A REDEVELOPMENT PLAN

FOR

THE TOWN OF CHURCHILL, MANITOBA

---

by

Gerald Joseph Tencha, B.Sc.(C.E.)

A Thesis

Presented to

the Faculty of Graduate Studies and Research

In Partial Fulfillment

of the Requirements for the Degree

Master of Science, (Community Planning)

University of Manitoba

Winnipeg, April, 1963.

THE UNIVERSITY OF MANITOBA ELIZABETH DAFOE LIBRARY

ACKNOWLEDGMENTS

The author would like to express his sincere thanks to all people who, through discussion or interviews, contributed to the completion of this thesis.

A special word of thanks is directed to Mr. D. Henderson, Planning Director, Town Planning Division, Department of Industry and Commerce, Manitoba government, for his co-operation and time rendered for discussions and interviews.

Also, the author wishes to express a special word of thanks to Associate Professor V. J. Kostka, School of Community Planning, University of Manitoba, for his encouragement and personal guidance.

CONTENTS

PAGE

Foreward vii

PART ONE

Introduction to Churchill

General Description 2

Historical Background 6

Present Land Use and Zoning 10

The Townsite 16

Condition of Buildings 16

Utilities 22

Present Population 28

Economy 31

Need for Redevelopment 34

Estimated cost of Acquiring and Clearing Townsite 38

PART TWO

Background to Design

Estimate of Future Population 42

Housing Requirements 46

PART THREE

PAGE

The Redevelopment Plan

General 53

Proposed Land Use 53

The Residential Area 56

The Commercial Area 59

The Industrial Area 60

The Circulation System 61

Walkways 66

Sidewalks 67

Enclosed Walkway (Suggested) 67

Utilidor 69

Water Supply 75

Storm Drainage 76

Implementation of Redevelopment Plan 76

BIBLIOGRAPHY 80

LIST OF FIGURES

TABLE		PAGE
I.	Age and Condition of Buildings	23
II.	Population Churchill Area	30
III.	Residential Area Breakdown	57

PLATE		
No. 1	Temperature and Precipitation Variation . . .	5
No. 2	Sketch of Collector Street	62
No. 3	Sketch of Cul-de-sac	65
No. 4	Sketch of Enclosed Walkway (Suggested)	68
No. 5	Sketch of Utilidor	70
No. 6	Typical Utilidor Layout	72

MAPS		
No. 1	Index Plan	7
No. 2	Present Land Use	12
No. 3	Present Zoning	14
No. 4	Condition, Age, Distribution of Buildings . .	20

PHOTOGRAPHS		
	Topography and Snowfall	3
	Family Dwellings within Townsite	18

FOREWARD

The purpose of the redevelopment plan is to provide a practical means by which blight in residential and commercial areas can be eliminated, and a new environment constructed which will provide for the health, safety, welfare and general well-being of all its inhabitants.

To prepare the redevelopment plan for the Town of Churchill, Manitoba, it was necessary to examine the historical background, population, economy, present conditions, and also the climatic extremes experienced in the region.

With careful study and due consideration given to the information obtained about the various factors listed above, and with the guidance of good planning principles, the plan of redevelopment for the town was designed.

PART ONE

INTRODUCTION TO
CHURCHILL, MANITOBA

GENERAL DESCRIPTION

The town of Churchill is situated on the east peninsula at the mouth of the Churchill River in Township 112, Range 20 East of the Principal Meridian, in the province of Manitoba.

This peninsula is quite narrow, being only about one half mile at its widest extremity, and forms the east bank of the Churchill River. The topographical features of this site can best be described as bleak and barren. The soil formation is characterized by granite outcrop interspersed with clay pockets. Boulders of various sizes are dispersed throughout the townsite.

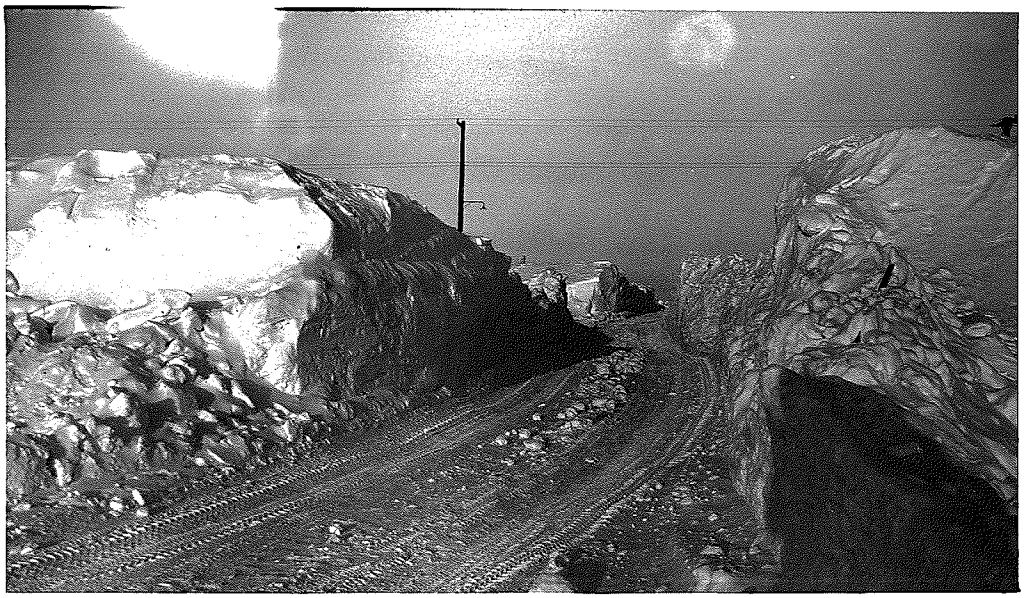
Following the northerly coast of the peninsula is a rock escarpment about 75 feet above Mean Sea Level. The elevation of the site which the town occupies varies from 45-58 feet above M.S.L. adjacent to the rock escarpment, down to 22-26 feet above M.S.L. along the southern limit of the townsite.

Although at one time there was a tree cover, none exists at the present time. Because of the short growing season, lack of topsoil and the high frost level, replanting has proven to be unsuccessful. Observations over a thirty year period reveal that there are an average of only sixty-three frost-free days per year. Also, during the warmer part of the year, the average depth of the thaw does



APR

Topography



FEB 63 •

Snowfall

not permeate to more than two feet below the ground surface. The Churchill region is well within the perma-frost region; that is the soil remains virtually frozen the year round.

The climatic conditions of this region are classified as of the sub-arctic type. Winters are long and quite severe whereas the summers are short and cool. The seasons of spring and fall are practically eliminated.

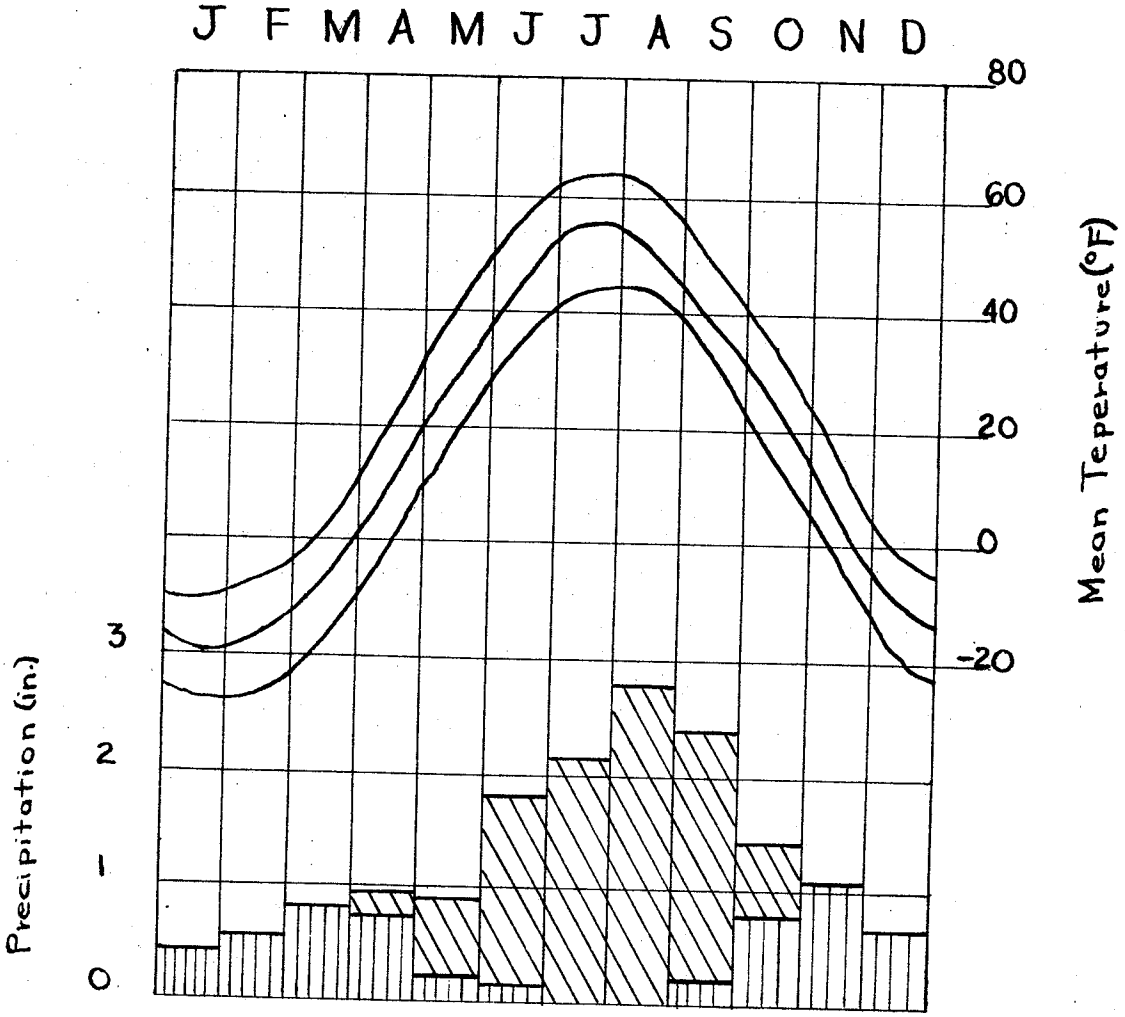
Precipitation is very low. Based on thirty years of observations, the average annual precipitation amounts to 15.7 inches, of which 10.2 inches is rain, and 5.5 inches snow. Note: 5.5 inches represent the snowfall equivalent to 5.5 inches of rainfall. One inch of rainfall will yield approximately the same amount of precipitation experienced from 10-12 inches of snow. Therefore, the Churchill region receives approximately five and one half feet of snowfall per year.

A graphical representation of temperature and precipitation variations based on thirty years of observations is shown on Plate 1, Page 5.

On the outskirts of the townsite a few settlements have been established. To the southwest of the townsite and located across the Canadian National Railways track from the town of Churchill is a windswept area known as the Flats. This area is owned mostly by C.N.R. although the

Temperature And Precipitation For The Churchill Region

Based On 30 Years Of Observation



Average Frost Free Period 63 Days

Spring Frost Average June 28, Earliest June 7, Latest July 15

Fall Frost Average August 30, Earliest July 16, Latest Oct. 2

Rainfall

Snowfall Expressed In Inches Of Rain

PLATE No. 1

Harbours Board owns some portion of it. The first shacks were constructed on this area by white trappers about thirty-four years ago.

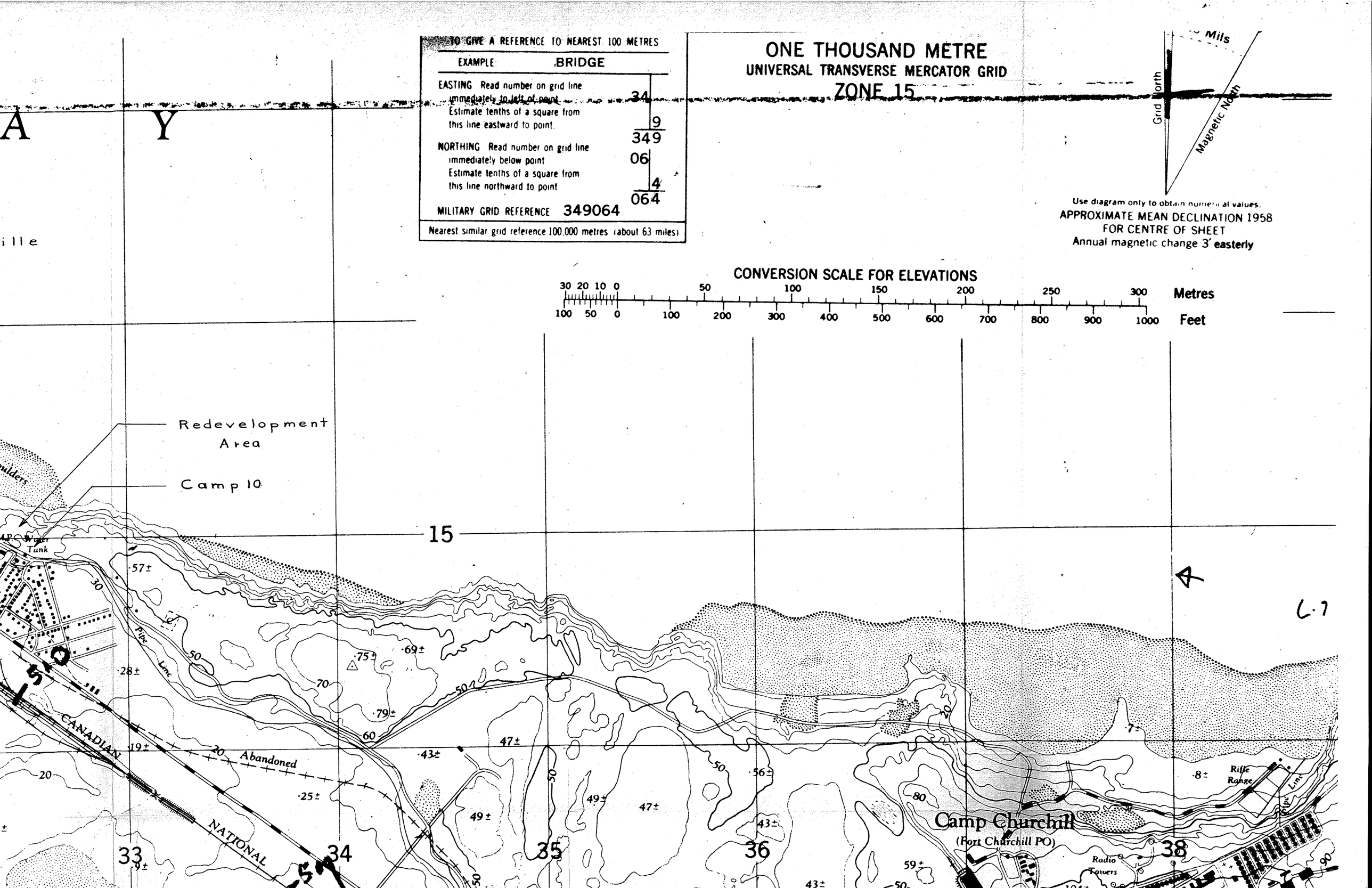
To the northeast of the townsite behind the National Harbours Board's property is an area known as Jockville. This area is very similar to the Flats.

About four miles to the southeast of the townsite lies the airfield and military camp, Fort Churchill. Approximately half way between this military camp and the townsite is an Eskimo establishment known as Camp 20. Please refer to Index Map Page 7, in order to obtain a visual orientation of these areas with respect to the townsite of Churchill.

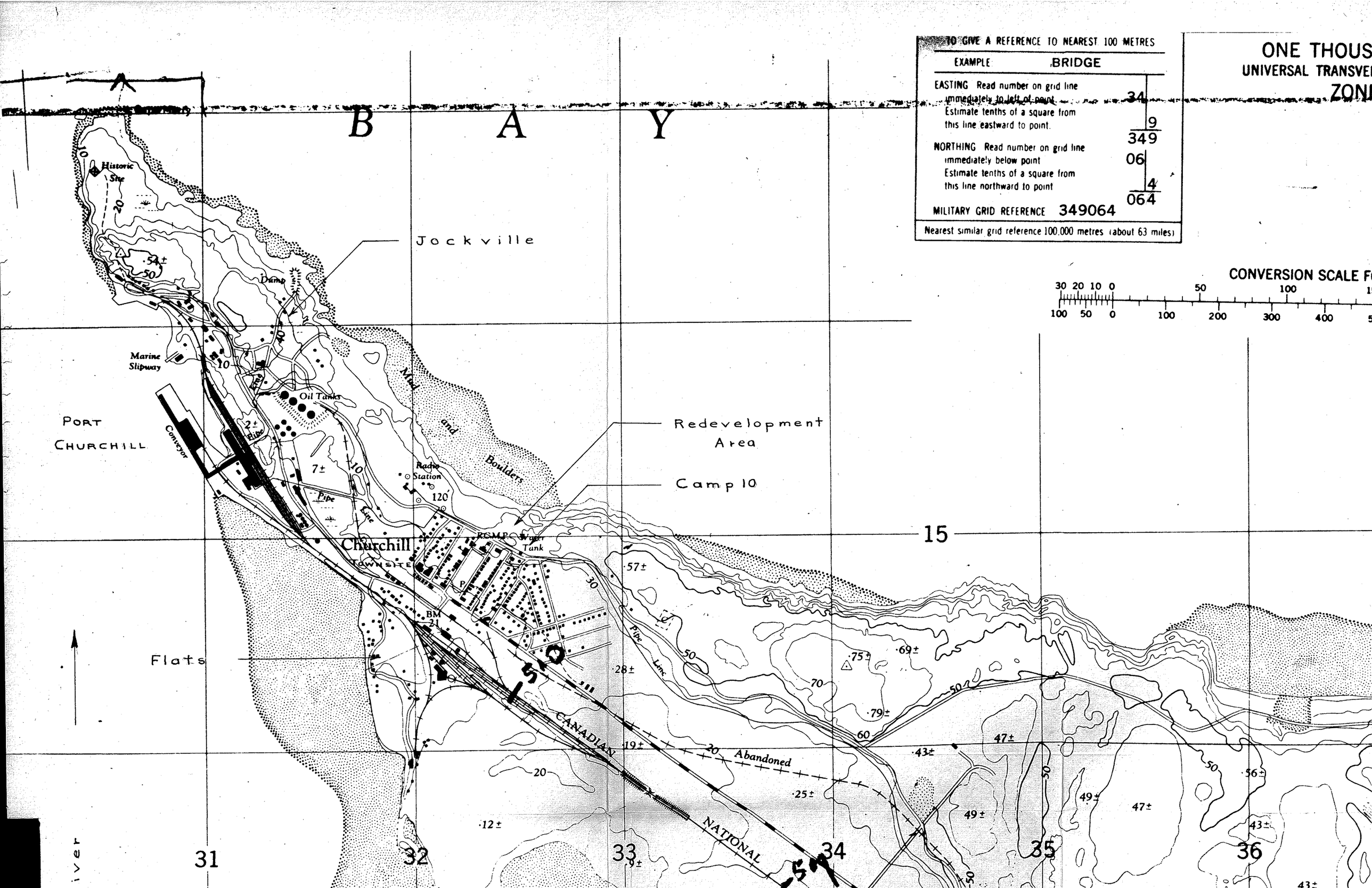
The townsite of Churchill grey in conjunction with the Federal Harbours Board and proximity rather than suitability determined its location.

HISTORICAL BACKGROUND

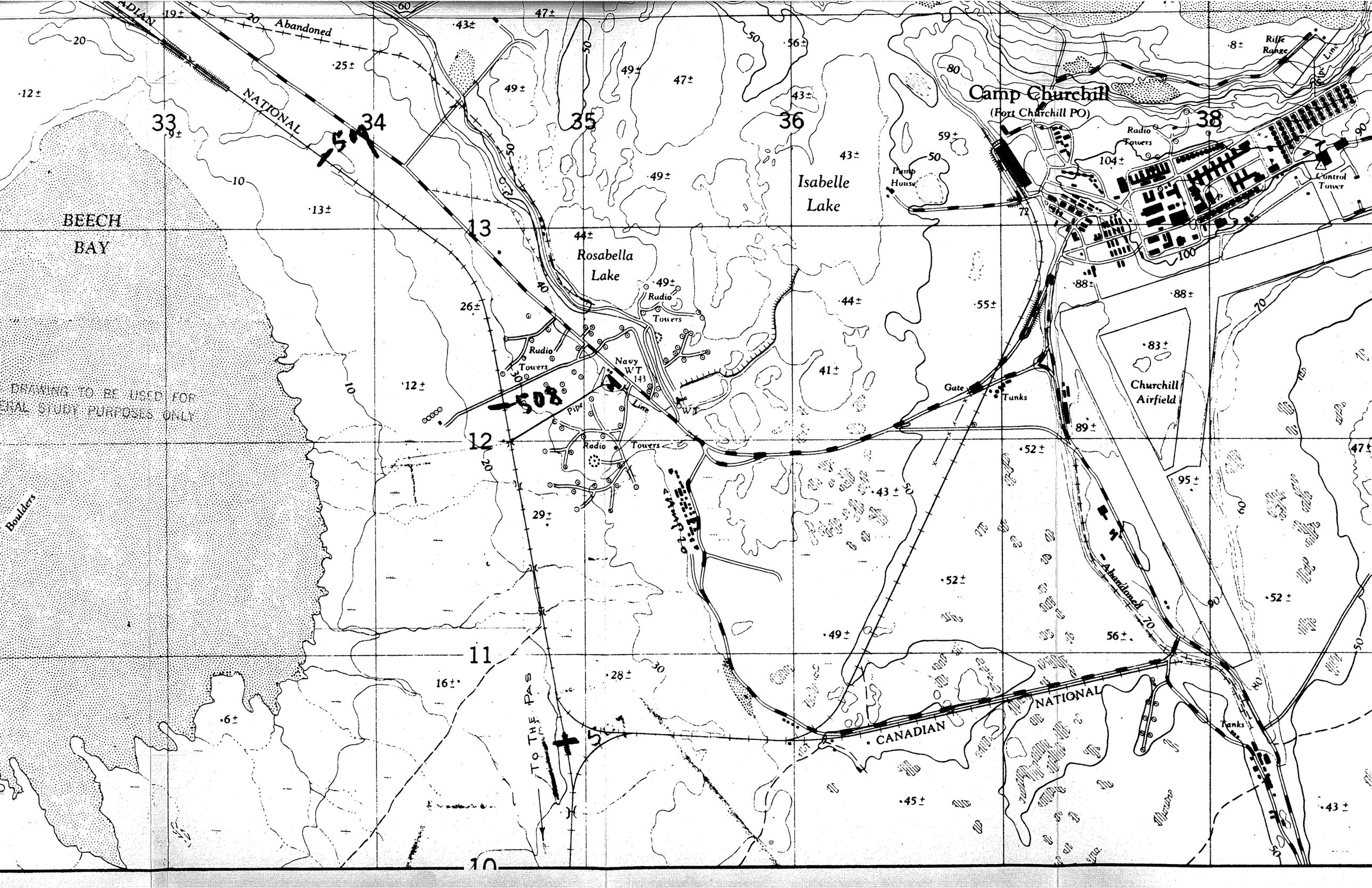
The founding of Churchill was a result of exploring the Northwest passage to the East Indies. The first of the explorers to reach the entrance of the Hudson Strait was John Cabot in 1498. More than a century later came Henry Hudson, forcing his way through the ice-choked straits to emerge on the Bay that bears his name. After wintering near the southern end, he and a few loyal followers were



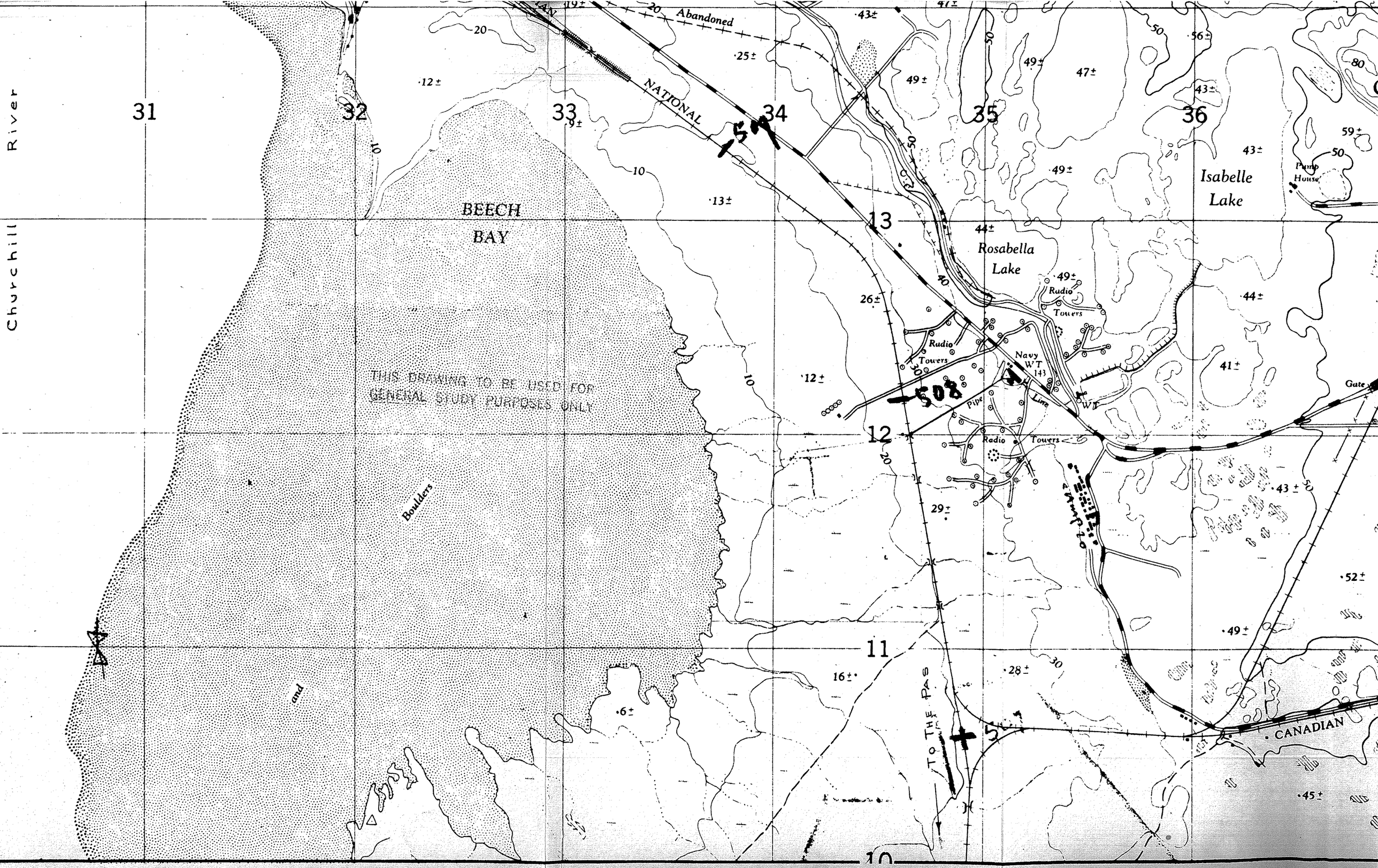
TO GIVE A REFERENCE TO NEAREST 100 METRES
EXAMPLE BRIDGE
EASTING Read number on grid line immediately to left of point
Estimate tenths of a square from this line eastward to point.
34
9
349
NORTHING Read number on grid line immediately below point
Estimate tenths of a square from this line northward to point
06
4
064
MILITARY GRID REFERENCE 349064
Nearest similar grid reference 100,000 metres (about 63 miles)
ONE THOUSAND METRE
UNIVERSAL TRANSVERSE MERCATOR GRID
ZONE 15
Mils
Grid North
Magnetic North
Use diagram only to obtain numerical values.
APPROXIMATE MEAN DECLINATION 1958
FOR CENTRE OF SHEET
Annual magnetic change 3′ easterly
CONVERSION SCALE FOR ELEVATIONS
30 20 10 0 50 100 150 200 250 300 Metres
100 50 0 100 200 300 400 500 600 700 800 900 1000 Feet
Redevelopment Area
Camp 10
15
Water Tank
Pipe Line
CANADIAN NATIONAL
Abandoned
Camp Churchill
(Fort Churchill PO)
Radio Towers
Rifle Range
33
34
35
36
38



TO GIVE A REFERENCE TO NEAREST 100 METRES
EXAMPLE BRIDGE
EASTING Read number on grid line immediately to left of point 34
Estimate tenths of a square from this line eastward to point 9
349
NORTHING Read number on grid line immediately below point 06
Estimate tenths of a square from this line northward to point 4
064
MILITARY GRID REFERENCE 349064
Nearest similar grid reference 100,000 metres (about 63 miles)
ONE THOUS
UNIVERSAL TRANSVE
ZONE
CONVERSION SCALE F
B A Y
Historic Site
Jockville
Dump
Marine Slipway
Oil Tanks
Mud and Boulders
Redevelopment Area
Camp 10
PORT CHURCHILL
Conveyor
Pipe Line
Radio Station
Churchill
TOWNSITE
RCMP
Water Tank
BM 21
Flats
CANADIAN NATIONAL
Abandoned
15
31
32
33
34
35
36



Camp Churchill
(Fort Churchill PO)
Isabelle Lake
Rosabella Lake
BEECH BAY
Churchill Airfield
Pump House
Radio Towers
Control Tower
Rifle Range
Navy WT 143
Pipe Line
Gate
Tanks
Abandoned
CANADIAN NATIONAL
TO THE PAS
Boulders
DRAWING TO BE USED FOR
ERAL STUDY PURPOSES ONLY
33
34
35
36
38
13
12
11
10



Churchill River
31
32
33
34
35
36
13
12
11
10
BEECH BAY
Boulders
and
Abandoned
NATIONAL
Isabelle Lake
Rosabella Lake
Pump House
Radio Towers
Navy WT 143
Pipe Line
Gate
CANADIAN
TO THE PAS
THIS DRAWING TO BE USED FOR GENERAL STUDY PURPOSES ONLY

cast off by a mutinous crew and left to perish.

In 1619, nine years after Hudson's fatal voyage began, Jens Munch, the Dane, set out to explore and colonize land for his king. After a difficult journey through Hudson Strait, a severe storm drove him across the bay to a coast Hudson had not seen. By chance he found refuge in a land-locked estuary. This was the mouth of the Churchill river. It was then late in the season, they were trapped, and had to remain there for the winter. Scurvey set in during the winter and wiped out nearly all the crew save for Jens Munch and two survivors. The following summer they sailed back home.

Churchill's next chapter opened with the fur trade. It was one of the several inland sea forts occupied by the Hudson's Bay Company in the latter part of the seventeenth century and figured in the furious wars when the English fought the French for possession of the Bay.

Two French soldiers, Radisson and Groseilliers, made the discovery that this remote area was rich in furs. Rejected by their own countrymen in New France, they turned toward the English. They took their story to London, and King Charles II granted them a charter in May 1670, to form a fur trading company in the Churchill area. Churchill was formed by the company in 1689. This Company changed hands between the English and the French many times.

After succumbing to a defeat by the French army in 1782, Fort Prince of Wales, now known as Churchill, lost much of its former prestige. The centre of trade gradually shifted to York Factory. For more than a century it remained an isolated fur post and white whaling station.

As time went on Agriculture slowly displaced the great fur trading companies in the West. In the 1880's men were already thinking of a railway to Hudson Bay and a seaport from which they might send out the produce of the growing country.

The construction of a railway from The Pas, Manitoba, to Churchill began in 1911, and the steel was pushed 332 miles northeastward before construction was halted by World War I. It then languished until 1927 when the whole project was re-examined.

The Palmer Commission of 1927 decided upon a change in terminus. Thus historic Churchill and not Port Nelson as originally intended was the final choice for a seaport.

With the completion of the railway to Churchill in 1929, the construction of the terminal elevator was soon to follow. The foundation construction began in 1930 and the structure was completed in 1931. It had a capacity of two and a half million bushels but later was increased to a capacity of five million bushels. In the year of 1946, three million bushels of wheat were shipped out of the port

and thirty-seven tons of merchandise imported. During the next thirteen years the trade through this area greatly increased. In 1959, over 21 million bushels of wheat were shipped out and approximately 3000 tons of merchandise were imported. This rapid increase in trade resulted in a rapid and uncontrolled growth in the area adjacent to the harbour facilities, thus bringing about a somewhat chaotic condition in what is known as the townsite of Churchill.

In order to bring some immediate direct control into this area, the Separate Local Government District of Churchill was created by the Provincial Government in 1959. This Separate Local Government District is administered by an administrator who is appointed by the Provincial government and is made responsible to the Minister of Municipal Affairs. The offices of this administration are located in the townsite.

PRESENT LAND USE AND ZONING

In a community that develops and grows in accordance with a Land Uses Plan, incompatible land uses are separated from one another and are arranged in such a manner that transportation costs and site rentals for all land uses are minimized. "The land use plan determines within certain limits where people will live, where they will work, and where they will shop. To the extent that it fixes

industrial, commercial, residential, and recreational areas, it will have a great influence upon the amount of time that the residents of the city spend in commuting and other travel. The chief means of carrying out the plan is the zoning by-law."[1]

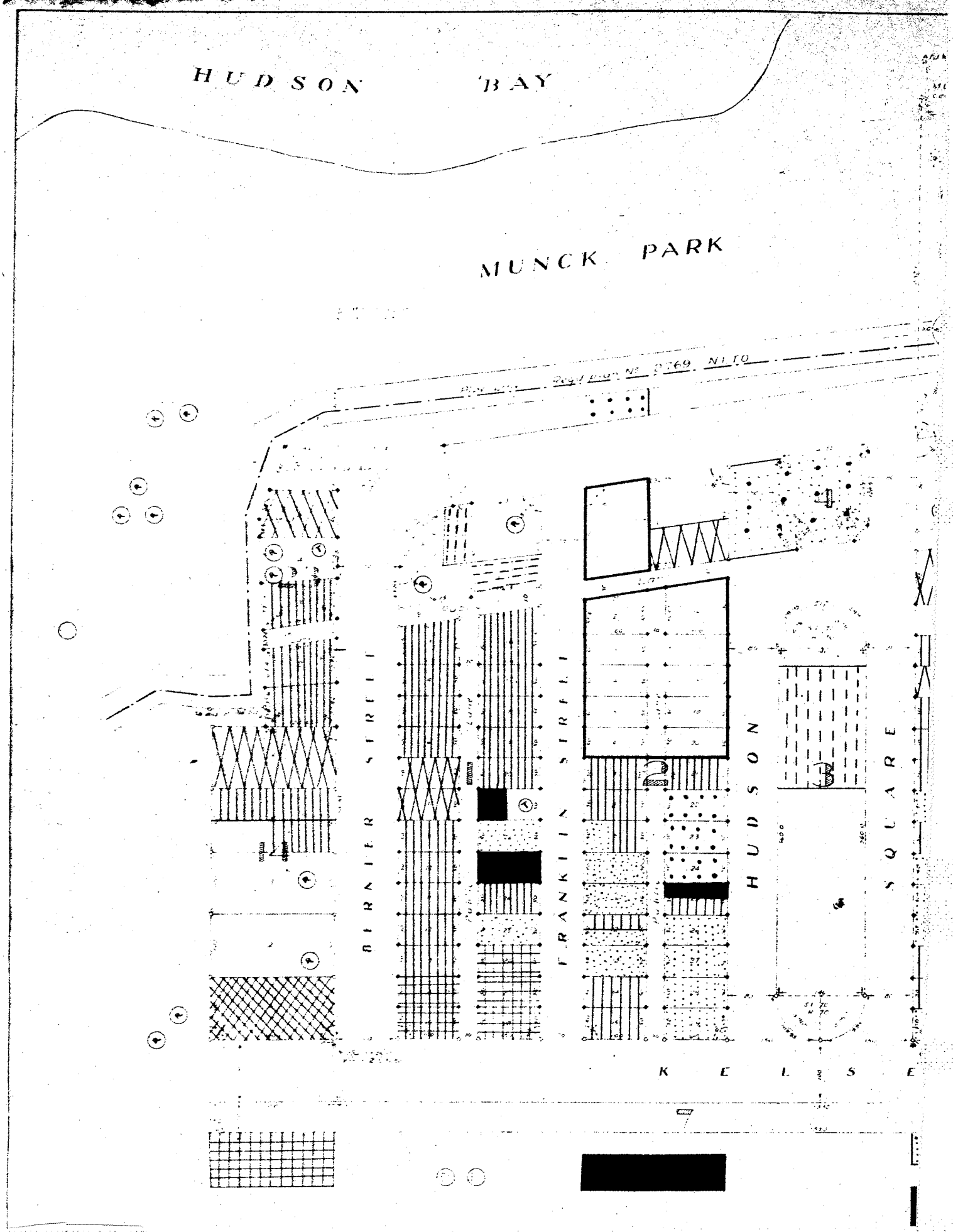
In the absence of a land use plan economic competition rather than desirability governs the land uses in a town or city. For example, reservation of land for public open space cannot compete economically with industrial uses. The result of this development controlled by economic forces alone is an undesirable intermingling of incompatible uses. This was the manner in which the townsite of Churchill grew.

Prior to 1955, no land use plan existed and physical growth ran uncontrolled. On looking at the existing Land Use map, the incompatible mixing of land uses is vividly evident. Single family dwellings have intruded into commercial areas, the opposite also being true; in the most extreme case heavy industry has invaded the single family district. Please see Land Use Map P. 12.

In order to remedy this chaotic state of development, the Provincial Government, in 1955, established a town planning scheme for this area. A land use study was made and a zoning map was drawn up. The area was zoned into six

---

[1]V. J. Kostka, Notes on Planning Principles, Unpublished, University of Manitoba, p. 8.


HUDSON BAY
MUNCK PARK
BRANIER STREET
FRANKLIN STREET
HUDSON
SQUARE
KELSE

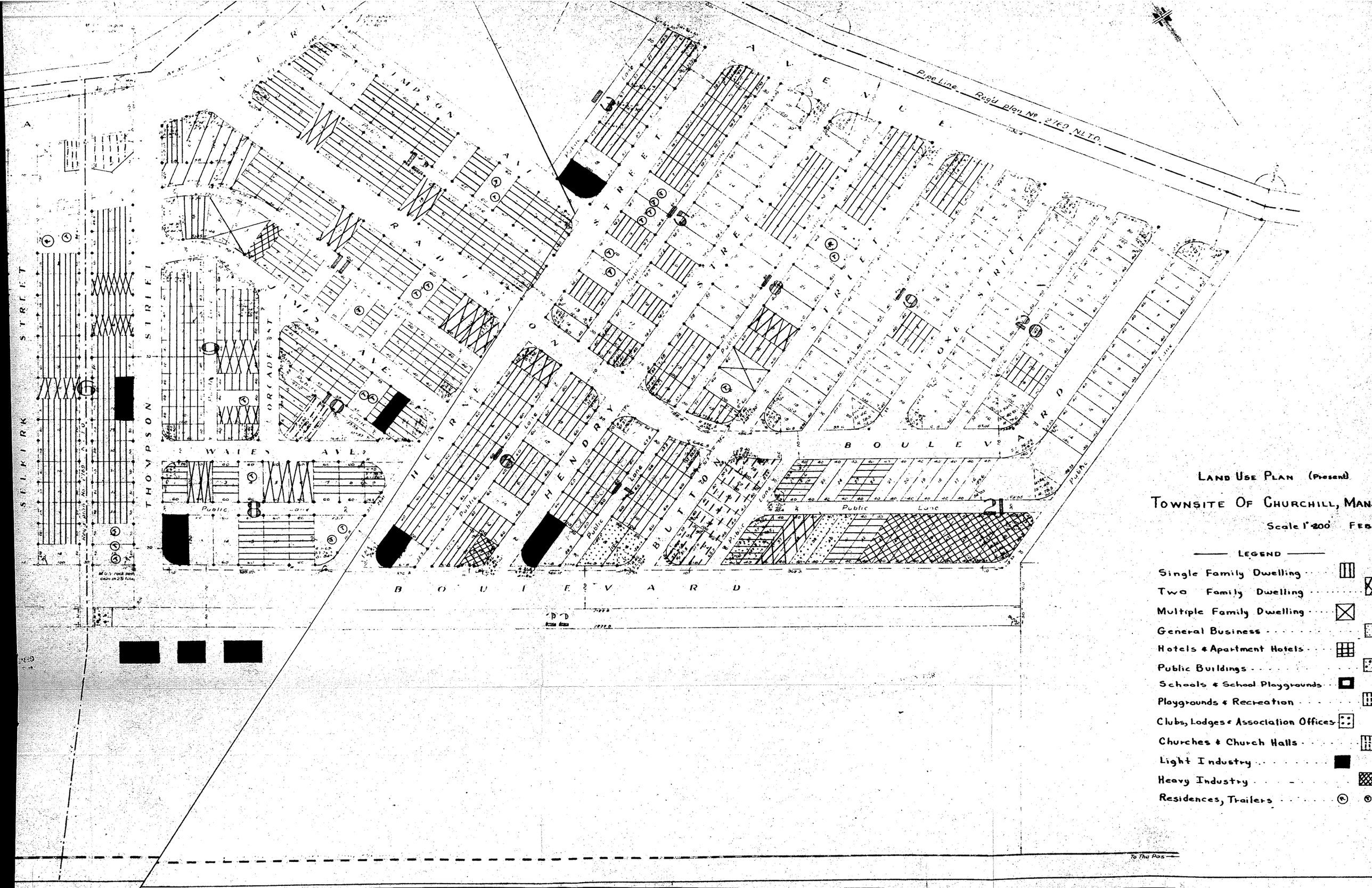
Land Use Plan (Present)

Townsite Of Churchill, Man.

Scale 1" 200' Feb 19

Legend

- Single Family Dwelling
- Two Family Dwelling
- Multiple Family Dwelling
- General Business
- Hotels & Apartment Hotels
- Public Buildings
- Schools & School Playgrounds
- Playgrounds & Recreation
- Clubs, Lodges & Association Offices



Pipe Line Reg'd plan No. 2769 N.L.T.O.
SIMPSON AVE.
RADISSON STREET
JAMES AVE.
CARNEGIE STREET
HENDRY
BUTTON
FOXE STREET
BOULEVARD
WALES AVE.
THOMPSON STREET
SELKIRK STREET
Public Lane
To The Pas
LAND USE PLAN (Present)
TOWNSITE OF CHURCHILL, MAN
Scale 1"=200' FEB
LEGEND
Single Family Dwelling
Two Family Dwelling
Multiple Family Dwelling
General Business
Hotels & Apartment Hotels
Public Buildings
Schools & School Playgrounds
Playgrounds & Recreation
Clubs, Lodges & Association Offices
Churches & Church Halls
Light Industry
Heavy Industry
Residences, Trailers

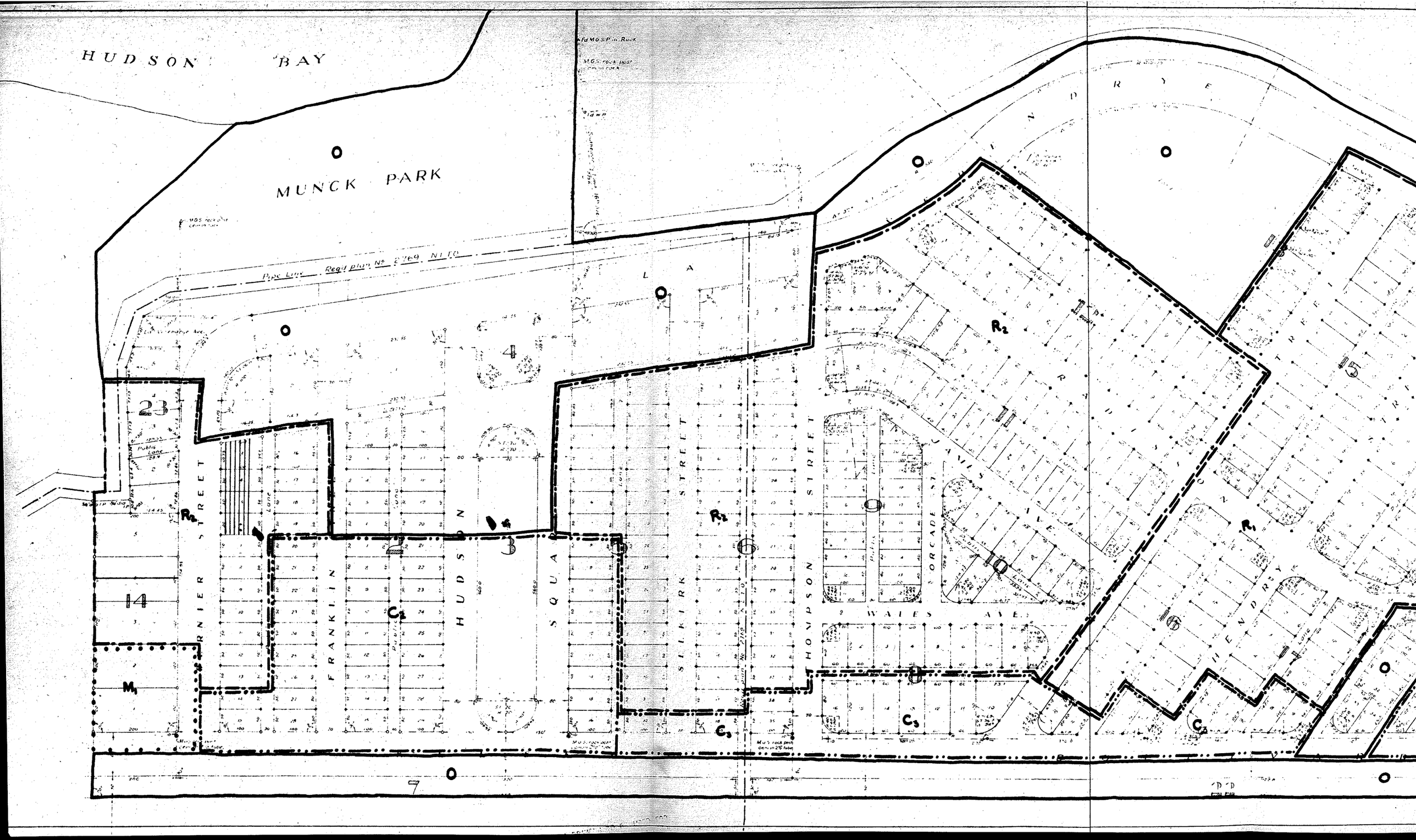
different categories R_1, R_2, C_2, C_3, M, O. Please refer to Present Zoning Map, Map No. 3, Page 14.

It is through the implementation of a zoning by-law that "a municipality divides its territory into a number of regulations to control the use of land, the height and bulk of buildings and the area of ground built upon. The British North American Act of 1867 gave to the provincial legislature an authority over municipal institutions. On this basis, each province has passed a Municipal Act providing for the setting up of municipal governments and prescribing their duties and functions. Among other functions, the municipalities are authorized to protect health, safety, convenience, morals, and the general well being of the community, and to control the use of private property for any of these ends. It is the right to control the use of private property for the public good which is the legal basis of zoning control."[2]

From a study of the townsite zoning map, it appears that the degree of concentration of certain uses dictated the category into which the area was subsequently zoned. For example, the eastern part of the townsite was predominated by single family dwellings and therefore the area was zoned single-family residential. This is about the only

---

[2] Ibid., p. 21


HUDSON BAY
MUNCK PARK
Pipe Line Reg'd plan No 2769 N.T.O.
FRANKLIN
HUDSON
SQUA
SILKIRK STREET
THOMPSON STREET
ORCADE ST
WALES AVE
HENDRY
R2
R1
C2
C3
M1
23
14
7
4
5
6
9
10
11
16
1
2
3

Zoning Map (Present)
Townsite Of Churchill, Man.

Legend

- O Open Space District
- R_1 One Family Dwelling District
- R_2 Two Family Dwelling District
- C_2 Central Commercial District
- C_3 Highway Commercial District
- M_1 Light Industrial District

Scale 1"=200' Feb. 1963

intelligent zoning compromise that can be adopted in an area that has advanced to such a mature stage of development.

It is inevitable that when a developed area is zoned, many of these restricted land use areas will be interspersed with incompatible land uses. These are known as non-conforming uses. "A non-conforming use is a use that now exists and does not comply with the regulations for the use district in which it was established."[3] The concept of the non-conforming use is based on the premise that the "destruction of an existing non-conforming use would be a dangerous innovation of doubtful constitutionality, and that a retroactive provision might jeopardize the entire by-law."[4]

Non-conforming uses are gradually eliminated within a reasonable length of time. This gives the owner an opportunity to make new plans for the future. Also, a reasonable amortization scheme will minimize the losses, if any, imposed upon the owner of the non-conforming uses. In many cases, losses incurred upon an owner are offset by the fact that he may enjoy a monopolistic position by virtue of the zoning by-law.

As can be seen from the zoning map, for the townsite of Churchill, non-conforming uses are very numerous.

---

[3] Ibid., p. 25

[4] Ibid., p. 25

THE TOWNSITE

The total area of the townsite is comprised of 128 acres of which 35.5 areas are single family residential (R_1), 37.1 acres multiple family (R_2), 10.7 acres general commercial (C_2), 9.6 acres highway commercial (C_3), 1.5 acres light industrial (M_1), 33.6 acres P.O.S.

There is no more room for expansion within the immediate area. Redevelopment must take place within the area defined by the existing town limits.

The area to the north and east of the town limits is too rocky making it unfit for building. The area of land between the elevator and the existing townsite is predominantly characterized by muskeg, whereas the area to the south of the town is low and because of poor drainage, vulnerable to flooding.

CONDITION OF BUILDINGS

The condition of the buildings is far below that of an average Manitoba community. The deterioration in most of the buildings has depreciated the value of the structures to the point where the present assessed value is less than what it would cost to serve the households with sewer and water. The only reasonable dwellings with a few exceptions are those that come under Federal jurisdiction: Eskimo

housing, some Indian housing, and dwellings on the Railroad and Harbour's property; although some of the buildings in the latter are in an advanced stage of blight.

The type of construction and inferior materials contributed to this substandard type of housing. Because of financial difficulties, the basic unit was built first, and year by year additions were constructed around this unit, with little regard for sound construction. Many of the structures were patched together with inferior materials that could be obtained at minimum cost, only to decay after a short while. Most of the buildings in this area were built after 1945 and hence are not so old that the age of the structure should justify its condition. Added to this are a number of abandoned army huts that were moved into the area for living quarters. In all, the townsite has a very ramshackle appearance with only the occasional good building.

This drastic situation is not to be blamed entirely upon the town inhabitants. People arriving in this area usually have very little money and thus construct the cheapest accommodations. Also, the severe weather conditions aggravate the situation. Fuel is expensive and the heating costs are nearly prohibitive, amounting to about $50-$60 per month in the coldest weather.

In general, the majority of houses are almost



APR



APR

Family Dwellings Within Townsite

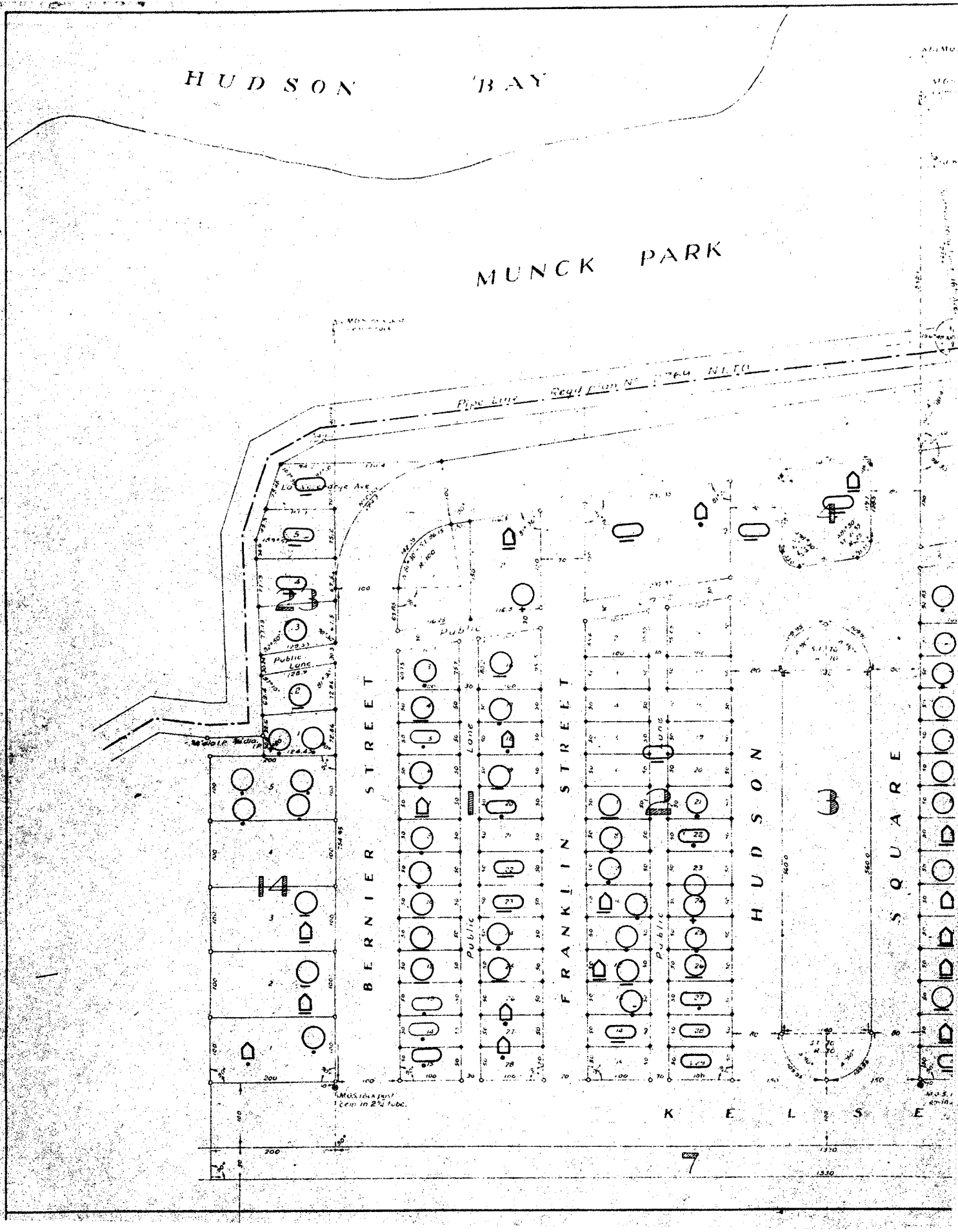
exclusively of the frame type construction. Because of the soil conditions in the area, virtually no full basements exist, and the structures are supported on mud sill foundation. The greatest percentage of residential and commercial buildings are of substandard construction and the majority could be classified as shacks.

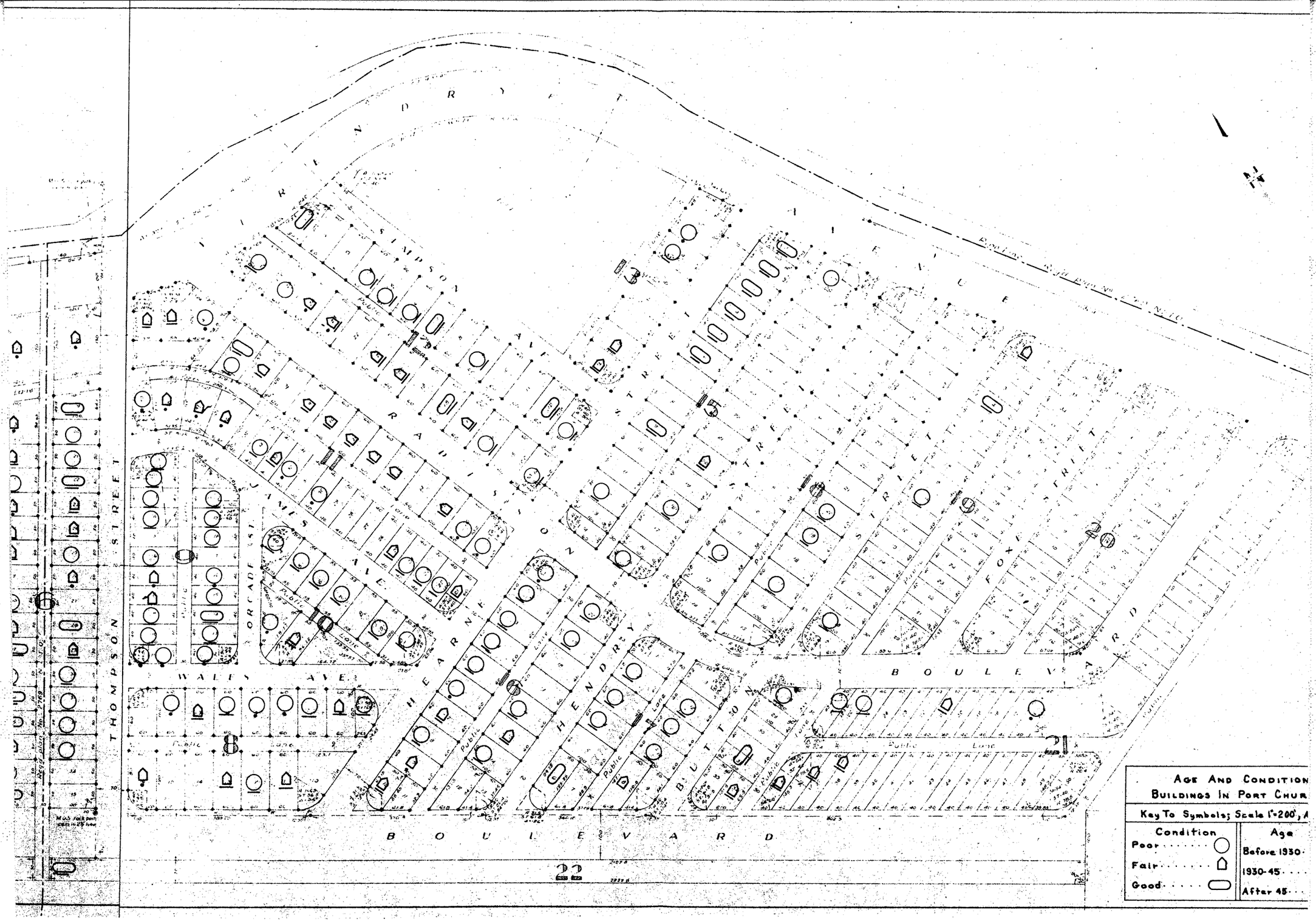
The buildings in the areas adjacent to the townsite are in a similar if not worst structural condition. The houses in the Flats and Jockville area can best be described as one or three room shacks. They are built from waste materials of any kind that will provide a minimum of warmth.

The Department of Indian Affairs has provided one to three room plywood, insulated, portable dwellings for the Chippewayan Indians. These dwellings are substandard but in reasonable condition.

From the study made of the area, by the Metro Planning Commission in 1960, the age and conditions of the buildings were categorized as follows: ages of buildings were divided into three groups, before 1930, 1930-45, after 1945; the conditions of structure were divided into four groups (for distribution of these structures please refer to map No. 4, Page 20).

Good - equipped with modern plumbing fixtures and heating, and requiring ordinary maintenance to keep it up


HUDSON BAY
MUNCK PARK
Pipe Line - Regulation No. 1764, N.T.C.
BERNIER STREET
FRANKLIN STREET
HUDSON SQUARE
KELSEY
Public Lane
Lane
Public
Public
Public
Lane
Public
Lane
Public
Lane



AGE AND CONDITION
BUILDINGS IN PORT CHUR
Key To Symbols; Scale 1"=200', A
Condition
Poor
Fair
Good
Age
Before 1930
1930-45
After 45
THOMPSON STREET
WALES AVE.
ORCADE ST.
JAMES AVE.
HEARNE
HENDRY
BUTTON
FOXE STREET
BOULEVARD
BOULEVARD
Public Lane

to standard.

Fair - requiring only minor repairs or alterations to raise it to acceptable standards, and thereafter requiring only ordinary maintenance.

Poor - requiring many minor repairs and possibly some major repairs to bring it up to standard; dubious whether or not it would be economically feasible to rehabilitate such a building; deteriorating rapidly and in many cases put together in piece-meal fashion using scrap material.

Very Poor - building receiving this rating should be condemned and rendered unfit for human occupancy. See Table I, Page 23.

Sixty-three per cent of all buildings were found to be seriously blighted and would not be worth rehabilitating.

There are approximately three hundred and thirty-one buildings housing some five hundred and fifty-two families. The dwelling types consist of single family dwellings, duplexes, rooming houses and apartments, and also living quarters above stores. Improvised living accommodation is evident throughout the area.

Of the three hundred and thirty-one residential buildings only sixty-two have inside baths and flush toilets. The majority of the buildings are heated only by stoves and are very poorly insulated, thus making them very expensive to heat in the cold seasons.

Approximately forty houses could be moved at reasonable cost; sixty more could be shifted around and rehabilitated, but the cost of this operation would be equivalent to that of building a new house. The remainder of the buildings are not worth considering.

There are sixty-four non-residential buildings in the area which are used for commercial and warehouse purposes; 22% of these buildings are seriously blighted.

UTILITIES

Watersupply. The townsite of Churchill is dependent on The National Harbours Board's water system for its water supply. The source of water supply is two small lakes located three miles east of the town. These lakes are replenished by spring runoff and summer rainfall. During the winter months there is no replenishing source. In the event of a dry summer and light winter snow, there would be a definite shortage of water. Water for the townsite, Harbours Board, and C.N.R. is virtually not treated with the exception of being chlorinated.

The water is piped into the area by way of a surface main. To protect the water from freezing during the cold period, the pipes are insulated with about a two-foot covering of moss, and heated by a steam line placed adjacent to the water main. This moss has proved to be a very

TABLE I*

AGE AND CONDITION OF BUILDINGS
CHURCHILL TOWNSITE, THE FLATS AND JOCKVILLE AREAS

Age	Res.		Non-Res.	
	No.	%	No.	%
0-15	224	67.67	39	60.94
15-30	55	16.62	9	14.06
over 30	3	0.91	1	1.56
no age	49	14.80	15	23.44
Total	331	100.00	64	100.00

Condition	Res.		Non-Res.	
	No.	%	No.	%
Good	38	11.48	19	29.69
Fair	56	16.91	31	48.44
Poor	151	45.61	13	20.31
Very Poor	86	26.00	1	1.56
Total	331	100.00	64	100.00

*Department of Industry and Commerce, Report on Existing Conditions and Associated Services in the Port of Churchill, Manitoba, Table 1, p. 10.

effective insulator.

Summer service outlets have been provided from the main pipe line and the C.N.R. line. These consist of a series of above-the-ground galvanized and black iron pipes, many of them in a poor state of repair. In many instances these pipes pass through garbage, liquid wastes and night soil, infecting the water supply and making it dangerously unsafe for human consumption. A few stand pipes have been installed on these lines and many residents receive their water supply from these taps.

Year round water service is provided only to the National Harbours Board, the Canadian National Railways, The Roman Catholic Mission, the Royal Canadian Mounted Police Barracks, the Federal Building, and residences along the pipe line to the Canadian National Railways station. During the winter months the majority of the citizens obtain their water supply by melting ice or snow. There is also a regular supply of water delivered by tank truck from the Harbours Board.

Sanitary Sewage System. No sewage treatment facilities exist in the area. Sewage is either collected in ground pits or discharged directly into Hudson Bay or the Churchill River. A limited sewage system has been constructed to serve the Canadian National Railways areas,

with outfall into the Churchill River.

Domestic sewage for the most part is disposed of in pits excavated in the soil, chemical toilets and some septic tanks without disposal fields.

Generally, the sewage is dumped by means of pails into cribbed covered pits which usually fill up with snow in the winter and are thus rendered useless. It is also dumped into barrels which are for the most part not emptied and thus overflow into the lots. In the extreme case sewage is dumped on the vacant lots.

Garbage Disposal. The Garbage Disposal system was developed in co-operation with the Unorganized Local Government District.

There is a spring clean up and ten pick-ups between June and October. This service is supervised by the Unorganized Local Government District and the health inspector from the Health Unit at The Pas, Manitoba. The garbage is disposed of into Hudson Bay.

Storm Drainage. The natural drainage of the townsite, from an easterly to a westerly direction, is intersected approximately at right angles by the Canadian National Railways Embankment. The storm drainage is on the ground surface. The existing streets are ditched on both sides. These ditches are intersected by a major ditch which

parallels the railways along the south side of Kelsey Boulevard.

Roads and Sidewalks. Roads in the townsite are constructed above existing topography. The waste material from ditching is placed on the roads forming a grade. Ditches provide summer drainage as well as space for snow storage during the winter months. At present there are no paved roads or sidewalks within the townsite, with the exception of Kelsey Boulevard.

Churchill is not connected to the provincial highway network but an asphalt paved road connects it to the Harbour Area, the Military Fort and the Airport.

Fire Protection. There is no general fire alarm system within the townsite. The local Unorganized Government District maintains a fire station, and the necessary fire-fighting equipment. A local volunteer fire fighting department is maintained and in case of an emergency the army provides assistance.

Telephone and Electric Power. Until recently the town depended on The National Harbours Board generating system for its supply of electricity. Available power was at a minimum and was to be used mainly for house lighting. Because of this insufficient supply of electric power, it

has been impossible to have street lighting. The Manitoba Power Commission have now taken over the responsibility for supplying power.

The Manitoba Telephone System has provided an automatic telephone exchange in the townsite. This system is connected by a single line to the town of The Pas, some four hundred and fifty miles south-west of Churchill.

Schools. Elementary school accommodation is provided for within the townsite in trailers. There are about six trailers in operation at the present time. Each trailer can supply sufficient room for approximately 30 pupils and one teacher. The accommodations provided are fairly satisfactory. Because of the high mobility in the population, the number of school children is subject to frequent fluctuations. The present school facilities are readily adjustable to meet this unstable demand. Should the number of elementary school children decrease or increase, the number of trailers in operation is adjusted accordingly.

There is no high school within the townsite. Consequently, the high school students attend classes at Fort Churchill.

Bus Line. There is a bus service operating in the area. Both the elementary and high school students are

transported to school by bus.

Medical Centre. There is no medical centre within the townsite. All medical services are available at Fort Churchill.

Modes of Transportation. The town of Churchill is connected to the outside world by railway, the Canadian National, by water via Hudson Bay, although this service operates for only about 3 months; and by air. An airfield is located near Fort Churchill. There is a taxi service in operation between Churchill airfield and the townsite.

PRESENT POPULATION

According to the information received from the Resident Administrator for the Separate Local Government District of Churchill, the 1960 population figure for this district was recorded at 2404 persons. A breakdown of this statistic follows. Of the 2404 persons, 1781 live within the townsite, 200 on the Flats, 123 in Jockville. Not included in the figure 1781 is the Indian population of 300 who are housed in Camp 10. For location of these areas please refer to Index Map No. 1, Page 7.

The permanent population within the townsite as of 1960 was recorded as 1191 persons. Out of the total population of 2404 approximately 900 persons are transient;

that is, they move into the region when the shipping season opens and move out on termination of the season. The permanent population within the Separate Local Government District of Churchill was approximately 1500 for the year 1960.

The following table classifies the population of the townsite and the Flats. No information was available on the size of families living in Camp 10 or in the Jockville area. See Table II, P. 30.

There is a variety of ethnic groups within the Churchill region but no one group predominates. Both the temporary and permanent residents seem to live together in harmony. There appears to be a strong sense of togetherness amongst the permanent families.

The permanent residents provide services required by a large number of federal employees and also for the large number of families that move into the area when construction or expansion takes place.

The native population, consisting of Treaty Indian, Metis, and Eskimo, are confined to specific areas close to the townsite, and are under the direction of the Department of Indian Affairs and the Department of Northern Affairs. The Metis are pretty well left to rely upon their own resources but are supervised by the Provincial Government under the Department of Health and Welfare.

TABLE II*

POPULATION CHURCHILL AREA

No. of persons per family	No. of families	No. of persons
1	27	27
2	123	246
3	89	267
4	82	328
5	59	295
6	46	276
7	33	231
8	8	64
9	13	117
10	5	50
11	5	55
12	1	12
13	1	13
Total Churchill Townsite and Flats	492	1981
Camp 10	--	300
Jockville	60	123
Total	552	2404

*Manitoba, Department of Industry & Commerce, Report on Existing Conditions and Associated Services in the Port of Churchill, Manitoba, Table 2, P. 13.

ECONOMY

Basically the economy of the region is to a large extent dependent upon the employment opportunities offered at:

1. Grain terminal
2. Canadian National Railways
3. Military Base at Fort Churchill
4. National Harbours Board
5. Provincial and Civil Service.

The establishment of these enterprises in this region were solely responsible for the development of the townsite. The first industry that moved into this region was the Grain Handling facilities, to be followed more recently by the establishment of a Military Base at Fort Churchill.

The commercial businesses established in the townsite of Churchill provide services for the personnel employed in the basic industries outlined above, and also to the Indian, Metis and Eskimo population residing in the Churchill region. The local economy is markedly influenced by the native population. Of the 1500 permanent residents within the townsite and surrounding regions, 600 are of native origin. These people purchase all their clothing and food within the townsite and thus provide stimulus to the local economy. Should some of these natives be unemployed they are granted financial assistance by the Federal

and Provincial governments and therefore always have some money to spend.

The average annual income of the labour force is rather high in comparison to the average income for all of Manitoba. The average income for all of Manitoba is approximately $267 per month.[5] According to a study made of this area in 1960, the monthly income of the permanent labour force ranged from $250 to $500 per month. The average monthly income range was somewhere between $350 to $375 per month.

The majority of the work force employed by the grain elevators and the National Harbours Board is seasonal. The employees reside in the Churchill region during the shipping season and leave the area when the harbour freezes over.

Acute unemployment problems are not serious in this area, the only problem being lack of full employment for the Indian and Metis population during the winter months; no such problem exists, however, during the summer months.

The permanent white population are fortunate in having steady employment. This is due to the fact that people do not move to the Churchill region unless employment opportunities are available. If no employment opportunities are forthcoming the people move out of the

---

[5]Dominion Bureau of Statistics. Canada Year Book, 1962. Ottawa: Queen's Printer, 1962. P. 722.

area.

The local Administrator for the Region has stated that the commercial business prospects in the area have up to the present time been very favourable. No business establishment that has started up in Churchill has experienced financial loss.

Outlined below are the types of commercial and public buildings presently located within the townsite. These establishments would have to be relocated in the new town.

Types of Business Establishments & Public Bldgs. in Townsite

1 Motel
2 Hotels
4 Restaurants
1 Liquor Commission
1 Pool Room
1 Bowling Alley
1 Theatre
1 Bakery and Coffee Shop
1 H.B.C. Department Store and Shopping Centre
2 Hardware Stores
1 Barbershop and Hairdresser
1 Lodge Hall
1 Boy Scout Hall
1 Parish Hall
1 Community Hall
1 Museum
3 Churches
2 Elementary Schools

Note: High School & Hospital Services obtained at Fort Churchill

1 Credit Union
2 Garages and Service Stations
1 Bus Terminal Garage
1 Gift Shop

1 Press Building
1 Fire Hall
1 Municipal Hall
Federal Building containing R.C.M.P. barracks
1 Cartage and Trucking Firm
1 Lumberyard

The economy of Churchill area has progressed very favourably up to the present, although it should be realized that the economic stability of this region is rather handicapped because there is not a great diversification of industries in the area. A shut-down by any one of the basic enterprises could seriously affect the economic structure of the site.

NEED FOR REDEVELOPMENT

Redevelopment is that part of Urban Renewal that implies large scale total or near total clearance of a blighted area, with subsequent construction of a new environment. Though redevelopment is not proposed primarily to rehabilitate people, the fact is that change to an improved environment may reasonably be expected to benefit the people of an area.

Redevelopment also improves the tax base structure of an area. In an advanced stage of decay, the assessed value of an area will decrease substantially. Thus, the amount of tax dollars realized from a blighted area can be

dangerously low in comparison to the cost of the municipal services required. For whether people live in a blighted area or in well built-up areas, certain basic municipal services such as police, fire protection, sewer and water are unquestionably required. In the past, experience has shown that the cost of these basic municipal services tends to be greater in the blighted regions. The increased costs are basically attributed to a greater demand for police and fire protection, and an increase in welfare recipients.

The relatively high number of welfare recipients is due to the fact that people experiencing financial difficulties cannot afford the rents in the well built-up areas and thus are limited to the cheap substandard living accommodations offered in the slums.

Although there is no serious social problem in Churchill, the present existing physical conditions render immediate redevelopment desirable. The information on age and condition of building was extracted from a report based on a study of this area in 1960. At that time immediate redevelopment appeared desirable; the present conditions would indeed be more demanding.

The need for redevelopment of this area is vividly exemplified in the poor structural and sanitary facilities of most residential and commercial buildings, the intermingling of incompatible land usage, and the existing

layout of the townsite. Because of the advanced stage of decay in most residential buildings and to some extent in the commercial buildings, the structural condition is such as to render them unsafe for human occupancy. Most of these buildings were very poorly constructed and lack proper insulation for protection from the elements. As was pointed out earlier, the cost of heating these homes runs as high as $50-$60 per month during the coldest months.

According to the Health Authorities, the lack of proper sanitary facilities, and of health standards in general, makes the buildings dangerously unsafe for human habitation.

As was mentioned earlier, there is an intermingling of incompatible land usage through the area under consideration. In 1955 a zoning map was drawn up and the area zoned into specific categories. But this did not remove the existing incompatible land usages, it only made them non-conforming and also restricted the further development of incompatible land usage. Through a redevelopment of the area, these incompatible land uses could be rearranged and placed in their proper relationship to the town.

The Commercial shopping area in this town is too decentralized. Shopping cannot be done under one roof.

The shops are scattered in a random fashion with the result that a shopper is subjected to a great deal of unnecessary walking in order to satisfy his shopping needs. The most unpleasant result is that a shopper must brave the elements in moving from shop to shop. When one considers the climatic extremes in this region, the significance of the unnecessary amount of outdoor walking can easily be appreciated.

The density of residential development is very disproportionate. In the western half of the town the density almost results in overcrowding, whereas in the eastern half the residential density is very low and very sparsely distributed. To service this region with public utilities would be unnecessarily expensive. The amount of residential dwellings served per length of utility provided would be exceedingly low, for it would be servicing many vacant lots in between the occupied lots.

The existing street layout is not suitable to the climatic conditions prevalent in the region. It appears that in the design of the existing street pattern, no consideration was given to the climatic conditions. The relationship between the surface area given to streets and back lanes is exceedingly high in relation to the surface area of the townsite. On the contrary the street surface should be limited to a minimum because of the extensive

snow fall in the area. An administrator in this area stated that the cost of snow removal, just for some of the major streets in the townsite, could easily take up forty percent of the tax dollar. The cost of keeping all the existing streets open all winter would indeed be prohibitive.

Sewer and water services for this site will have to be of the surface type. Because the existing street layout fragments the area into many unnecessary segments, servicing would prove unduly costly and in some instances impossible. The utilidors (surface sewage and water system) would have to cross streets too often, creating problems for traffic movement. Also, experience has shown that freezing in utilidors occurs most frequently where they are subjected to vehicular traffic.

ESTIMATED COST OF ACQUIRING AND CLEARING TOWNSITE

In order to obtain an estimate for the cost of acquiring and clearing the townsite, the flats, and Jockville areas, the assessed values for the land and buildings were obtained from a report by a government body which made a study of the area.

Total assessment of the Churchill area including federal property and vacant land amounted to $3,902,670 (100% land and building assessment). This assessment was

made in the year 1960. The total residential assessment of lands and buildings was $515,235, non-residential $3,369,025 and for vacant land $18,410.

In 1960, the assessment officer indicated that the market value of land and buildings for that area was 2,281 times the 100% land and building assessment. Allowing for such unforeseen items as expropriation, legal costs, etc., three times the assessed value was considered to provide adequate compensation.

It was estimated that the 331 residential buildings could be bought and cleared for $1,600,000, roughly $500 apiece. Some property values would undoubtedly be higher, others lower. The non-residential properties (not including Federal Agencies assessed at $3,240,105) could have been purchased at an additional sum of approximately $450,000 based on 3½ times the 100% assessed value. Because of loss of business during redevelopment it was estimated that 3½ times 100% assessed value should be used for commercial areas, instead of 3 times assessed value as used for residential property. This would in effect be a compensation for loss of business during the redevelopment.[5]

With the exception of the non-residential federal

---

[5]Figures quoted obtained from Man. Dept. of Industry & Commerce, Report on Existing Conditions and Associated Services in the Port of Churchill, Manitoba, P.P. 15-16

properties, the cost to acquire and clear the townsite, flats and Jockville was estimated at $2,050,000.

Under provisions made for in the National Housing Act, the Federal government will pay 75% of the cost of acquiring and clearing property; the remainder 25 per cent is usually shared equally between the local and the provincial government. There is some speculation indicating that in the near future the Federal Government of Canada will assume full responsibility for the acquiring and clearing out of blighted areas.

PART TWO

BACKGROUND TO DESIGN

ESTIMATE OF FUTURE POPULATION

The conventional method of predicting the future population of an area is by means of a graphical projection. Population statistics for an area are traced back as far as is possible. These statistics are plotted on graph paper. A curve showing the relationship between population size and the year is established. On the basis of this mathematical relationship, the future population can be estimated by projecting this curve into the future.

The determination of the population size in the townsite of Churchill cannot be made on the basis of a mathematical projection. There is not sufficient statistical information available to establish a trend in population growth. The settlement of the area began shortly after 1946, consequently only three Dominion Bureau of Statistics figures on population size are available. This is not sufficient data to establish a trend in population growth.

Another serious drawback with the statistics concerning this area is that they are not broken down sufficiently. The population figure for the area under consideration for redevelopment is included in one lump sum figure with the result that a true representation of the population count for the area under consideration is lacking.

The following statistics were obtained from the

Dominion Bureau of Statistics.

1951 Churchill School District part of Consol. Local Government District.

Male	1504
Female	664
Total	2168

In 1951, 830 people resided within the townsite. No figures were available for the other areas that are to be affected by the redevelopment.

According to the 1956 Census the townsite of Churchill had a population of 949 people, no other statistic was available.

In the 1961 Census, the population figure was recorded for the Local Government District of Churchill, which was incorporated in 1959.

1961 Churchill Local Government District.

Male	2301
Female	1631
Total	3932

No statistical breakdown was given and therefore it was impossible to calculate the population for size in the year 1961, for that segment of population which will be affected by the redevelopment.

An exhaustive study of the economy would produce an accurate design population for the townsite. However, the author feels that sufficient time is not available for such a study. If the anticipated design population used in this thesis should prove to be practically unrealistic, that is a matter of little concern. For the main premise of the thesis, the redevelopment plan will not be seriously affected. The main principals of the town design would remain the same regardless of whether the design population was based on 3000 or 4000 people. The only difference is that the town designed on the anticipated population would be physically larger or smaller depending on how the future population size relates with the anticipated population.

It should be pointed out that in a practical design the estimation of future population would be of paramount importance, and a thorough study of the economy would then be justified.

The redevelopment area will be designed for an anticipated permanent population of 2800 people. The composition of the population will be assumed to consist of:

Permanent Residents in the Townsite (Whites)	1800 persons
Metis and Indians from the Flats and Jockville and also including the Chippewayan Indians from Camp 10, all to be housed within the townsite	1000 persons
Transients	1000 persons
Total including transients	3800 persons

At the height of the shipping season, the maximum population within and in the immediate vicinity of the townsite will be 3800 persons, that is 2800 permanent residents and 1000 seasonal workers.

HOUSING REQUIREMENT

The housing accommodations incorporated into this design place strong emphasis on high density dwellings such as row houses and two-storey apartments. Approximately one quarter of the dwelling units incorporated in this design are of the single family dwelling type.

The introduction of high density dwellings into this area was influenced by three factors, namely: consideration of climatic conditions, soil conditions, and the need for an intensive utilization of the site.

To house 3800 people in single family dwellings, approximately 211 acres of land would be required. This

figure is based on allowing 18 persons per gross acre as suggested by Prof. V. J. Kostka in his book entitled "Neighbourhood Planning." The amount of land available for redevelopment is approximately 128 acres.

Because of the extreme climatic conditions prevalent in the area, the physical size of the town should be designed for a minimum. That is, the places where a person works, lives, or finds recreation should be as close to one another as is physically possible.

The installation of sewer and water facilities in the area is a very expensive undertaking. Because of permafrost and to some extent rock outcrops, the installation of a conventional sewer and water distribution system is economically unrealistic. These sewers must be installed on the ground surface and heated by a steam line to prevent them from freezing. The introduction of high density dwelling will minimize the length of these services, thus reducing costs. In row house development, 42 persons can be housed per gross acre as compared to 18 in single family development. In other words, more people will be using the same length of municipal service provided.

The townsite is designed for a population of 3800 people of which 2800 will reside in the town permanently and 1000 on a temporary basis. Housing accommodation for one-half of the temporary residents will be provided for

within the townsite. The remainder having housing accommodations provided for them in hostels located near their place of employment, on the outskirts of the townsite.

Housing accommodations will be provided for 3300 people within the townsite.

In referring to Table II, Page 30 it can be seen that the average family size in this area is approximately five. Out of a total of 552 families only 27 are composed of one person. The demand for bachelor units is very low. About 95% of all families contain 2 or more persons.

The dwelling units will be allocated as follows.

To meet the present demand for 2000 people, 400 dwelling units will be required.

900 Permanent Whites . . . . . 180 dwelling units.

Of these 180 dwelling units, 130 will be housed in single family dwellings, the remaining 50 dwelling units to be housed in row houses. These 130 single family dwelling units will be used to house those families who at the present time own their own home and lot. They will be given the choice of either owning their own home, as they have done in the past, or seeking rental accommodations. It would be morally wrong to evict them from their single family homes and under compulsion place them in high density dwellings. Redevelopment should take place from

the grass roots level and all conflicts that are avoidable should be made so. It has been stated by a local authority from the Churchill region that the majority of the residents at present prefer rented units.

600 Indians and Metis . . . . . 120 dwelling units.

These families will be housed in 2-storey apartments that will form part of the low cost housing development.

500 non-permanent residents . . . . . 100 dwelling units.

These will be used to house part of the seasonal workers and also the temporary residents. They will be housed in row houses of the rental type.

A trailer court will be provided to accommodate house trailers. Some people who move to the Churchill area for a few year's duration bring their house trailers with them. There are approximately 25 house trailers scattered throughout the townsite at the present time.

Future housing requirements are to be allocated as follows:

Increase in permanent white population anticipated to be 900 . . . . . 180 dwelling units.

These will be housed in row houses, and single family dwellings.

Increase in Indian and Metis population anticipated to be 400 . . . . . 80 dwelling units.

These will be housed in 2-storey apartments that form parts of the low cost housing.

Summarizing the housing requirements:

PRESENT POPULATION

Permanent White:

Single family dwellings, owner-occupied . . . 130 units

Owner-occupied row house . . . . . 50 units

Non-Permanent:

Rental accommodations in row houses . . . . . 100 units

Native population:

Rental accommodations in 2-storey apartments . . . . . 120 units

Sub-total . . . . . 400 units

FUTURE POPULATION

Permanent White:

Owner-occupied in single family dwelling . . . . . 21 units

Owner-occupied in row house. . . . . 69 units

Rental accommodation in row houses . . . . . 90 units

Native Population:

Housed in 2-storey rental apartment	80 units
Sub-total	260 units.
GRAND TOTAL	660 dwelling units.

PART THREE

THE REDEVELOPMENT PLAN

GENERAL

A redevelopment plan indicates how the existing sub-standard conditions of a seriously blighted area will be altered in order to produce a better environment in which to live. It provides the framework and guiding hand, according to which the physical and economic development of an area can most efficiently take place. The construction of a new environment in accordance with the redevelopment plan is highly integrated and co-ordinated. That is, the programme of public works is carried on in close conjunction with the building construction. Through this co-ordination the maximum benefits, accruing from the new environment to the general public, can be realized at a nominal cost.

The redevelopment plan separates different land uses into specific areas so as to make them complementary rather than conflicting.

PROPOSED LAND USE

The proposed land use pattern of redevelopment within the townsite is to be segregated into four distinctive districts, which are to be zoned R_1 - single family; R_3 - multiple dwelling; C_2 - central commercial; C_3 - trailer courts, (highway commercial).

Outlined below are the permitted uses in each district.

R_1:

One family dwellings
Churches, church halls, Sunday Schools and convents
Kindergartens and day nurseries
Home occupations
Libraries
Museums
Parks, playgrounds, and recreational areas
Accessory buildings when incidental to a permitted use.

R_3:

Multiple family dwellings
Boarding and rooming houses
Churches, church halls, and Sunday schools
Libraries
Day nurseries and kindergartens
Home occupations
Parks and playgrounds
Senior Citizens housing
Nursing home
Accessory building when incidental to the permitted use.

C_2:

Community shopping centre
Amusement enterprise
Halls
Banks
Bakeries
Studios
Funeral parlors
Department or furniture stores
Beverage rooms
Carpenter shops
Hotels
Laundries
Public buildings

Taxi stands
Fuel order offices
Retail store or retail business within an enclosed building
Advertising signs or structures and billboards.

C_3

Highway Commercial
(Trailer courts.)

M_1

Any manufacturing or industrial use conducted within an enclosed building or structure
Automobile service station
Automobile and trailer sales area
Boat building shops
Ice storage houses
Public garages and public utilities
Public parking
Plumbing and sheet metal
Service shops
Warehouses.

Outlined below are the boundaries of the above areas:

Areas within townsite limits.

C_2 - Central Commercial

All that land bounded by Selkirk Road, Thompson Street, Kelsey Avenue, and the public lane.

R_1 - Single family residential

1. All that land bounded by Selkirk Road, public lane and Kelsey Avenue.

2. All that land bounded by La Verendrye Road, Hearne Street, Kelsey Avenue, and Thompson Street.

3. All that land enclosed within Bernier Bay and Hearne Street, and also all lots fronting on Bernier Bay.

R_2 - Multiple Family

1. All that portion of land within the area bounded by La Verendrye Road, Kelsey Avenue, Hearne Street, and excluding that area of R_1 outlined above.

2. All that area of land bounded by La Verendrye Road, Thompson Street, Selkirk Road and Kelsey Avenue,

3. All that portion of land bounded by the northern and western limits of the townsite, Franklin Place and La Verendrye Road.

C_3 - Highway Commercial (Trailer Courts)

All that area of land bounded by La Verendrye Road, James Place, Western limit of townsite, and Franklin Place.

M_1 - Industrial Area (outside townsite limits)

All that portion of land bounded by the following limits; Commencing from the intersection of the eastern limit of Munch Road with southern limit of Kelsey Avenue, thence easterly to intersection of Munch Road with centre line of siding, easterly from this point to intersection of centre line of siding with centre line of C. N. mainline, thence easterly to intersection of eastern limit of town-site with said centre line, thence northerly to intersection of eastern limit townsite with south limit Kelsey Avenue, thence southerly along said limit to point of commencement.

THE RESIDENTIAL AREA

Of the 128 acres of area to be redeveloped within the townsite, approximately 100 acres are allocated for residential purposes. A breakdown of the residential sub-division is outlined below. The remainder is taken up by the commercial area, and rights-of-way.

TABLE III

RESIDENTIAL AREA BREAKDOWN

Dwelling type	Vicinity (bounded by)	Dwelling units	Area (acres)	Persons per acre (gross density)
Row house	La Verendrye, Hearne, Kelsey	125	18.2	35
Single family	La Verendrye, Hearne, Kelsey	21	--	--
Single family	La Verendrye, Hearne, Thompson, Kelsey	130	40	19
Row house	La Verendrye, Selkirk Road, Thompson, Kelsey	184	24.6	38
2-storey apts.	West of La Verendrye	216	12	80*
Trailer courts	Adjacent to low cost housing	28	4.8	29

*Net density; Net and gross area very nearly equal in area.

These densities compare very favourably with those suggested by Prof. V. J. Kostka in his book entitled "Neighbourhood Planning." The following figures recorded below are quoted from the above book.

Single family--gross density 18-19 per acre.

Row house--gross density 42 per acre.

2-storey apartment--net density 108 per acre.

Compactness is an essential element of the design of the residential area. Basically, the residential dwellings are clustered around the cul-de-sac in very small groups. The longest cul-de-sac in the row house and single family dwelling districts is under 400 feet in length.

The lots are rather small in size. The lot widths vary between 50-60 feet, the majority being about 50 feet; the lot depths vary between 90-100 feet. The minimum lot area for single residential dwellings is approximately 5000 square feet; the minimum area for row houses is approximately 4000 square feet per unit. That the distribution of population density is rather concentrated is indicated in Table III, Page 57. The number of people per gross acre is just under the allowable suggested by Prof. V. J. Kostka.

The compactness of the design can be attributed to the following three considerations: firstly, to accommodate 3300 people on 128 acres requires a fairly

concentrated design; secondly, the townsite is kept to a small size so that people, at least during the warmer periods, can reach their destinations easily by walking; and finally, in limiting the physical size of the town the cost of public utilities, a very expensive item in these latitudes, can be kept at a minimum.

Because of the short culs-de-sac, the monotony one encounters in residential districts that contain long seemingly endless streets, where residential dwellings are lined up in long rows, is entirely eliminated.

An intelligent use of the setbacks combined with the short cul-de-sac can introduce diversity into the residential area and thus produce an aesthetically pleasing environment.

THE COMMERCIAL AREA

The commercial area is located very near the physical centre of the townsite, on Kelsey Avenue. It is the most travelled road in the region, and hence an appropriate place for the commercial centre to be located.

Since most of the goods are transported to Churchill via railway the town should be close to the railway station. The railway is a very important element to the economy of the town. It is the only overland link with the southern part of the Province of Manitoba. In the new

design the town centre is approximately 600 feet north of the railway station. A road connects the station with the town centre.

The commercial area is comprised of some 4½ acres. It is very compact and the shops are all concentrated and integrated in one large unit. An enclosed mall connects all shops. In the extreme weather conditions experienced in the colder months, a shopper can walk comfortably from shop to shop without stepping out of doors and challenging the harsh elements of these northern latitudes.

THE INDUSTRIAL AREA

The industrial area is comprised of that portion of land situated between Kelsey Avenue and the Canadian National Railways property.

Because of its proximity to the railroad, (the chief means by which goods are transported to Churchill), the site is favourable for industry.

The uses permitted in this zone are outlined under the section entitled "Proposed Land Use."

The industrial area is not subdivided into lots. Unlike the residential lots, where the size of lot is very well defined, the size of lots demanded by industry varies with the type of industrial use. For example, lumber yards undoubtedly demand much larger lots than do gas

stations.

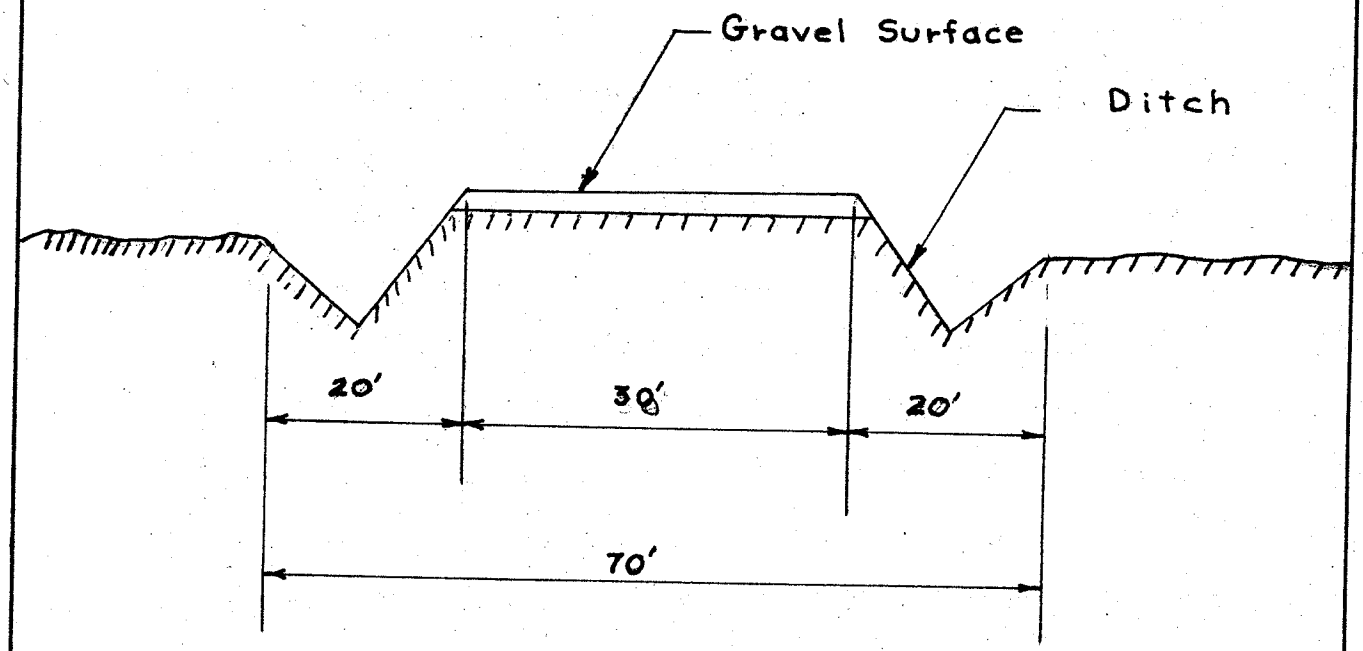
A general road pattern is defined and off this pattern industrial lots are subdivided according to need.

CIRCULATION SYSTEM

The street system within the townsite extends off the main traffic artery, Kelsey Avenue. Incidentally, Kelsey Avenue forms part of the paved major artery that connects the townsite with Fort Churchill to the south-east and Port Churchill to the north-west.

The major traffic artery within the townsite is La Verendrye Road, which borders the town on three sides. The minor collectors are Hearne Street, Thompson Street and Selkirk Road.

The rights-of-way for all minor and major collectors within the townsite are all 70 feet in width. This width is not based on any traffic surveys or traffic engineering formula. This type of study would be unnecessary, for the governing factors of the right-of-way width are the more practical considerations of snow removal and storage. This would undoubtedly require a greater width than the concentration of vehicular traffic would justify. The road surface on all these collectors is to be 30 feet in width. See Plate No. 2, P. 62.



COLLECTOR STREET

CROSS SECTION

PLATE No. 2

Although, the volume of vehicular traffic is not required in designing the roadway width, it would nonetheless be of vital importance to determine the number of cars operating in this area, for the car has a significant influence on the design and layout of the street rights-of-way, particularly in these high latitudes.

An attempt was made to determine this number but unfortunately, all efforts proved in vain. The Motor Vehicles Branch in Winnipeg do not have on their records the motor vehicle registrations recorded separately for each town in Manitoba, but only have them lumped into one figure.

However, the resident administrator for the area stated that the number of families per car would be substantially higher than in any North American town in the lower latitudes. The main reasons that account for this phenomenon are: a large portion of the population is made up of natives who do not own cars; the amount of roadway that is travelable by car is very limited, under ten miles; because of the extreme climatic conditions it is very difficult to operate motor vehicles during the winter months.

Although the motor vehicle did not have a significant influence in the town design, provisions were made so that every lot in the town is accessible to a motor

vehicle. Regardless of whether a person owns a car or not, taxi service is available and hence would justify vehicular accessibility to a lot. Because of the high mobility in the population, migration of families to and from the area is very frequent. A moving van should be permitted access to the lot in moving furniture and other goods.

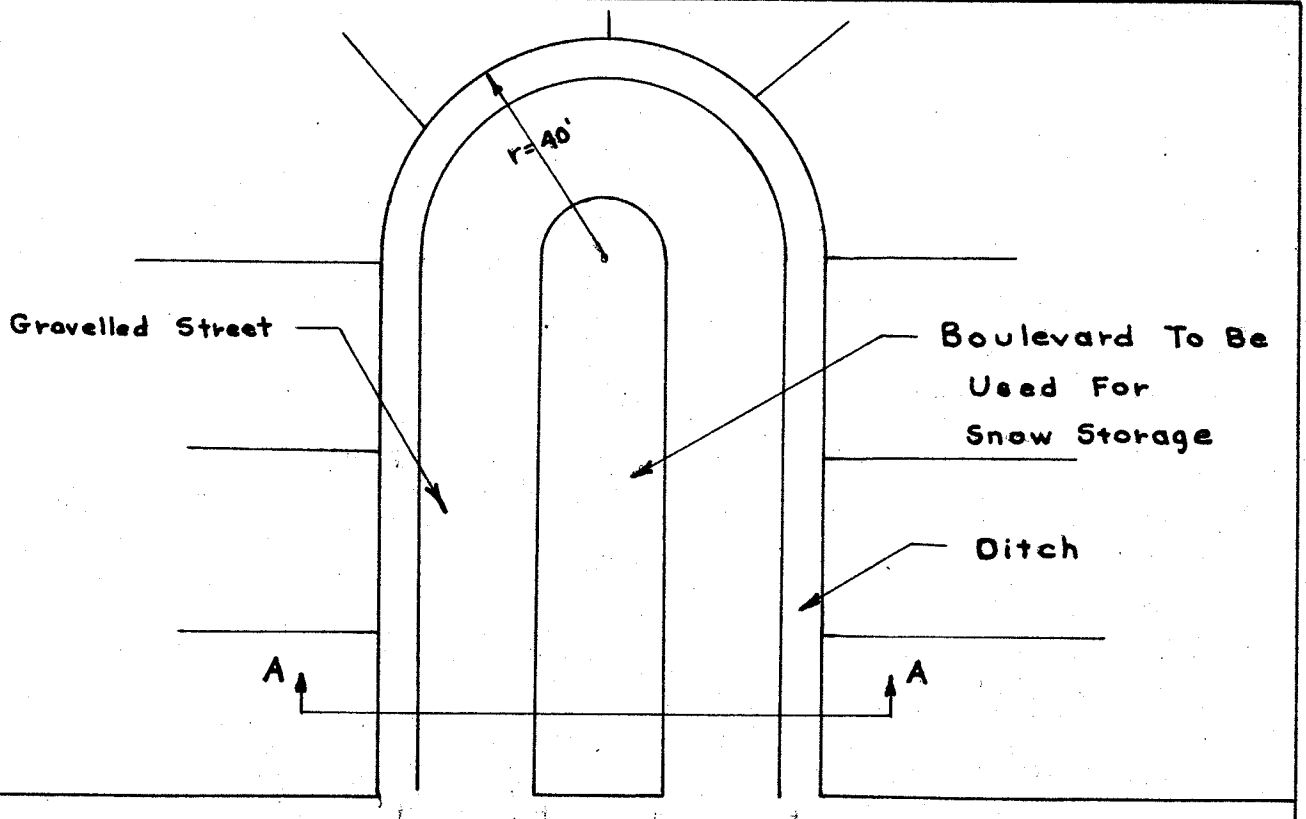
During the colder months when the wind chill factor can drop to a low of 1900 (compared to about 1400 for Winnipeg) a walk of 400 feet is considered to be sufficient.[7] Consequently, walking distances for school children should not unnecessarily exceed 400 feet. The school bus would not enter the cul-de-sac but would pick up the children at the intersection of the cul-de-sac and the collector street. With the exception of the 4 culs-de-sac in the low-cost housing project and trailer court area, all other culs-de-sac are 400 feet in length or less.

Note that the availability of school bus service is not solely dictated by climatic conditions but also by geographical considerations. There is no high school within the townsite; hence pupils of high school age must attend classes at Fort Churchill, some 3 miles away.

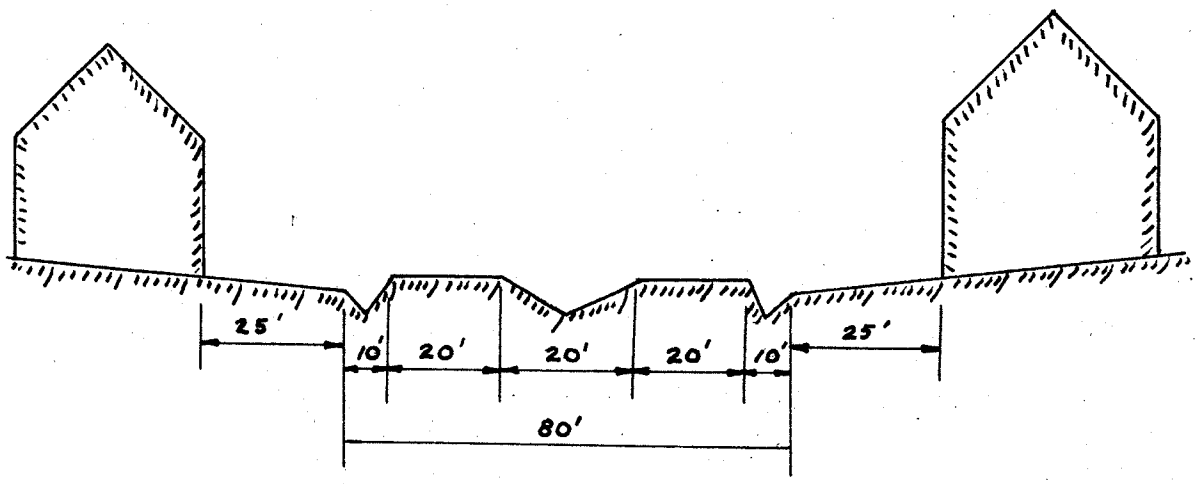
Attached to the minor and major collector arteries are the purely residential streets. These take the form of culs-de-sac of 80 feet in width. See cross-section

---

[7]Wind chill factor expressed in kg.-cals./sg.m./hr. Information received from climatologist at Weather Office, International Airport, Winnipeg.



PLAN VIEW OF CUL-DE-SAC



SEC. A-A

PLATE NO. 3

shown on Plate No. 3, Page 65. This width, as for that of the minor and major collector, is influenced by the snow problem. A 20 foot roadway goes round the cul-de-sac with the centre strip of about 20 feet used for snow storage. This snow storage area is very important when one appreciates the fact that snow covers the ground surface for about ten months of the year.

The roadways incorporated into this design take up approximately 25 percent of the land surface. It is stated that for a design to be efficient not more than 25 percent of the land surface in the subdivision should be taken up by roadways.

The right-of-way surface area in this design is just under the efficient rating because the rights-of-way were made excessively wide in order to minimize the costs of snow removal.

WALKWAYS

As indicated on the Redevelopment Plan, a 10 foot right-of-way is provided to minimize walking distances. According to the manner in which the street pattern was designed, the shortest walking distance between two points necessitates the crossing of private property. The 10 foot right-of-way provides a legal access, between 2 culs-de-sac situated back to back and opposite one another, or

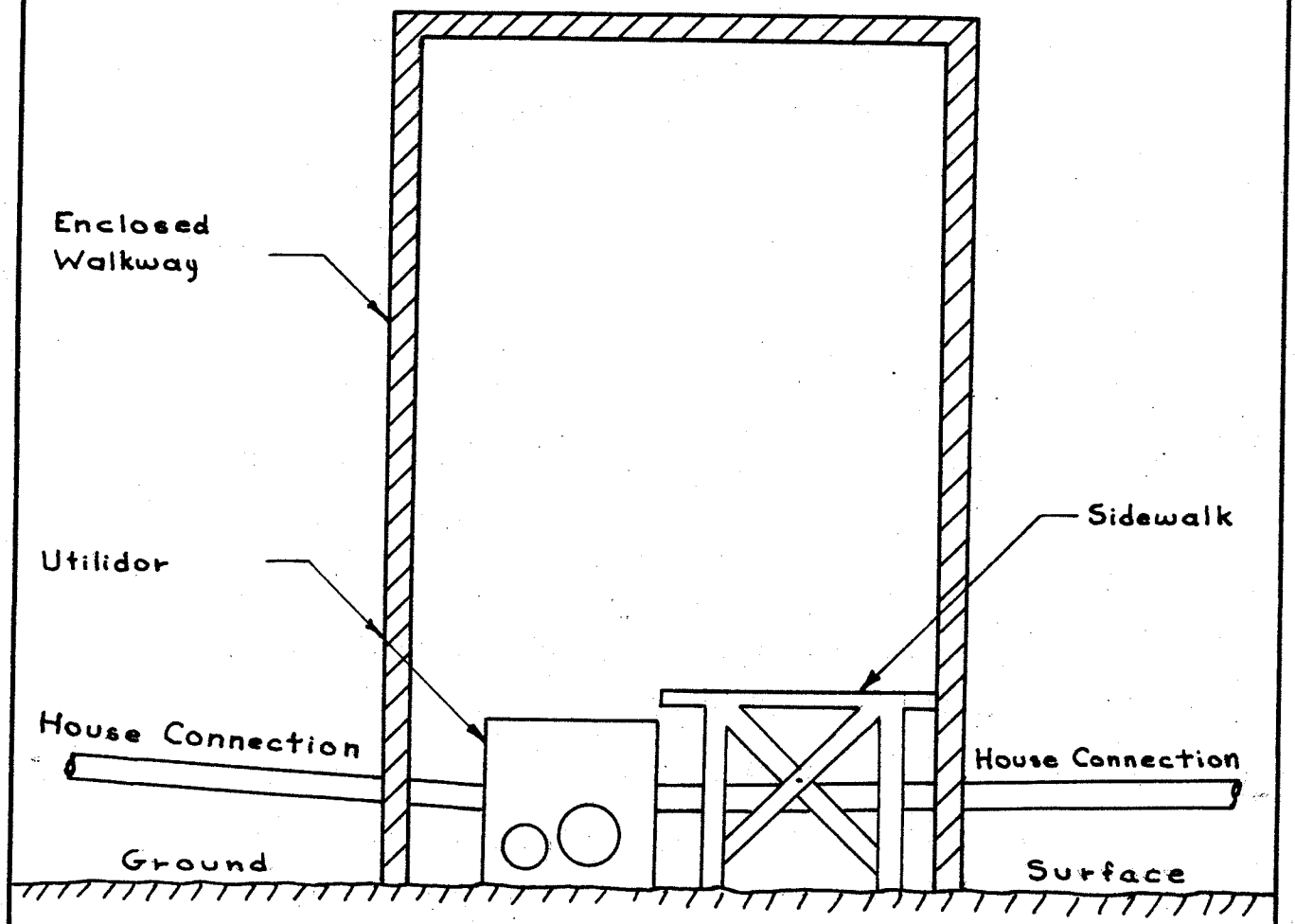
between a cul-de-sac and a street right-of-way. See Redevelopment Plan in folder on back cover.

SIDEWALKS

No sidewalks will be constructed within the townsite. Because of the excessive amount of snowfall in this region the cost of maintaining the sidewalks during the winter months would be prohibitive.

ENCLOSED WALKWAY (SUGGESTED)

The proposed street layout lends itself very favourably to the construction of an enclosed walkway. This walkway would be located at the back of the lots. Within this enclosed structure could be located the utilidor and a sidewalk. The cost of constructing this enclosed walkway would have to be carefully weighed against the cost of operating a school bus; however, the enclosed walkway would certainly offer extra benefits. It would be there to serve the people and school children at all hours of the day or night, whereas the school bus service is only available to school children, and, at that, only for certain hours of the day. People would be able to commute on foot a lot more comfortably during the cold winter months. Snow removal from the sidewalks would be unnecessary, and the wind chill factor would be eliminated. Also, this



ENCLOSED WALKWAY

(Suggested)

PLATE NO. 4

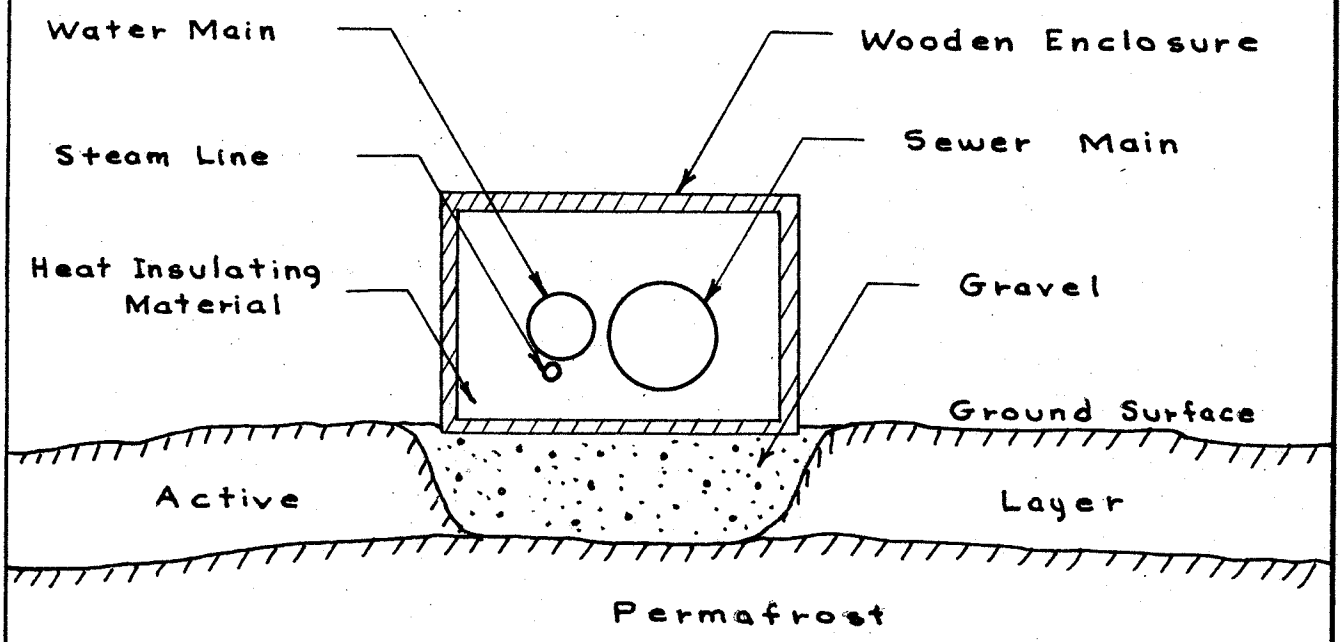
enclosure would shelter the utilidor from the strong cold north winds. It is a scientifically known fact that a strong wind can lower temperatures substantially beyond that recorded on a thermometer. This is known as wind chill. A utilidor housed in this type of enclosure would require less insulation because of the elimination of the wind chill factor.

UTILIDOR

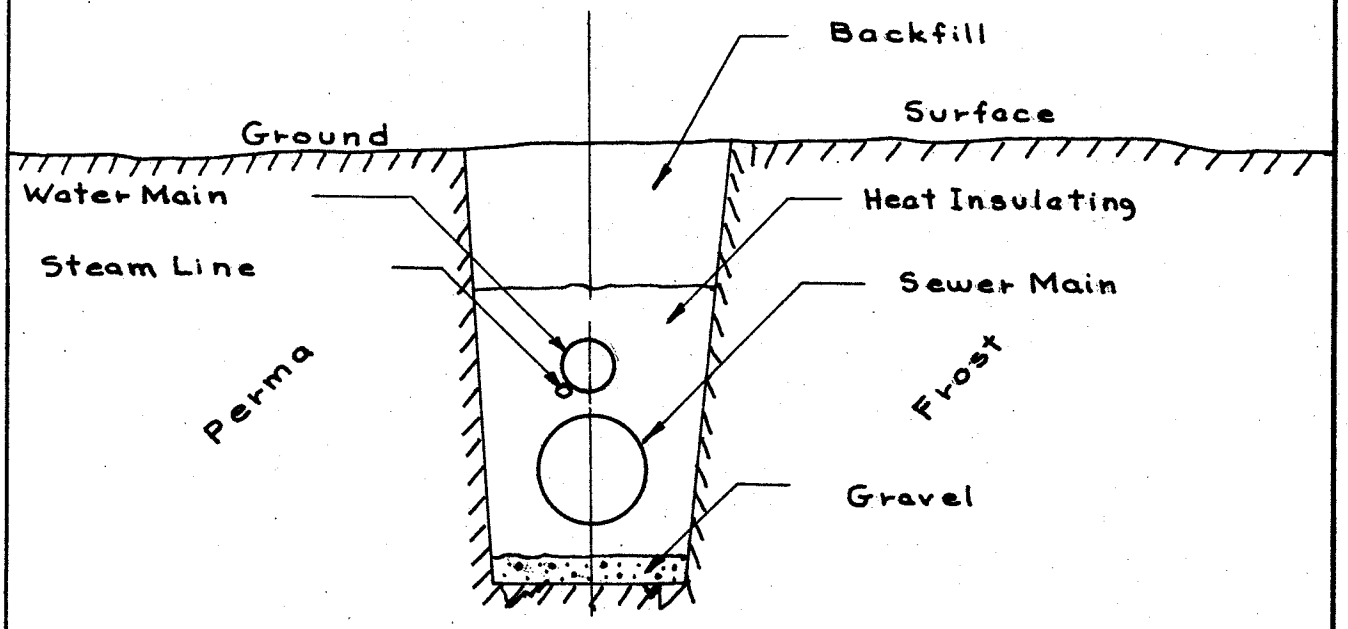
The most expensive element in the development of the new townsite will undoubtedly be the sewage and water distribution systems. The installation of these utilities in the sub-arctic and arctic regions poses many problems not encountered in more temperate regions. Foremost is the manner of insulating sewers to prevent freezing and also to prevent the thawing of the permafrost. The thawing of the permafrost region would result in the differential settling of the sewer main, thus destroying the necessary grade and alignment in the sewer system.

The construction of utilidors to enclose sewer lines along with other utilities appears to be the best method to overcome the difficulties mentioned above.

Utilidors have been used successfully in sub-arctic and arctic regions of Canada and the United States for a number of years. They have been in use at Flin Flon since



SURFACE UTILIDOR



SUB SURFACE UTILIDOR

PLATE NO. 5

1932, at Fairbanks since 1939, and at Yellow Knife since 1949. A utilidor service is presently in operation at Fort Churchill. These utilidors can be of the surface or subsurface type. The utilidors in this design will be mainly of the surface type. A subsurface utilidor will have to be installed from Thompson Street to the outfall in order to obtain the necessary grade for sewage flow. The outfall is to be located on Hudson Bay and the sewage discharged into the bay. For sketch of subsurface and surface utilidor see Plate 5, Page 70.

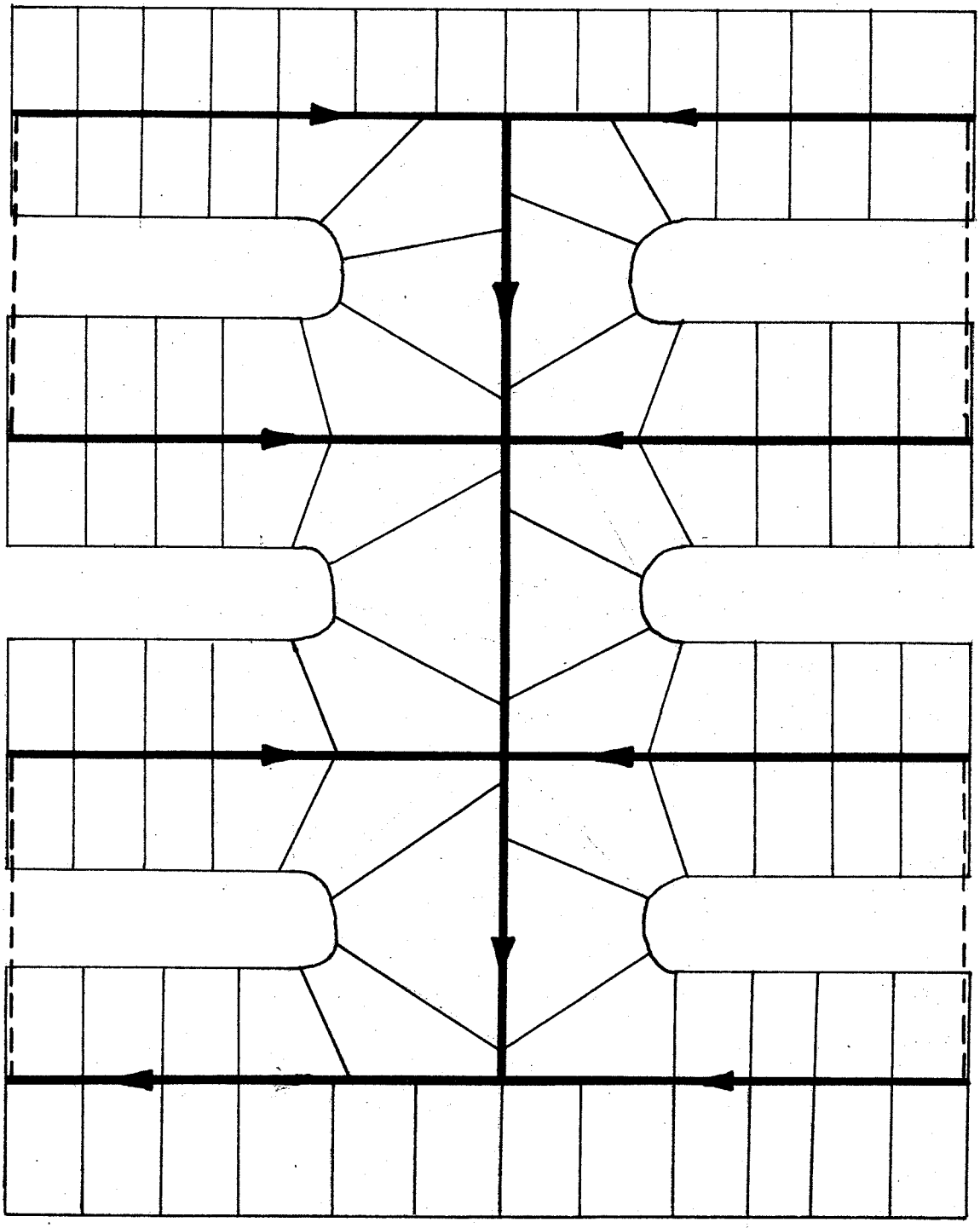
In laying out this type of distribution and collection system a number of considerations should be kept in mind if the design is to achieve maximum economy and a minimum of operating trouble.

Dead ends in water mains must be avoided, for experience has shown that freezing occurs in the sections of pipe where the water is stagnant. All water mains in this design form a complete loop, and steady circulation of water is possible. Please see Plate No. 6, Page 72.

Dead ends in sewer mains are permissible only if they are located at the top end of a sewer line, where concentration of sewage is not possible.

The number of street crossings that a utilidor encounters should be kept at a minimum. There are two basic reasons for this. The surface utilidor introduces

TYPICAL UTILIDOR LAYOUT



UTILIDOR

WATERMAIN: Installed to prevent dead-ends in water mains, Located below grade

PLATE NO. 6

an obstruction in the right-of-way and therefore it is necessary to construct ramps to carry motor vehicles over. This is a very expensive venture. The sewer line cannot be made to go under the street because it must be kept at grade.

Also, experience has shown that sections of sewer and water-line underlying roadways are more vulnerable to freezing than sections not travelled over. The vehicular traffic compacts the insulation and seriously reduces its insulation qualities. Although the passage of sewer and water-lines under travelled roadways causes operational problems, it nevertheless can be made to work effectively. The insulated sewer and watermains are encased in a steel or concrete culvert. This minimizes the damaging effect produced by vehicular traffic although it is a very expensive operation and should be avoided, if at all possible.

In this design the utilidor intersects a roadway a minimum of five times. The crossing at Hearne Street will be the only one that will cause an obstruction problem, all other street crossings will be made below street grade. It should be noticed that the layout of the street pattern was to some extent influenced by the above consideration, that is to keep the amount of roadway intersections down to a minimum.

The utilidor will be located at the back of the lot on a 15 foot easement. The main trunk sewer will be located on a 30 foot easement. In the majority of the lots this easement will be shared equally, that is $7\frac{1}{2}$ feet will be obtained from the back of each lot that parallels the utilidor. In some cases the easement will be shared in whole or in part by a single lot. This will be necessary where the utilidor cannot follow the back lot line because of its staggered alignment. It is very important that the sewer main be laid in a straight line.

It is economically more feasible to locate the utilidor in the back of the lots because the house connections are shortened. From a practical reason this is equally important. The majority of the operational problems experienced in the utilidor are the freezings that occur in the house connections. If these connections are short, the freezing problems will be reduced.

By placing the utilidor at the back of the lots, they can be concealed and hidden from the public eye. Their form is of no aesthetic value and if put in too obvious a place they would create a drab appearance within the townsite.

WATER SUPPLY

One of the main problems encountered in the permafrost regions is the lack of an adequate and reliable source of fresh water. Because of the permafrost, the movement of ground water is restricted and hence cannot be relied upon as a source. Rivers, unless they are large enough to maintain a steady flow during the winter period, usually freeze solidly. There are many lakes in the vast northland but most of them are under 10 feet in depth and consequently freeze solidly during the winter months.

The townsite of Churchill is rather fortunate in that it is situated adjacent to the Churchill River. This river is large enough to maintain a flow throughout the year.

The water in the Churchill River, adjacent to the townsite is saline, because of the intermixing with the waters of the Hudson Bay. However, where the elevation of the Churchill River is above high tide, a reliable source of fresh water is available throughout the year.

The introduction of sewer and water facilities into the townsite will greatly increase the demand for water. The present source, Isabella Lake and a few other small lakes, situated about 3 miles east of the townsite, will not be able to meet the increasing demands. Consequently,

the Churchill River will have to be used as an additional source.

STORM DRAINAGE

The storm drainage will be of the surface type, that is ditching. The natural drainage pattern of this area is from an easterly to a westerly direction. Therefore, all surface water will be made to flow via ditches into the existing collector ditch that parallels the south side of Kelsey Avenue.

Since the movement of storm water will be dependent upon gravity flow, the ditches will have to be carefully constructed so as to obtain the necessary gradient.

To some extent the above consideration influenced the design of the street pattern. It is laid out in such a manner that an intensive utilization of the natural slope for the necessary gradient in ditching is possible.

IMPLEMENTATION OF REDEVELOPMENT PLAN

For the successful redevelopment of an area, a co-ordinated program must be adopted if the redevelopment is to be realized at a nominal cost and at a minimum discomfort to the inhabitants of the area under consideration.

Because the inhabitants will have to be displaced from their homes during the demolition, arrangements must

be made to rehouse these people during this period, and also, during the period of reconstruction. The pattern in which clearing and reconstruction should take place, in order to minimize the amount of discomfort experienced by the inhabitants, is a study in itself and therefore will not be considered in this thesis, although the author wishes to point out that a study of this sort forms an integral part of a redevelopment project. This thesis is concerned mainly with the redevelopment plan, which forms only a part of the redevelopment program.

In order that the development of the townsite be realized at a nominal cost, reconstruction should take place in stages. This is to ensure a defined pattern of development, which will evolve in a prescribed manner, within certain fixed limits. Although, staging places very stringent restrictions on the development, it is nevertheless very necessary; when one considers the fact that the cost of installing the public utilities in this region is one of the most expensive items in the reconstruction of the area. The utilities should be installed according to the stages of development. In other words, only that section of public utilities that services Stage I should be installed. This will insure that, once installed, these utilities will be put into immediate use. Consequently, the amortization program can commence as soon as the services

are installed, thus minimizing the interest charges on the capital investment.

The reconstruction of the townsite should occur in 2 stages. Stage I would be constructed immediately to meet the demand of the present population which is 400 dwelling units.

Stage 1 would consist of the following areas.

1. Single family dwelling district bounded by La Verendrye Road, Thompson Street, Hearne Street and Kelsey Avenue. Contains 130 dwelling units.

2. The row house district bounded by La Verendrye Road, Thompson Street, Selkirk Road and Kelsey Avenue. Contains 179 dwelling units.

3. The low cost housing project; all the 2-storey apartments that front on Hudson Place. Contains 108 dwelling units.

4. The trailer court; to accommodate all the house trailers presently dispersed throughout the townsite.

5. The commercial centre.

6. The community centre.

7. The combined high school and elementary school.

Stage II The construction of Stage II will commence when accommodations are required to house the anticipated increase in population. The pattern of development should be such that a minimum extension of public utilities should serve the maximum number of dwelling units.

The areas contained in Stage II are defined by

the following limits.

1. All buildings and dwelling units bounded by Hearne Street, La Verendrye Road and Kelsey Avenue; contains 141 dwelling units.

2. All 2-storey apartments that form part of the low-cost housing project, fronting on Radisson Place

BIBLIOGRAPHY

Kostka, V. J. Notes on Planning Principals. Unpublished; University of Manitoba.

Kostka, V. J. Neighbourhood Planning. Winnipeg: Published by Author, 1957.

Saskatchewan Co-operative Wheat Producers Limited. Via Churchill (A Shipment of Saskatchewan Wheat to Europe), Regina: 1936.

Kenny, James F. The Founding of Churchill. J. M. Dent & Sons Ltd., 1932.

Clark, Lloyd K. Insulating Materials For Sewerage Systems in Permafrost Areas. National Research Council, June, 1950.

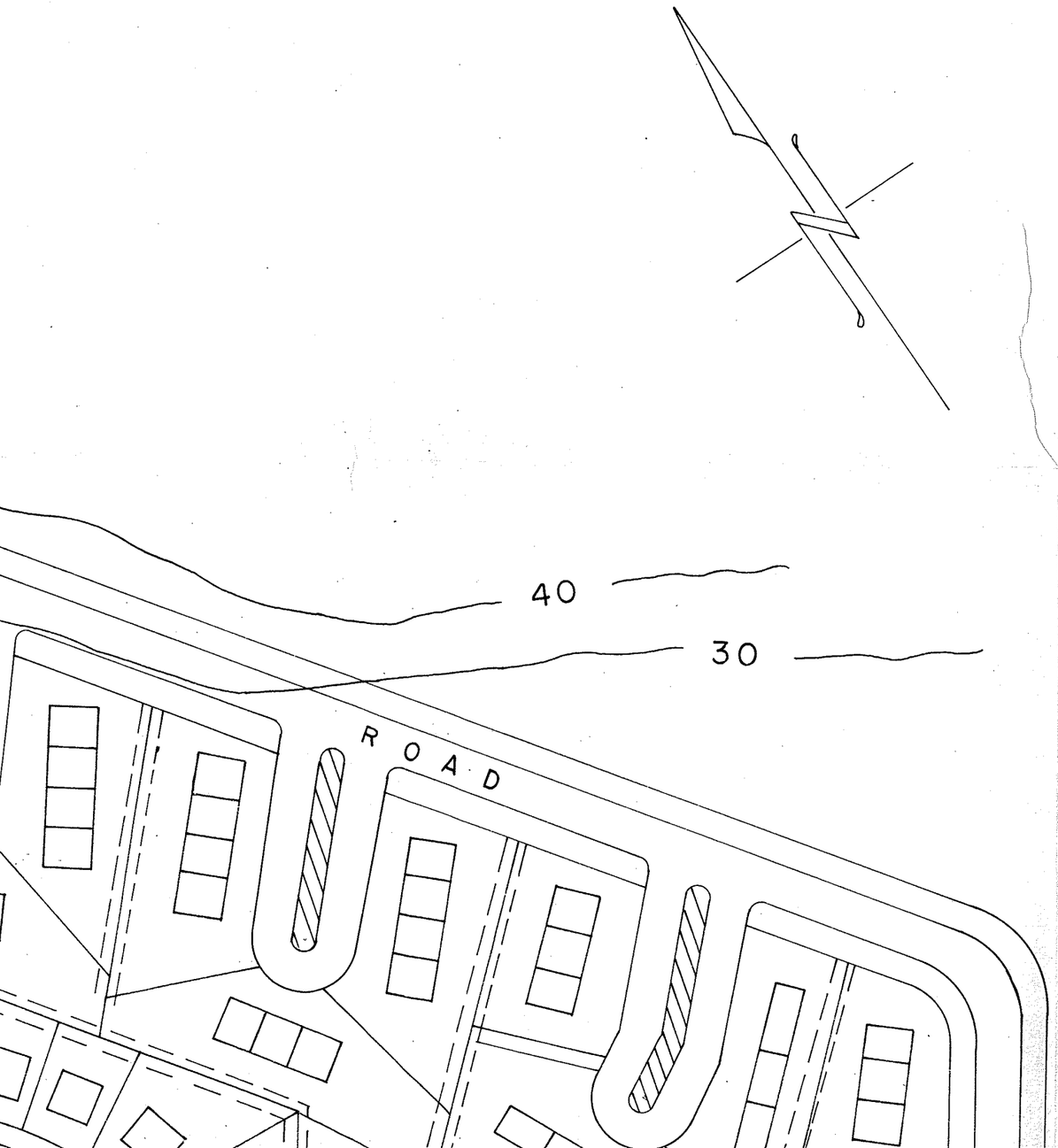
Dickens, H.B. Water Supply and Sewage Disposal in Permafrost Areas of Northern Canada. National Research Council, August, 1959.

United States, Department of Health, Education, And Welfare. Mobile Home Park Sanitation. 1960.

Manitoba, Department of Industry and Commerce. Economic Atlas of Manitoba, 1960.

Manitoba, Department of Industry and Commerce. Report on Existing Conditions and Associated Services in the Port of Churchill, Manitoba. 1960.

Dominion Bureau of Statistics. Canada Year Book, 1962. Ottawa: Queen's Printer, 1962.


40
30
ROAD

30

40

30

VERENDRYE

L A

CH.

CH.

CH.

CH.

STREET

STREET

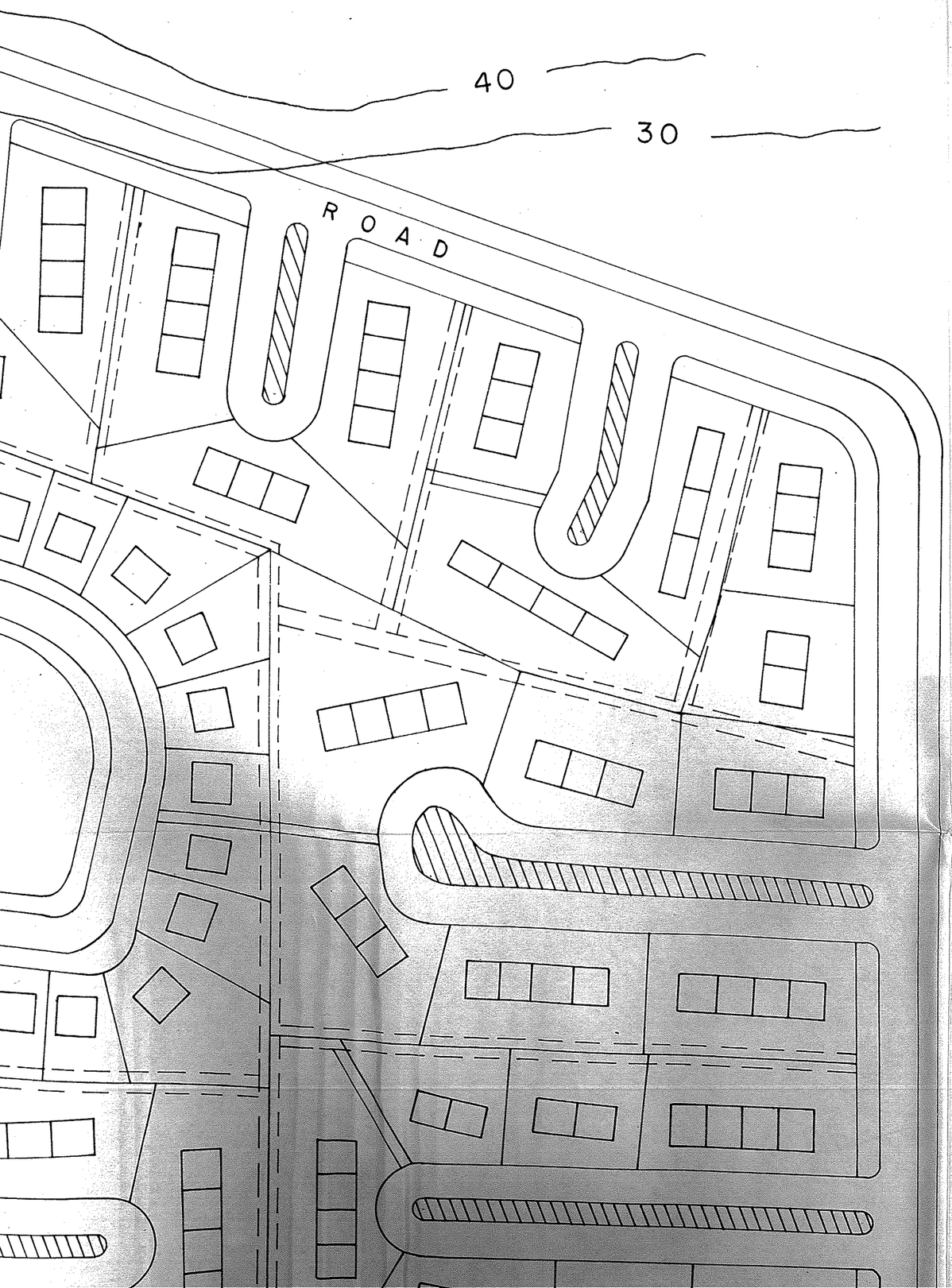
10

20

Outfall ——→ Approx. 1200' (from northern limit of townsite)

RADISSON PLACE

L



REDEVELOPMENT PLAN
FOR THE
TOWNSITE OF CHURCHILL
MANITOBA

Scale: 1 inch = 100 feet

DATE: APRIL 1963	DESIGNED & DRAWN BY : G.J. TENCHA

LEGEND

- Single family dwelling
- 2 Storey Apts (low cost housing)
- Row house
- Easement for Utilidor
- Boulevard
- Existing and paved
- 10' Walk way
- Industrial area

All minor and major collectors - 70' right of way

All culs de sucs - 80' right of way.

CH.

CH.

CH.

CH.

STREET

STREET

BERVIER

ELEM.
SCH.

BAY

HEARNE

THOMPSON

C.P.

Restaurants

Offices

Bakery

Masonic Lodge

Legion

Bowl Alley & Billiards

Cinema

ENCLOSED MALL

Shp. Centre
&
Dept Store

Hardware

Drug

Hair Dress Barber

Gift Shop

Rest.

Press

Bank

C.P.

C.P.

Lane

AD

Outfall ⟶ Approx. 120

RADISSON PLACE

HUDSON PLACE

20

L A

ROAD

C.P.

High Sch.
&Elem Sch.

Indoors
Skating
&

Lane

C.P.

Y G R O U N D

K I R K

HUDSON PLACE

RADISSON PLACE

20

Outfall ⟶ Approx. 120

FRANKLIN PLACE

TRAILER COURT

JAMES PLACE

20

MUNCK ROAD

To Elevator

CANADIAN
ST

S E L K I R K

P L A Y G R O U N D

Skating
&
Curling

Comm.
Hall

Public

C. P.

M A L L

Barber
Gift Shop
Rest.
Press
Bank
Fed. Prov.
Bldg.
Local
Offices

Motel
Hotel

C. P.

Monument

K E L S E Y

T H

20

I N D U S T R I A L

SIDING

DIAN NATIONAL
STATION

C A N A D I A N N A T I O N A L R A I L W A Y S

A V E N U E

Fort Churchill Approx. 3 miles

All

All

A R E A

To the Pas — 508 miles

All minor and major collectors - 70' right of way

All culs de sucs - 80' right of way.

Fort Churchill Approx. 3 miles →

To the Pas →— 508 miles