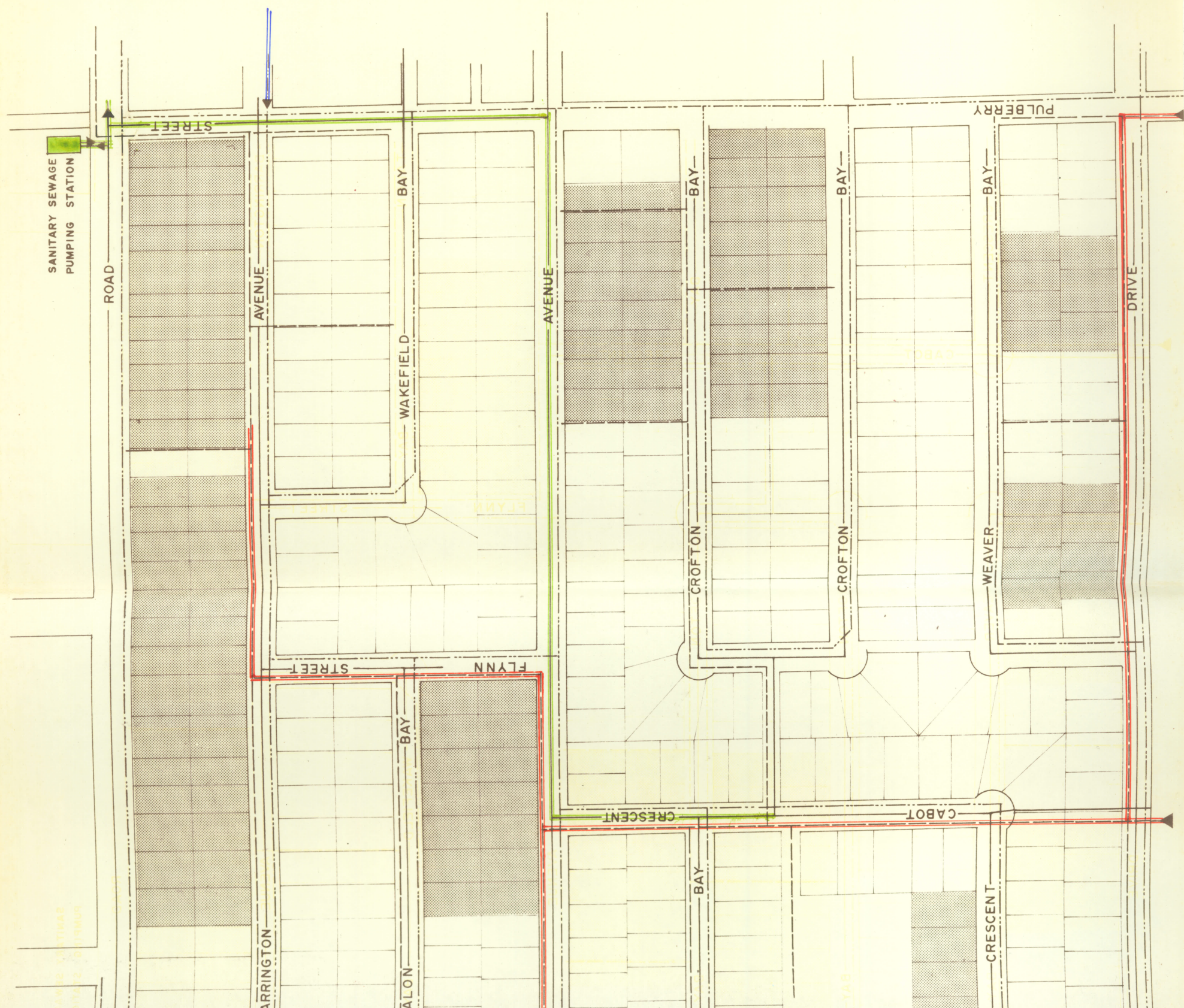
including Tussock Land Area

November 1962

plan of subdivision with services
PULBERRY
 city of st. vital



————— sanitary sewer
 - - - - - water main
 - - - - - storm sewer



CHAPTER SIX

TUXEDO PARK, TOWN OF TUXEDO

The area now known as Tuxedo Park was owned in piecemeal fashion by Tuxedo Land Associates, the Town of Tuxedo, and certain private parties. The total acreage of land within the boundaries was 107.9 acres.

Lot acreage owned by Town	22.04
Lot acreage owned by T. L. A.	54.57
Lot acreage owned by independent owners	1.22
Acreage in road and lane allowance	<u>30.07</u>
TOTAL	107.90 acres

I - DEVELOPMENT AGREEMENT

General

Tuxedo Land Associates requested the town to install the necessary public services to permit development of the area. Both parties subsequently approved a resubdivision plan, (the former plan was cancelled), and entered a development agreement in November of 1962.¹¹

¹¹ Agreement between Chataway Developments Ltd., Girton Developments Ltd., and Mountbatten Developments Ltd.; (called Tuxedo Land Associates), and the Town of Tuxedo, November 1962.

The services to be installed were:

1. Reinforced concrete roads and curbs.
2. Watermains and appurtenances.
3. Sanitary sewers and appurtenances.
4. Storm sewers and appurtenances.
5. Ornamental street lighting.
6. Landscaped boulevards, and park areas (sodding and tree planting).
7. Underground telephone and electrical lines.
8. Sanitary, storm and water service connections to each lot.
9. Sidewalks and street signs.

All public services except telephone and power were to be installed by the town under the supervision of the engineers appointed by the town. Specifically, the town negotiated approval of the new subdivision plan, appointed a surveyor to survey and register the plan, appointed engineers to design the area and to supervise construction, and called public tenders for the installation of these services.

The cost of all services, direct and indirect, was to be assessed to all lands fronting or abutting the public services on a basis of standard charges per front foot as determined by the town. Any balance over and above the amount raised by standard charges was to be assessed equitably against all of the land in the area.

Where financing was necessary, the town sold debentures on the open market.

Miscellaneous

The developer agreed to:

1. Enter into any easement agreements required for utilities which crossed the developer's land.
2. Allow the town to select all street names and numbers.
3. Obtain the agreement of the private owners or to acquire their land.
4. An equitable distribution of lots in the new plan.
5. Be subject to the approval of the town regarding the exterior architecture of any proposed structure before submitting application for a building permit.
6. Prohibit the construction of any structure until all the services were installed and refrain from selling any lot until the future owner accepted this condition and the condition regarding exterior architecture.

In addition, the town required that the developer:

1. Submit a bond guaranteeing payment of taxes for 10 years on developer owned land.
2. Agree to the phased development of the area to ensure orderly construction. The first section was to be developed in three parts. The requirement was that 2/3 of the lots were to be sold and dwellings erected on 1/3 before work could commence on a subsequent part.

3. Agree that the subdivision proceed only when sanitary trunk services were available. The town was made responsible for getting Metro to install sufficient sewage disposal capacity.

The parties also agreed that it was their intention to negotiate an agreement for the next section of the area as soon as the servicing in the first section was essentially completed.

II - SERVICING STANDARDS

The engineering standards governing the installation of utilities in Tuxedo Park were the highest of the subdivisions studied.

Sanitary Sewers

Sanitary sewers were concrete, C-14 extra strength, 10 inch minimum size, and bedded in sand to within 2/3 of the top of the pipe.

Storm Sewers

Storm sewers were also concrete, C-76 Class III, 12 - inch minimum size and bedded in the same way as the sanitary sewer. Catch basin leads were identical to the minimum sanitary sewer.

Watermains

Watermains were required to be either asbestos cement, ASTM C296-63T, Class 150, or cast iron, AWWA C101-57, Class 22, and were to be bedded in sand to 4 inches above the pipe.

Backfill

The sanitary sewer trenches were completely refilled with gravel backfill.

The storm sewer and watermain trenches were refilled with gravel at road crossings.

Gravel backfill was necessary to avoid excessive settlement of the concrete pavement which was to be placed during the same construction year.

Concrete Pavement

The pavement was 28 feet wide, (20 feet wide on one side of the parkette loops), varying from 6-3/4 inches thick at the centreline to 8 inches thick at the edges. The concrete was 3000 p. s. i. with bar mat reinforcing throughout over a base of 6 inches of gravel and a sub-base of 6 inches to 24 inches of gravel when required by soft conditions.

III - SUMMARY

Tuxedo Park is an exclusive residential development which aims at perhaps 1% of the total housing market. The utility costs reflect this high standard, being almost double that of other areas. (See Table X). The exclusiveness was deliberately planned in an expensive layout (see Table IX), with standards of servicing unlike those of the other subdivisions.

The subdivision consists of short curving streets with landscaped island parks and boulevards. There are no commercial or industrial areas and no apartments or row houses in the subdivision or the entire municipality (except for several small isolated exceptions). There are no church sites in the area, probably since no church has been willing to purchase the four or five lots required to erect a church at the relatively high prices charged.

Each building lot has two sewer connections instead of the usual one; the extra being a separate storm sewer connection for rainwater. In addition, pavement is wider and thicker than is normally required. Other services show similar tendencies. The standards are deliberately more expensive so that only the most expensive homes will be built.

The selling price of lots in Tuxedo Park has been an average of \$100 per front foot, plus utilities. Using the calculations contained herein, (Table IX), the total cost would be approximately \$166 per front foot.

The northwesterly portion of Tuxedo Park is the only part which has been actually developed at the present time, and prices and standards of servicing applied to the whole area are those which were determined for this section. Certain items, such as granular backfill in trenches under the road, may not be required over the whole area. The reason that granular backfill was used so extensively in the first portion of the development was that the concrete pavement had to be installed the same year and would have been subject to large settlements had an unshrinkable backfill not been used. The engineers hope that, for the remainder of the development, underground services and pavements will be installed in different years. In this case, special backfill would not be required. This would save about \$5 per front foot.

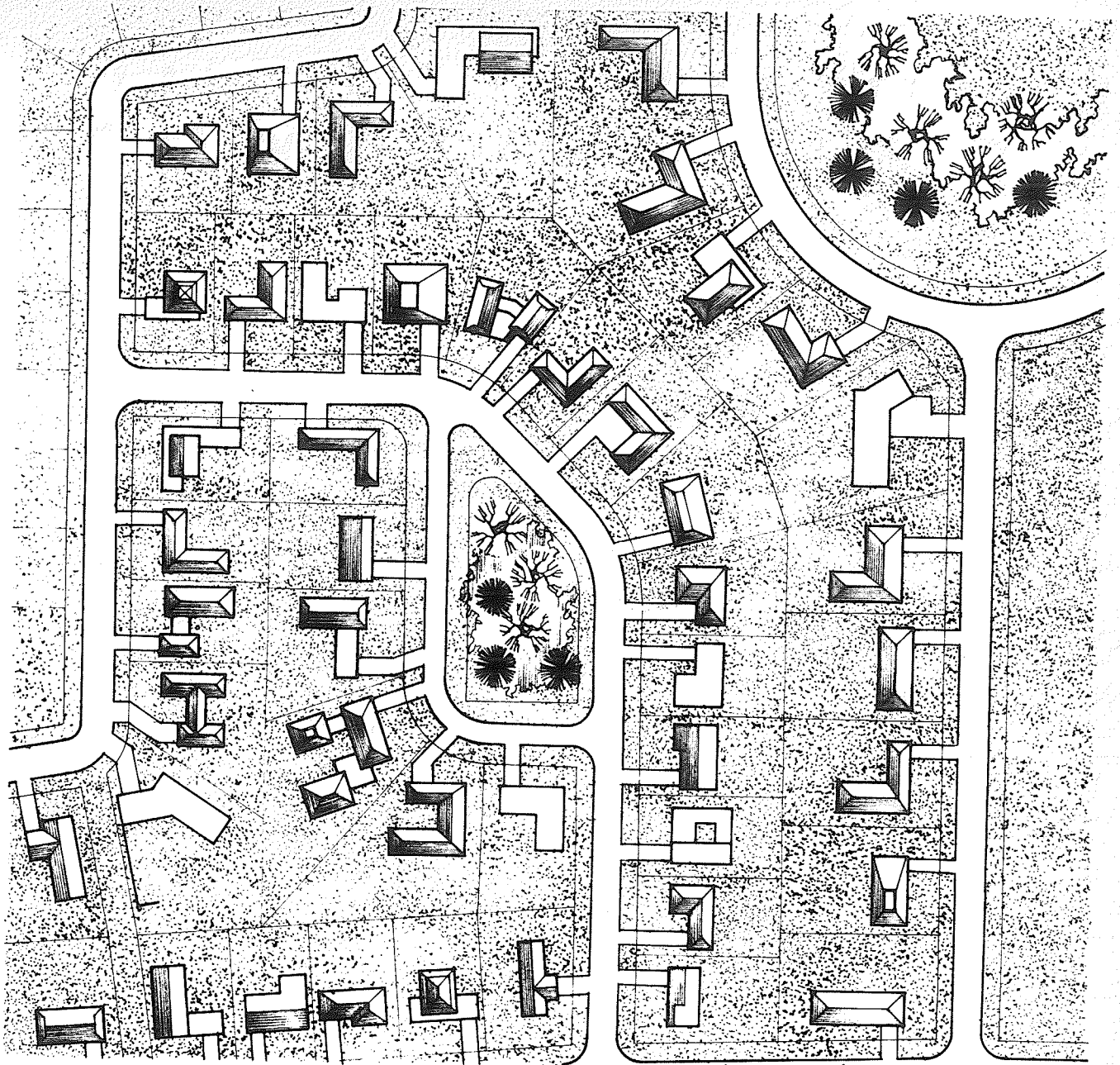
TABLE V

TRUNK SERVICES TUXEDO PARK

Description	Proportion Charged	Total Cost (1964 base) +15% engineering, legal & survey fees	Cost per acre	Cost per frontage foot
STORM				
.. 4330' of 84" & 96" (to Assiniboine River)	20%	\$60.80/ft. x 4330 x 20% + 15% = 60,600		
.. 1334' of 48"	50%	\$24.60/ft. x 1334 x 50% + 15% = 18,900		
.. 1520' of 30"	100%	\$13.02/ft. x 1520 + 15% = 22,700		
		<u>102,200</u>	\$ 974	\$ 4.46
SANITARY				
.. pumping station	100%	\$48,700 + 15% = 56,000		
.. 3390' of 8" forcemain	100%	\$ 3.96/ft. x 3390 +15% = 15,440		
.. 3680' of 12" and 15" infall (granular backfill)	100%	\$28.00/ft. x 3680 +15% = 118,500		
		<u>189,940</u>	1,810	8.30
WATER				
.. 4450' of 10" water- main in subdivision (major supply trunks existing)	100%	\$ 7.62 x 4450 +15% = 39,000	372	1.70
PAVEMENT				
.. all residential streets 28' wide				
.. Grant Avenue collector by Metro				
TOTAL			\$3,156	\$14.46

TABLE VI
OTHER MUNICIPAL SERVICES TUXEDO PARK

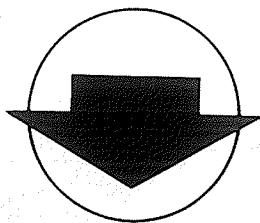
Description	Total cost (1964 base) +15% engineering, legal and survey fees (where applicable)	Cost per acre	Cost per frontage foot
Lateral storm sewers .. 15,000 ft. of 12" to 24"	\$13.50/ft. x 15,000 + 15%	\$2,220	\$10.12
Lateral sanitary sewers .. 15,500 ft of 10" sewer (granular backfill complete)	\$ 8.64/ft. x 15,500 + 15%	1,465	6.70
Lateral watermains .. 15,660 ft. of 6" and 8"	\$ 6.06/ft. x 15,660 + 15%	1,038	4.74
Concrete pavement & curb .. 18,980 ft. of 28' and 20' wide 6" to 8" thick (thickened edge) .. no back lanes	\$22.00/ft. x 18,980 + 15%	4,575	20.85
House connections .. 298 water, sanitary & storm	\$339 ea. x 298 + 15%	1,103	5.04
Sidewalks along main roads .. 2610 ft. 8' & 5' wide 4" thick	\$ 3.50 x 2,610 + 15%	100	0.46
Driveways by builders			
Landscaping - sodding, trees and sprinkler systems for parkettes	57,000 square yards sod- ding boulevards and par- kettes plus sprinklers	548	2.43
Street lighting ornamental .. 98 standards	\$150 ea. x 98	140	0.64
Hydro underground	Monthly charge		
Telephone underground	\$35.00/lot (estimated)	99	0.45
TOTALS		\$11,288	\$51.43



l o c a l d e t a i l

T U X E D O P A R K

t o w n o f t u x e d o



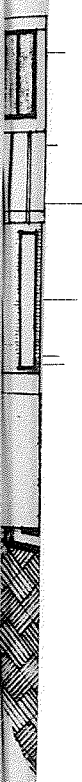
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t y p i c a l c r o s s - s e c t i o n

T U X E D O P A R K

t o w n o f t u x e d o



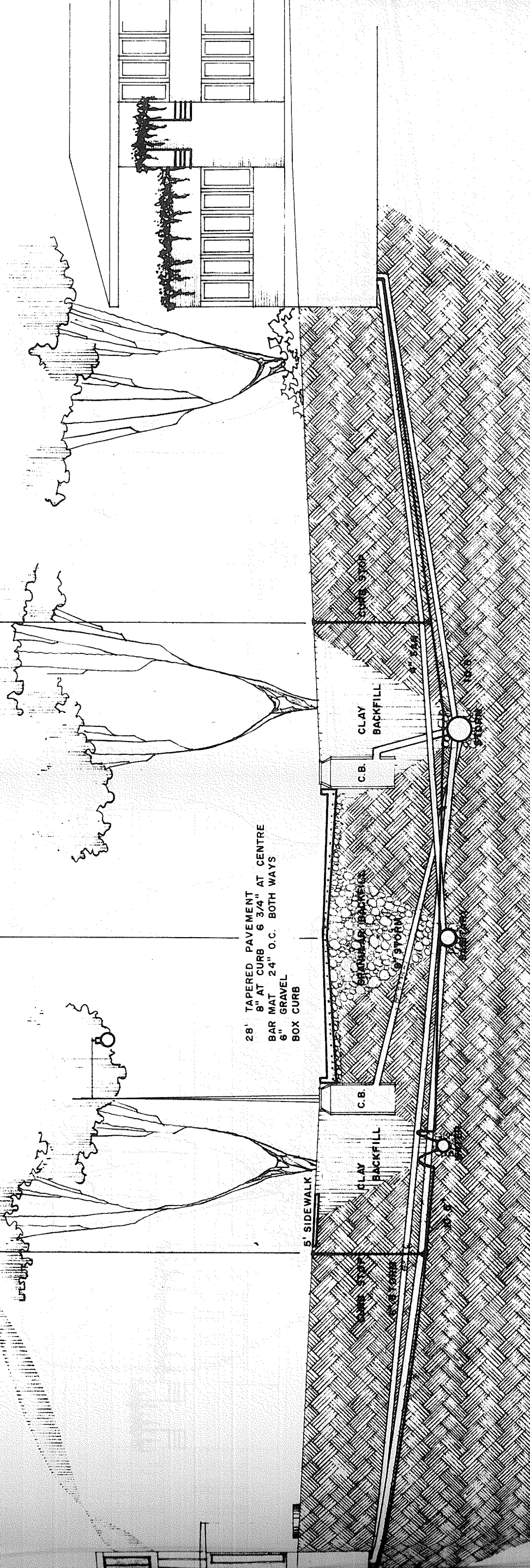
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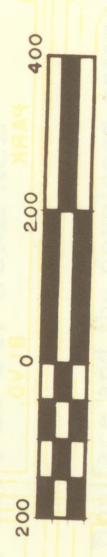
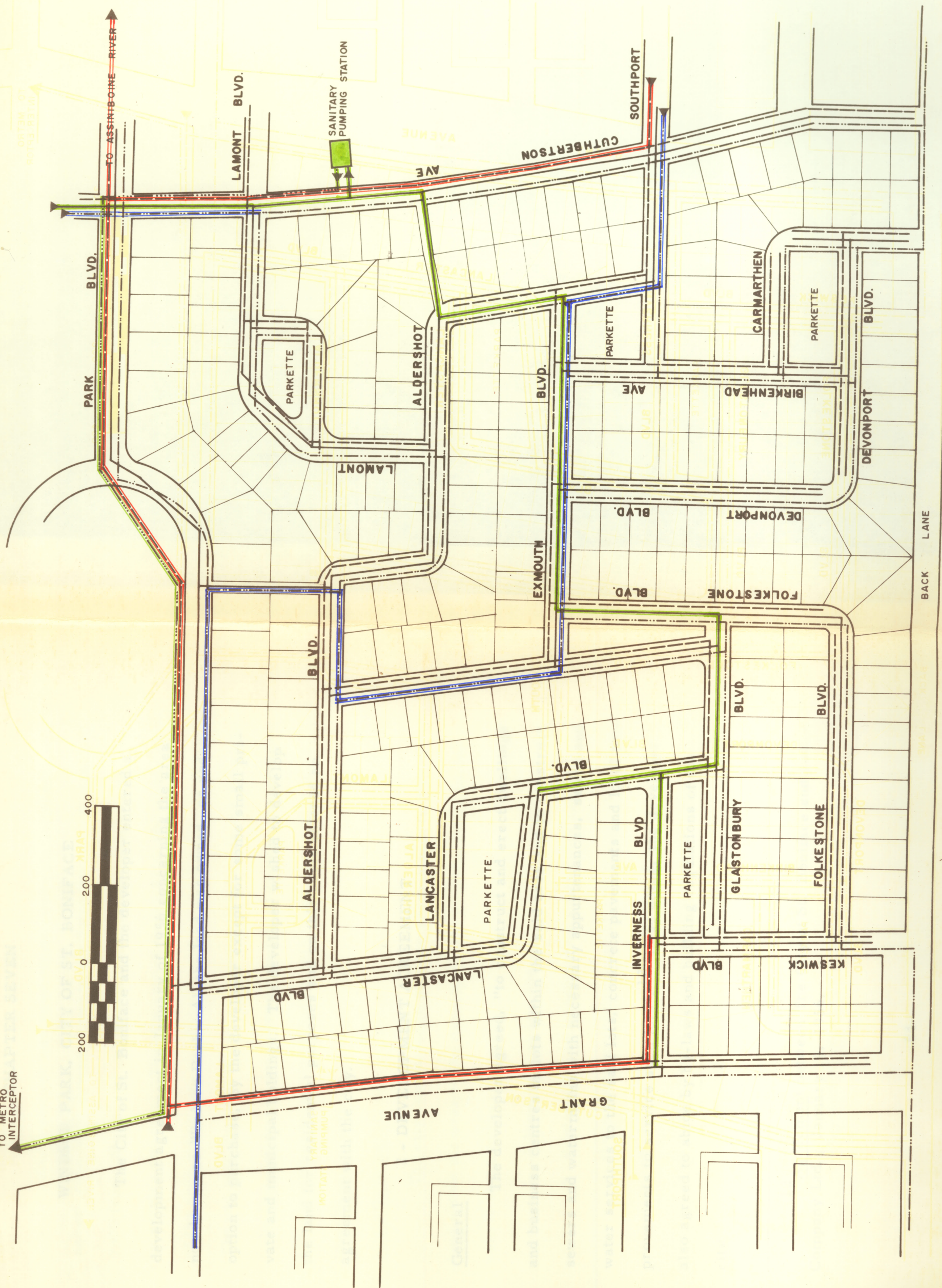
60' R.O.W.

R

G

R





TO METRO INTERCEPTOR

SANITARY PUMPING STATION

TO ASSINIBOINE RIVER

BACK LANE

PARK BLVD.

LAMONT BLVD.

ALDERSHOT BLVD.

LANCASTER BLVD.

INVERNESS BLVD.

EXMOUTH BLVD.

DEVONPORT BLVD.

SOUTHPORT BLVD.

PARKETTE

ALDERSHOT

LANCASTER

PARKETTE

PARKETTE

CARMARTHEN

PARKETTE

DEVONPORT

BLVD.

BIRKENHEAD AVE

DEVONPORT BLVD.

FOLKESTONE BLVD.

GLASTONBURY BLVD.

FOLKESTONE BLVD.

LANCASTER BLVD.

KESWICK BLVD.

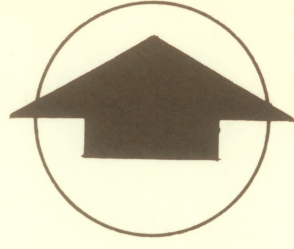
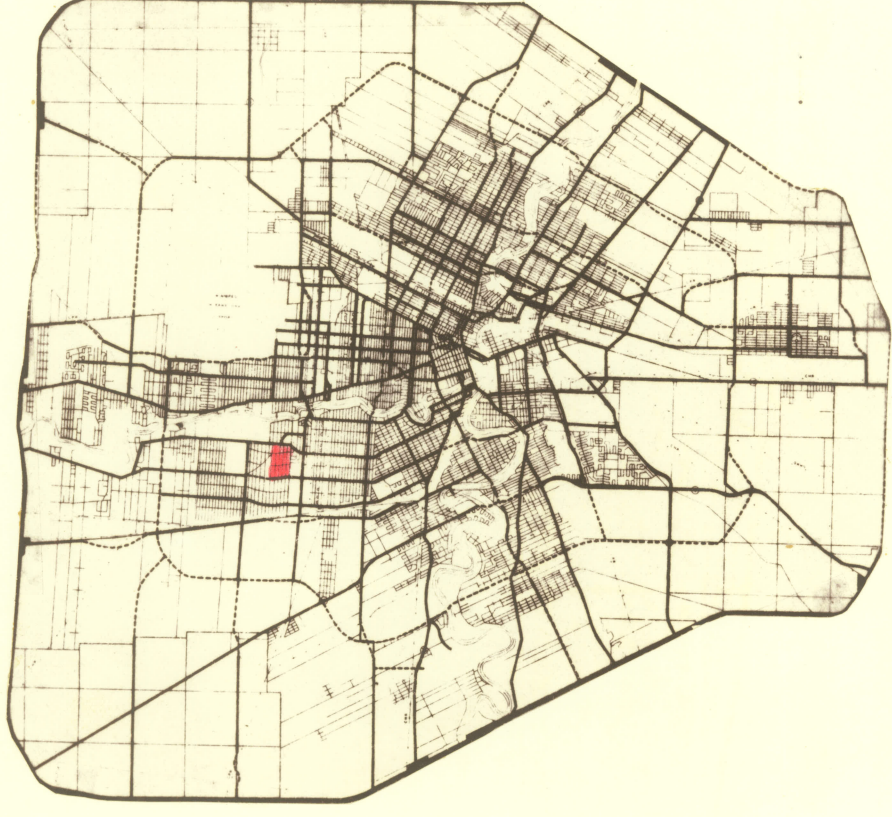
PARKETTE

FOLKESTONE

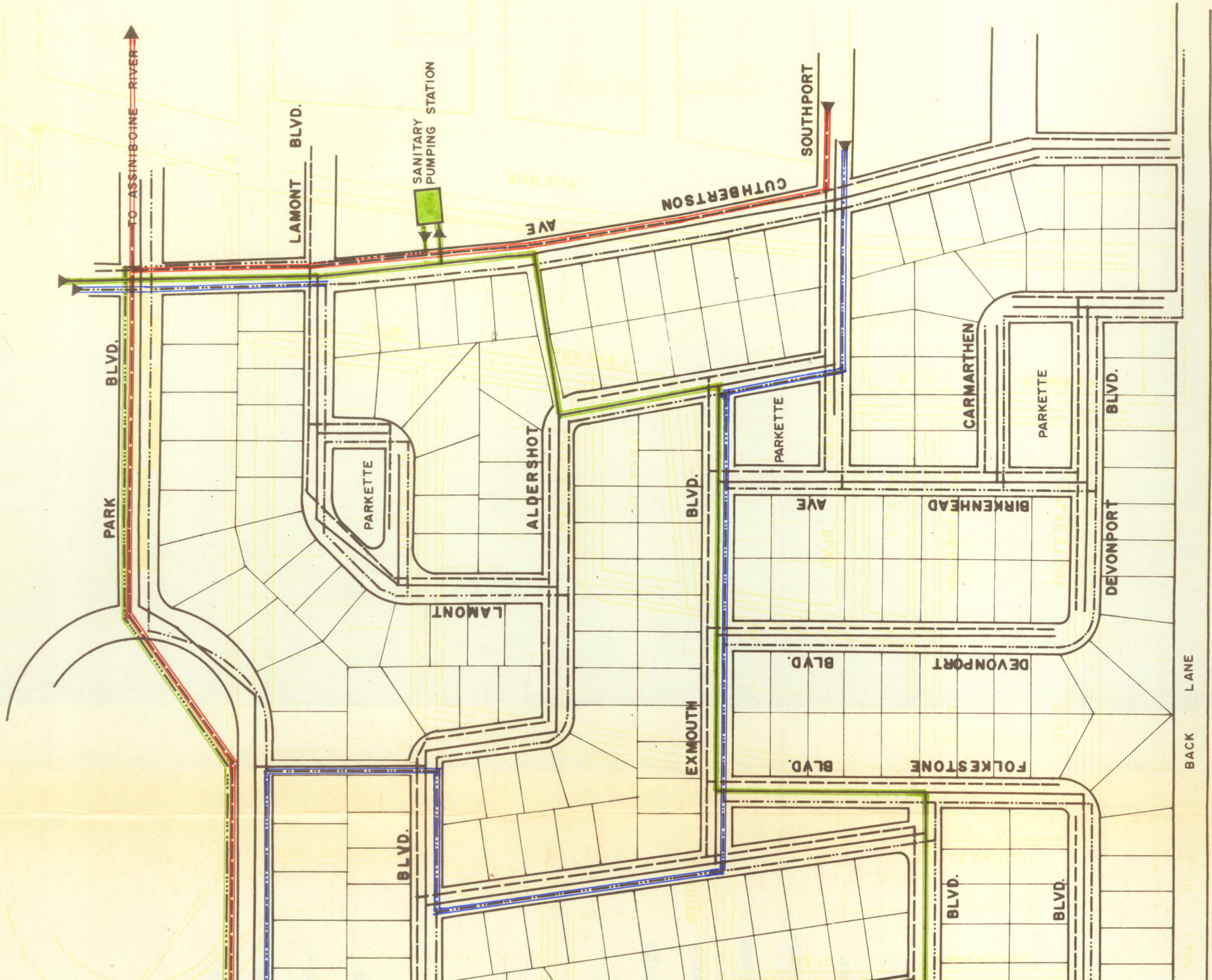
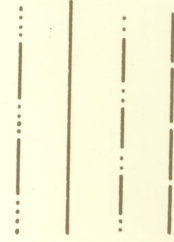
GRANT AVENUE

CUTHBERTSON AVE

plan of subdivision with services
TUXEDO
 TOWN OF TUXEDO



force main
 sanitary sewer
 water main
 storm sewer



CHAPTER SEVEN

WINDSOR PARK, CITY OF ST. BONIFACE

The City of St. Boniface and the developer entered a development agreement in January of 1956 concerning the area now known as Windsor Park. All the land was owned, or under option to purchase, by the developer except for some small private and municipal holdings. The developer wished to develop the land for residential purposes and on this basis entered an agreement with the city.

I - DEVELOPMENT AGREEMENT

General

The developer agreed, "to construct and erect dwellings and business centres on lots within the said area and to construct sewers and watermains with necessary appurtenances, sewer and water services to the said lots, concrete pavements and local improvements to service such lots".¹² In so doing, the developer also agreed to abide by by-laws and building regulations of the city.

¹² Agreement between The City of St. Boniface and Ladco Company Ltd., January 19, 1956.

Trunk Services Required

The developer was required to construct a 108 inch storm sewer trunk from Dawson Road to the Seine River, a distance of 7400 feet. This trunk was considerably larger than was necessary to service the area. The city agreed to pay \$110,000 as the share of the area outside the subdivision and serviced by the trunk.

The pro rata share of the private land falling inside the area was to be financed by the developer by means of 10 year debentures at 5½% and annual taxes levied by the city, sufficient to pay the annual installment of principal and interest.

Miscellaneous

The city contracted to sell two parcels of city-owned land within the area to the developer, the consideration for the sale to be as follows:

1. A lump sum of \$20,000.00.
2. Registration of an industrial subdivision covering these parcels which complied with the requirements of the St. Boniface Town Planning Scheme.
3. Construction of sewers, watermains and other local improvements within the parcels, as and when these parcels were developed.
4. Installation of sanitary and storm sewers on Elizabeth Road to serve the parcels.

5. Installation of 32 foot pavement on Elizabeth Road, between DeBourmont Street and Rue Archibald, to service the parcels. (Any property fronting on Elizabeth Road was assessed for 24 feet of pavement and the developer paid for the remainder).
6. Transfer of a 14 foot strip of company land, bounding Elizabeth Road, to the city.
7. Payment of taxes by the developer, for the lands in question from the date of the agreement.

Municipal Services Required

The types and standards of utilities required in Windsor Park were agreed to be as follows:

1. Sanitary and storm sewers, including lift stations, and forcemains, watermains and appurtenances.
2. Crown type concrete pavement on all streets: in bays, 24 feet in width and 6 inches thick, fully reinforced; through streets, 32 feet in width and 8 inches thick, fully reinforced.
3. Rolled curbs in bays and 6 inch barrier curb along through streets.
4. A minimum grade of 0.4% on streets with surface drainage not extending over 500 feet.

5. Concrete sidewalks 5 feet wide on both sides of through streets and through public walkways between loops.
6. Ornamental street lighting.
7. Boulevards and public park areas constructed throughout the subdivision and seeded, as well as trees and shrubbery planted parallel to the railway line.
8. Paved concrete lanes.
9. A concrete sidewalk 5 feet in width on the south side of Elizabeth Road.
10. Street signs throughout the area.

The developer was made responsible for the furnishing of all designs, profiles, plans and specifications for all the work included in the agreement at no cost to the city. All work under such designs was to be carried out under the supervision and to the satisfaction of the city's engineer.

Financing

The cost of local improvements was recovered by the developer by the sale of building lots in the area. Improvements benefitting private land were to be financed by the developer by means of 10 year debentures with the city collecting annual payments of 1/10 of the cost at $5\frac{1}{2}\%$ interest and depositing these payments in a trust account in favor of the developer.

The two parties agreed that the ownership of all sewers, lift stations, watermains, roads, streets, lanes, sidewalks, ornamental lights, boulevards and parks should vest in, and become the property of the city and that the duty of operating, servicing and repairing such utilities and the duty of maintaining said boulevards and parks should be performed by the city at the city's expense.

They also agreed that any right-of-way opened by the developer would become the property of the city and that any old right-of-way that was closed as a result of the new plan of subdivision would thereafter belong to the developer.

Any construction by other parties within the area was required to conform to an equal standard.

II - SERVICING STANDARDS

The servicing standards in Windsor Park varied slightly during nine years of development (from 1956 to 1964), but were essentially as follows:

Sewers

Concrete pipe, ASTM C-14 extra strength (8 inches to 15 inches), ASTM C-76 (18 inches and larger), asbestos cement pipe, ASTM C-428, and clay pipe CSA A60.1 extra strength, were all bedded on 4 inches of sand with 12 inches of hand placed backfill over the pipe. Sanitary sewers were subject to a minimum

size requirement of 10 inches and were required to have rubber gaskets. Storm sewers had mortar joints except that in freezing conditions rubber gaskets were specified.

Watermains

Asbestos cement watermains, AWWA C-400 Class 150, were bedded on and surrounded by sand. Cast iron pipe, ASA A21.8 Class 22, was bedded on clay and backfilled using hand placed material to one foot above the pipe. Stainless steel trim was required in the first phases of Windsor Park.

Pavement

The concrete used was of 3000 p. s. i. strength.

Residential streets were 24 feet in width with 6 inches of concrete, bar mat reinforcing and no base material.

Collector streets were 32 feet in width with 8 inches of concrete, bar mat reinforcing and no base material.

III - SUMMARY

Windsor Park was the first self-contained neighbourhood to be developed in Winnipeg. It was also the largest subdivision to be studied. The most striking feature of Windsor Park was the cost of trunk services which amounted to 47% of the total. A 108 inch storm sewer extending from Dawson Road to the Seine River

accounted for almost one half of this amount. The city contributed \$110,000 towards the cost of this sewer but this was only 13.5% of the actual total cost. The remaining 86.5% was borne by the subdivision.

Only 57% of the total area is devoted to building lots even though 50 foot rather than 60 foot rights-of-way have been used on residential streets. Parks and school space account for almost 12% of the total area. (See Table IX). Both these considerations tend to make the servicing more expensive.

The subdivision is a mixture of single family housing types, developed at a rate of about 350 lots per year since 1956, ranging in cost from \$14,000 to \$20,000 per home. The median range of dwellings would likely be about \$16,000. The average selling price of a lot in 1963 was about \$70 per front foot.

TABLE VII
TRUNK SERVICES WINDSOR PARK
(estimated by developer)

Description	Proportion Charged	Total Cost (1964 base) + 15% engineering, legal & survey fees	Cost per acre	Cost per frontage foot
STORM				
.. 7400 ft. of 108" (Dawson Road to Seine River)	86.6%	\$126.30/ft. x 7400 x86.6% + 15% = 932,000		
.. sub trunks 30" to 54"	100%	\$598,000 + 15% = 688,000		
		<u>1,620,000</u>	\$2,130	\$ 9.50
SANITARY				
.. main trunks 15" and 18"	100%	\$316,000 + 15% = 364,000		
.. sub trunks 12"	100%	\$ 73,000 + 15% = 84,000		
.. lift station and forcemain	100%	\$172,000 + 15% = 197,000		
		<u>645,000</u>	849	3.78
WATER				
.. 12" & 10" watermain feeders down main roads	100%	\$408,000 + 15% = 469,000		
			617	2.75
PAVEMENT				
.. full width of all main streets 32' wide 8" thick	100%	\$903,000 + 15% = 1,038,000		
			1,365	6.09
TOTALS			\$4,980	\$22.12

TABLE VIII

OTHER MUNICIPAL SERVICES WINDSOR PARK
(estimated by developer)

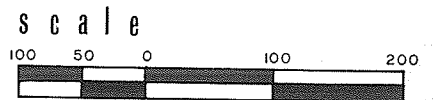
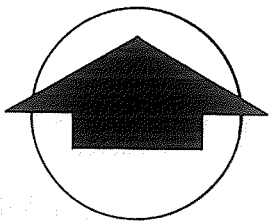
Description	Total cost (1964 base) +15% engineering, legal and survey fees (where applicable)	Cost per acre	Cost per frontage foot
Lateral storm sewers .. 12" to 24"	\$ 396,000 + 15%	\$ 600	\$ 2.67
Lateral sanitary sewers .. 8" and 10"	\$ 462,000 + 15%	700	3.11
Lateral watermains .. 6" and 8"	\$ 579,000 + 15%	875	3.90
Concrete pavement & curb .. residential streets only 24' wide 6" thick reinforced	\$1,780,000 + 15%	2,700	12.00
.. back lanes	\$ 25,500 + 15%	35	0.17
House connections (included under water and sanitary laterals.)			
Sidewalks & walkways	\$ 186,000 + 15%	282	1.25
Driveways constructed by builder			
Landscaping .. boulevard sodding and park landscaping	\$ 229,000	300	1.34
Street lighting .. 734 standards	\$ 150 x 734 = 109,900	145	0.64
Hydro standard overhead no extra cost			
Telephone standard overhead no extra cost			
TOTALS		\$5,641	\$25.08



l o c a l d e t a i l

W I N D S O R P A R K

c i t y o f s t . b o n i f a c e



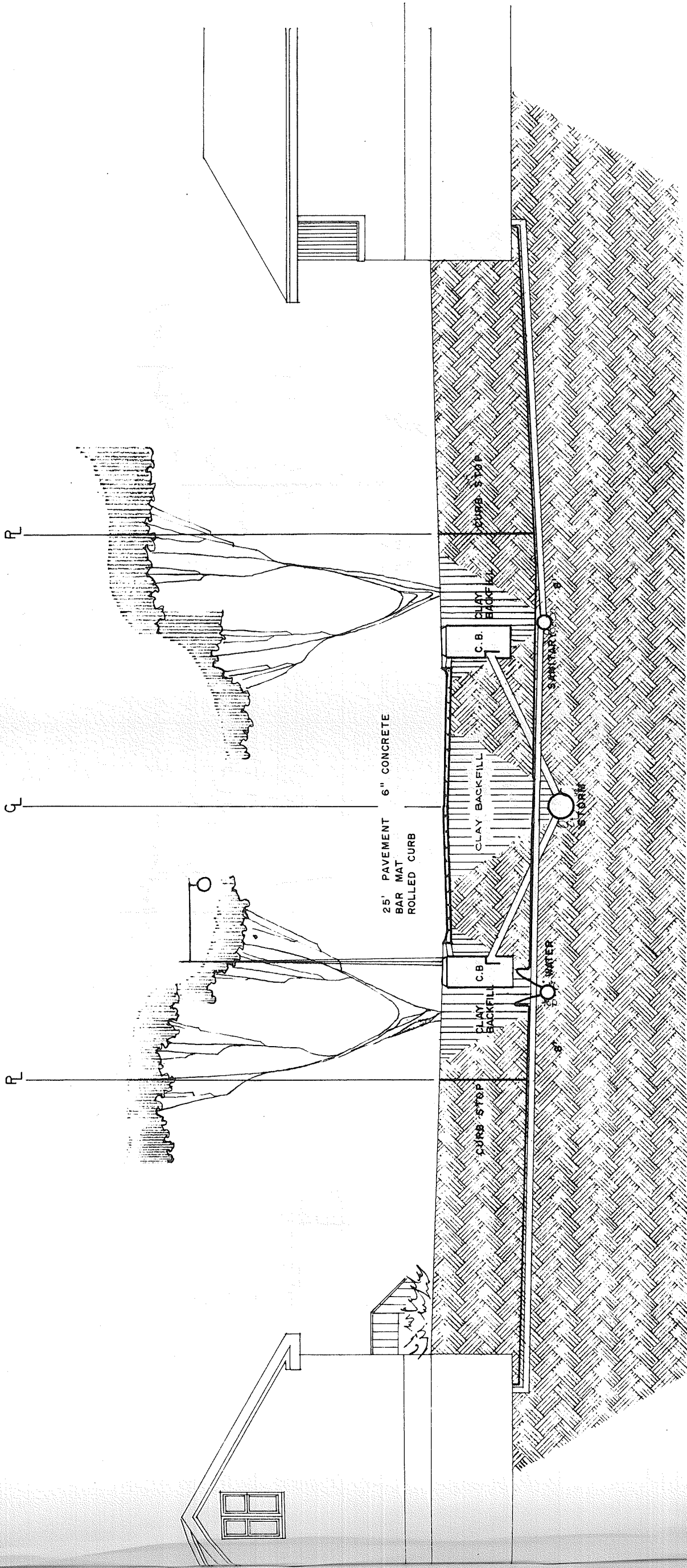
t y p i c a l c r o s s s e c t i o n

WINDSOR PARK

c i t y o f s t . b o n i f a c e

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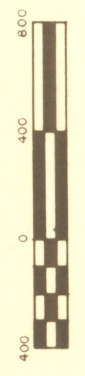
50' R.O.W.





TRANS-CANADA HIGHWAY EAST

BUFFER ZONE



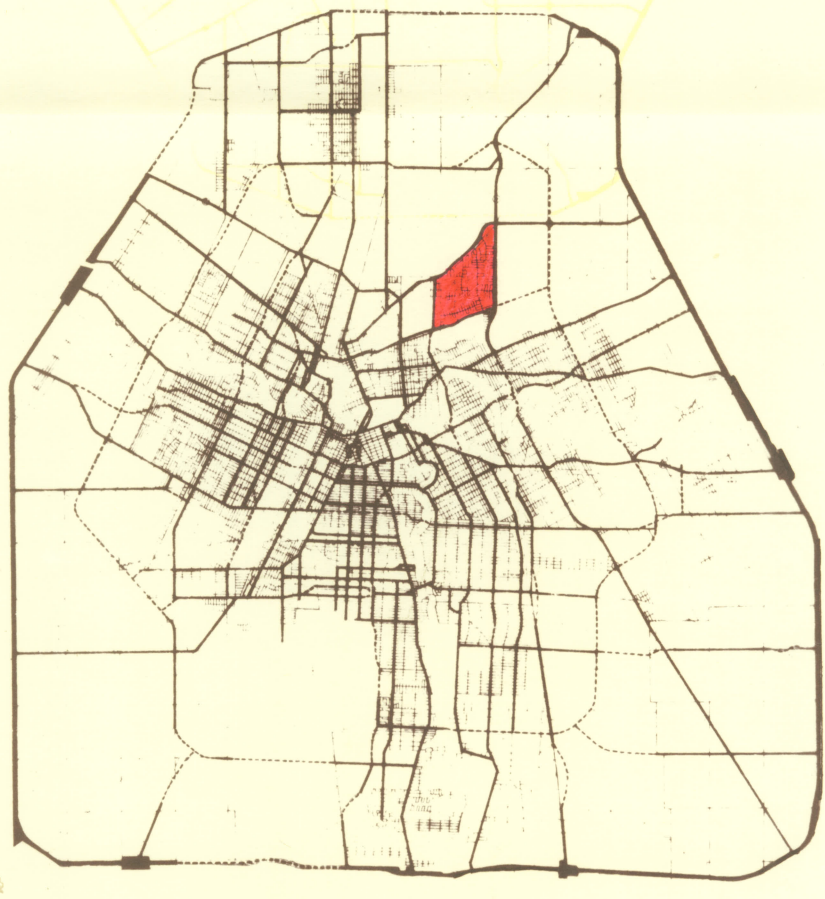
237

239

plan of subdivision

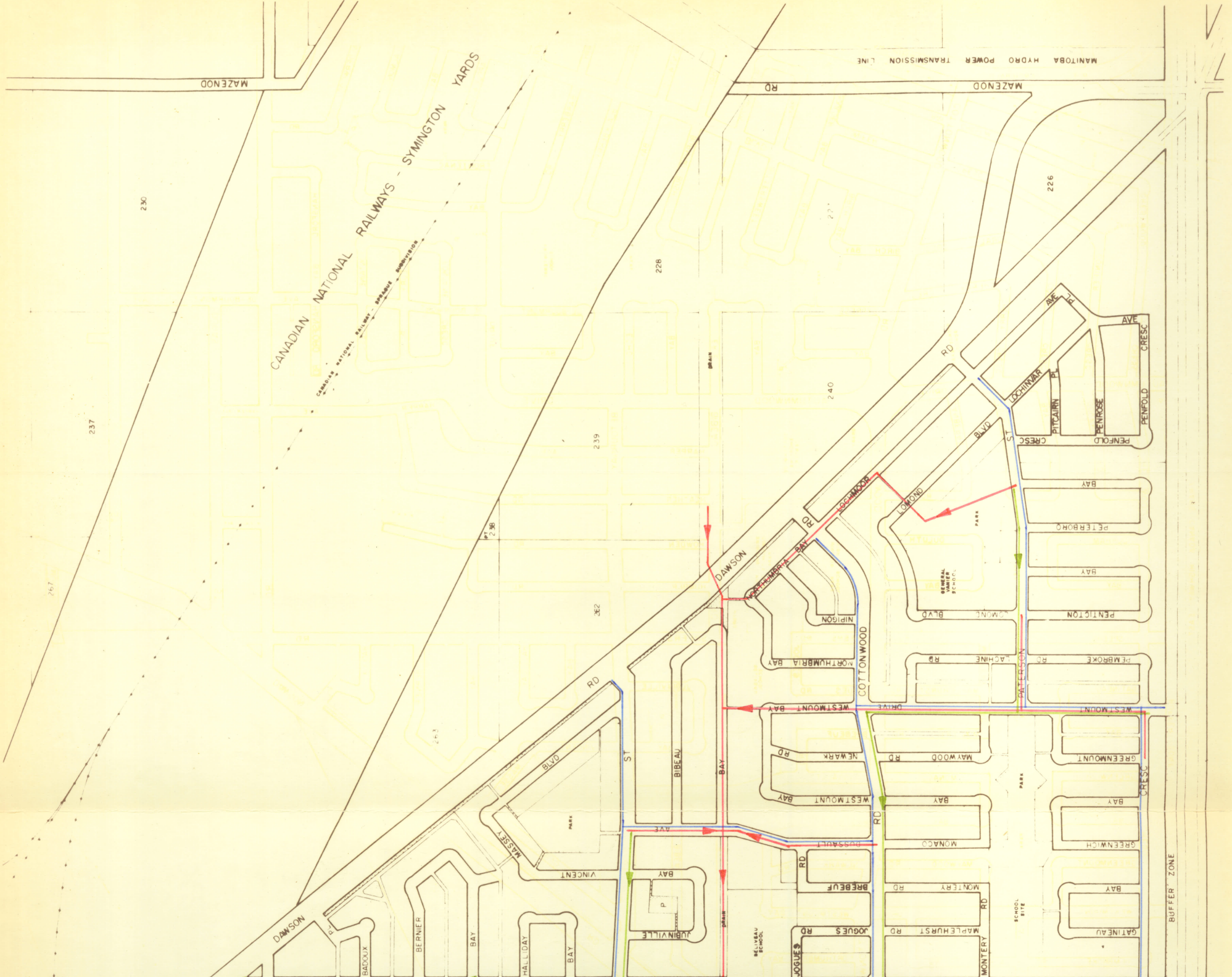
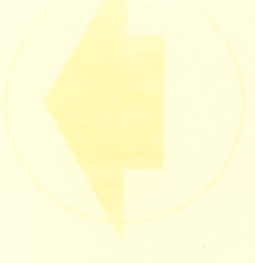
WINDSOR PARK

city of st. boniface



SERVICE TRUNKS

- FORCE MAIN
- SANITARY SEWER
- STORM SEWER
- WATER MAIN



CHAPTER EIGHT

COMPARISONS

The subdivisions studied are quite dissimilar. Table IX shows this clearly. In order that a direct cost comparison of subdivision could be undertaken, such variables as location, percentage of open space, density and frontage per net acre, would have to be comparable, which is seldom the case. Within any particular subdivision, nevertheless, a great deal can be learned about development by studying the effects of the various components of cost.

Trunk Costs

Reference to Table XI shows that the trunk services constituted from 18% to 47% of the total cost of servicing the subdivisions. This is a considerable variation when one takes into account that trunk services may or may not be required depending on the location of the subdivision.

Methods of distributing trunk costs vary widely. In some municipalities the cost of the trunk within a subdivision is spread over a large district and all share in the cost through taxation. In other municipalities, the system is not quite so equitable.

In Windsor Park for instance, the future residents were charged with 86% of the cost of the 108 inch storm sewer crossing the subdivision and leading to the Seine River. The municipality at large contributed only 14% towards the cost of installing this facility which was intended to replace a ditch system serving the entire eastern section of the municipality. In Pulberry, as well, the subdivision was charged with the entire cost of the storm trunks, pumping chamber and trunk watermains, facilities which actually will be of benefit to an area considerably larger than the subdivision itself.

Lateral Costs

While trunk costs varied widely in the examples indicated, Table X shows that lateral costs were quite constant. Except for Tuxedo Park, which is a quite separate class of subdivision, the lateral costs varied only from \$25 per front foot to \$32 per front foot. It should be noted, as well, that these services comprised about 70% of the total servicing cost.

Maintenance

These tables and prices quoted include only initial installation costs. The maintenance required to keep these services in operating condition has not been considered.

Reference to the typical street cross-sections accompanying Chapters four to seven, will show that the engineering policies vary from municipality to municipality. Some of the most obvious differences are:

1. The methods of draining surface water into the storm sewer.
2. The placement of storm and sanitary sewers and the location of the trenches with respect to the road pavement.
3. Placement of catch basins under or close to pavement.
4. The material used for backfilling trenches, particularly under pavement.
5. Thicknesses of concrete pavement.
6. Use of reinforcing steel.
7. Thickness of base material used, if any.

Minimum sewer sizes, larger than might otherwise be employed, are imposed in some subdivisions.

	<u>SMALLEST SEWER SIZE USED</u>			
	Westwood	Pulberry	Tuxedo Park	Windsor Park
Storm	8"	12"	8"	12"
Sanitary	8"	8"	10"	10"

Higher requirements than strictly necessary for particular applications are more expensive, but long term economies may be realized. All the variable standards previously listed are the results of engineering design aiming at long term economies. For example, settlements of a sewer system and/or concentrations of solid material within a sewer do not affect larger sewers as severely as smaller ones; hence, maintenance is less and the large one may be more economical over a long term.

Selling Price of Lots

The average selling prices of lots in the four subdivisions are as follows:

Westwood	\$80 per frontage foot
Pulberry	\$70 per frontage foot
Tuxedo Park	\$165 per frontage foot
Windsor Park	\$70 per frontage foot

The cost of a developed lot to a home buyer does not always reflect the cost of development. Initially, the developer may sell at a low price so that an area can become established and so that builders are not penalized for buying large blocks of land. He then might raise prices slightly every year to protect the early investors and to increase profit. The price of land in Pulberry for instance, rose from \$62 per foot in 1961 to \$70 per foot, with only a few lots remaining undeveloped, in 1964.

The selling prices given are the averages once the subdivisions were fairly well established.

Income groups living in the areas studied have been estimated to be:

Westwood	\$7,000 per annum
Pulberry	\$6,000 per annum
Tuxedo Park	\$20,000 per annum
Windsor Park	\$5,500 per annum

These rough estimates have been made in order to indicate that suburban living is perhaps overly expensive for the average family which, in Winnipeg, earns less than \$4,000 per annum.¹³

Reducing Servicing Costs

Possible methods of reducing servicing costs are as follows:

1. A greater use of more economical street systems. A study made by C. M. H. C. determined that loops and cul-de-sacs make more efficient use of municipal services than conventional gridiron systems.¹⁴ Cul-de-sacs and loops have an inferior yield of lots per acre, however, because of the large irregular lots

¹³Government of Canada, Canadian Census, 1961.

¹⁴Central Mortgage & Housing Corporation, Housing Design Part I, Ottawa, 1952, Page 16.

required at corners. Other items such as safety, privacy, cost of construction and snow clearance, need to be assessed in a cost-benefit study before the most economical type can be determined.

2. Storm sewer sizes could possibly be reduced. Design standards in use provide for a storm duration-intensity of a three to five year frequency. Research should be conducted to determine the actual frequencies at which storm systems flow full, the effects of street storage of storm water, and other equally important items about which little is known. Because of the relatively high cost of providing storm drainage, significant savings might be achieved by modified designs.

3. Minimum sewer sizes, enforced by some municipalities, are of questionable benefit, simply because some municipalities require them and others do not. The object of the minimum sizes has undoubtedly been long range economy for the municipality, but the requirement seems to be rather arbitrary and not based on flow requirements. Sanitary house connections are subject to the same criticism. As an illustration, it should be noted that the normal domestic sewer size in other Canadian cities is 4 inches as compared to 6 inches in three out of the four subdivisions studied.

4. Residential streets should be of a standard suitable for the volume and character of traffic expected. A number of municipalities make little or no distinction between the width and type of pavement or the right-of-way width used on a minor residential street and one which serves heavier traffic loads. There is no reason why purely residential streets must be of the same design standards as collector or arterial streets. This practice constitutes a definite deterrent to economical development.

5. Another inequity with which new residents are faced is that of providing and paying for improvements and utilities in excess of what is needed to serve the specific area being developed. An example of this is the case where a development is required to install a service larger than required, in order to serve future development outside the area. This was the situation in Windsor Park and Pulberry with respect to storm and watermain trunks. Objections to this type of requirement are that the new residents are creating new taxable values for the city as a whole, to which the city is not contributing, and that they are paying for improvements which are benefitting and are properly chargeable to areas beyond their subdivision, and of no direct benefit to them.

Reducing Housing Costs

This thesis deals only with development costs encountered off the building sites but it is apparent that these costs lead to and have a direct effect on housing. The price paid for a building lot usually predetermines the cost of the structure which will be erected thereon. Within a given subdivision the most expensive lots will, of course, have the most expensive houses built on them. Within a city the same holds true. Hence, more expensive off-site development encourages higher cost housing and discourages the more economical housing schemes.

A higher density of development is one way of reducing unit costs. This aim can be achieved by employing duplexes, row housing, apartments, cluster arrangements, and a number of other systems in which there is a more economical use of available land. Higher densities are possible but most municipalities do not favour this kind of development within their municipal boundaries. They fear that once such developments are entrenched within municipal boundaries, they will attract a flood of similar types, and a general lowering of standards may result. If an equitable and rational method existed for distributing different housing types among municipalities, perhaps municipal resistance would diminish.

Summary

The methods of reducing costs which have been suggested are only a few of the ways in which savings can be realized. Presumably savings could be made in all the other areas of development as well. Savings must be made if we are to provide adequate housing for a greater portion of our population. As the situation exists, we are producing homes only for our highest 40% income group. The absolute lowest income group which can buy and maintain a new home in Winnipeg is that earning about \$4,500 per annum.¹⁵ This is considerably over Winnipeg's average annual income. Obviously less expensive alternates to our contemporary systems of development must be found.

¹⁵ C. M. H. C. permits a home purchaser to allocate up to 27% of his earnings to paying for an N. H. A. house. Of course, with a second mortgage, or by buying his house under a private financing arrangement, he could spend more.

TABLE IX

subdivision calculations

and

summary of development costs

- WESTWOOD
- PULBERRY
- TUXEDO PARK
- WINDSOR PARK

	TOTAL AREA acres	RIGHTS OF WAY acres	PUBLIC OPEN SPACE AND SCHOOLS acres	PRIVATE LAND acres (included in area lots)	OTHER USES acres	NO. LOTS AREA LOTS	DENSITY lots per net acre lots per gross acre	FRONTAGE LOTS feet	COST OF TRUNK SERVICES per frontage foot	COST OF OTHER SERVICES per frontage foot	TOTAL COST per frontage foot
WESTWOOD	230	60.9	17.6			959 lots 151.5 acres 65.9 %	6.35 4.15	60,040 261 / gross acre 61.5 / lot	\$ 7.36 18 %	\$ 32.44 82 %	\$ 39.80
		26.45 %	7.65 %								
PULBERRY	92.5	21.6	3.1	19.35		484 lots 67.8 acres 73.3 %	7.14 5.23	28,400 (8,000 private) 307 / gross acre 58.7 / lot	\$ 12.86 32 %	\$ 27.32 68 %	\$ 40.18
		23.35 %	3.35 %	21 %							
TUXEDO PARK	105	29.8	3.9	1.22		298 lots 71.30 acres 67.9 %	4.18 2.84	22,870 218 / gross acre 76.8 / lot	\$ 14.46 21 %	\$ 51.43 79 %	\$ 65.89
		28.4 %	3.7 %	1.15 %							
WINDSOR PARK	760.7	193.5	90.0		38.2	3,100 lots 439 acres 57.8 %	7.06 4.07	170,400 224 / gross acre 55 / lot	\$ 22.12 47 %	\$ 25.08 53 %	\$ 47.20
		25.4 %	11.8 %	5.0 %							

TABLE X
(summary of Tables I to VIII)

COST PER FRONTAGE FOOT

	WESTWOOD	PULBERRY	TUXEDO PARK	WINDSOR PARK
TRUNKS				
STORM	\$3.38	\$6.45	\$4.46	\$9.50
SANITARY	0.93	3.70	8.30	3.78
WATER	1.19	2.39	1.70	2.75
ROADS	1.86	0.32	----	6.09
LATERALS				
STORM	2.43	3.51	10.12	2.67
SANITARY	2.22	3.51	6.70	3.11
WATER	4.34	5.47	4.74	3.90
ROADS	14.45	11.82	20.85	12.00*
LANES	0.85	----	----	0.17
HOUSE CONN.	3.66	1.41	5.04	(included elsewhere)
SIDEWALKS	0.64	0.95	0.46	1.25
DRIVEWAYS	1.39	----	----	----
LANDSCAPE	1.41	----	2.43	1.34
STREET LIGHTING	0.65	0.65	0.64	0.64
HYDRO	----	----	----	----
TELEPHONE	0.40	----	0.45	----
TOTALS	\$39.80	\$40.18	\$65.89	\$47.20

*excludes cost of any portion of main roads (see Table VIII)

CHAPTER NINE

CONCLUSIONS

The intent of this study has been to determine certain development costs and to clarify and evaluate some of the problems inherent in residential development. The scope is plainly limited, since only four subdivisions in Metropolitan Winnipeg have been examined, and is limited further in that only municipal utility costs have been assessed. Nevertheless, the consequence has been to reveal some important characteristics of our development system.

The most evident inadequacy is that residential development is providing housing for only our higher income groups. Whether development costs are as low as they could be is a debatable question.

Another characteristic is that every subdivision is completely different. On the basis of the evidence presented, it is evident that developments which appear at first to be basically analogous, are in fact, quite dissimilar when all aspects of design and politics are considered.

The prices determined are representative only of the areas concerned and must not be assumed to be accurate for

other places and times. The contract costs employed have been affected by innumerable obscure differences, some of which have been mentioned previously, as well as normal construction fluctuations. Hence, the price structure cannot be applied indiscriminately in the analysis of other situations which appear to be the same. Every development is separate and must be analysed and assessed individually.

A more complete study of the development of residential subdivisions should contain a complete assessment of all development costs including raw land and the developer's overhead and profit. In addition, maintenance, performance and obsolescence studies of all services installed should be conducted with the aim of determining a cost of a utility per resident per year. These studies surely would reveal the mistakes and successes of the designers in understandable economic terms.

Further investigations to broaden the scope of this study are required. Subdivisions in all of the member municipalities of Metro Winnipeg should be analysed so that a complete cross-section of development is represented. Perhaps a number of developments in other Canadian cities could be considered and equated to these findings.

Once a study of this nature is completed, it should be possible to effectively compare various subdivision systems in meaningful economic terms and to formulate standards of design which are appropriate to particular situations. This thesis is possibly one step in this direction.

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5. Other Records

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