

City of Brockville



**Report  
on  
North Area  
Sanitary Sewer Services**

**GORE & STORRIE LIMITED**  
CONSULTING ENGINEERS

TRAVERS E. FITZPATRICK

# City of Brockville



## Report on North Area Sanitary Sewer Services

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Attention: Mr. T. H. Dobbin, P.Eng.  
City Engineer

Gentlemen:

Re: North Area Sanitary Sewer Services

We are pleased to submit herewith our report on the City of Brockville North Area Sanitary Sewer Services.

The purpose of the report was to:

- a) Review the capacities of the existing trunk sewer system and the projected ultimate tributary flows, when all areas of the City are developed in accordance with the new Zoning Plan.
- b) Determine requirements for sewer services for the north east area industrial lands, which were not originally included in the drainage area boundaries for design of the Butler's Creek Trunk Sewer.
- c) Review the requirements for alternatives to relieve projected overloading which might be anticipated in the Butler's Creek Trunk Sewer.

A basic Master Plan for providing sanitary sewer servicing for the north area of the City has been developed and is presented in the report. The major recommendations which are included in the report, and which describe the

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proposed development of the overall sanitary sewer servicing system, are briefly summarized following:

1. The northeast industrial lands within the City (area nos. 101 and 102) may be serviced by a gravity trunk sewer, southerly along Broome Road and First Avenue, discharging on a temporary basis, into the existing Butler's Creek Trunk Sanitary Sewer.

When development and flows increase to the extent that the Butler's Creek Sanitary Sewer reached capacity, the flow from this area will have to be diverted via a new pumping station, forcemain and gravity sewer, directly to the Water Pollution Control Plant by way of a proposed route, easterly to Oxford Avenue and then southerly across the Ontario Psychiatric Hospital property.

2. The northwest area of the City (area no. 113) presently zoned rural, would be serviced southerly through a trunk sewer crossing Highway No. 401 and then connecting into the Butler's Creek Trunk Sanitary Sewer at a point immediately north of the Canadian National Railway Tracks (point G) if and when this area is re-zoned and developed.

If problems are experienced in this section of the Butler's Creek Trunk Sewer, as the north area develops, then the westerly trunk sewer may be diverted southerly to connect to the Butler's Creek Trunk Sewer at Church Street (point D) at that time.

3. The remainder of the north area should continue to be serviced southerly, through the Parkdale Avenue and Ormond Street Trunk Sewers, to the Butler's Creek Trunk Sewer, in accordance with the system of existing and proposed sewers, described in the General Plan, Figure No. 2, accompanying the report.

The Windsor Heights Development, within area 110, is presently serviced southerly, through the Loyalist Phase I and Phase II system of local sewers. This system of local sewers does not have excess

capacity to service the additional area and it is recommended that the Buell's Creek Trunk Sewer be extended northerly to service this area, as soon as possible and certainly before any additional development takes place in that area.

4. An area of approximately 1215 ha (3000 acres) within Elizabethtown Township, immediately east of the present City Boundary, has been identified as a potential development area which is readily serviceable. A servicing scheme for this area has been developed as part of this study and would combine with the proposed pumping station, forcemain and gravity sewer required to service the northeast industrial lands. The Township and the City should, therefore, give consideration to a joint overall planning of development in this area prior to finalizing servicing requirements for the northeast development area.
5. The existing 600 mm (24-inch) forcemain from the Main Pumping Station to the Water Pollution Control Plant, must be twinned before the flow to the station reaches 54 ML/d (12 mgd). It is expected that this will occur by about the year 2000, on the basis of the population forecast presented in this report.

We have appreciated very much, the excellent co-operation which we have received throughout the course of this study, from the staff of the City of Brockville Engineering Department, for which we wish to express our sincere thanks.

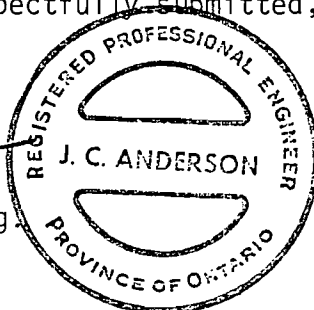
We trust the report is complete in accordance with the Terms of Reference developed for the study and that the report will provide the City with valuable and useful information in the planning of future trunk sewer servicing requirements.

All of which is respectfully submitted,

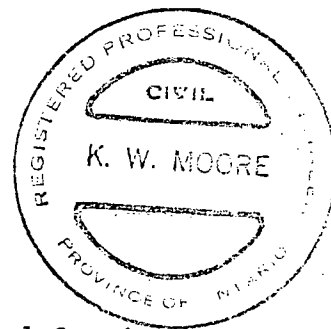
Yours very truly,



J. C. Anderson, P.Eng.  
Branch Manager



K. W. Moore, P.Eng.  
Chief Engineer - Municipal Services



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SECTION 1

INTRODUCTION

## SECTION 1

### INTRODUCTION

#### GENERAL

This study was authorized by the City of Brockville to provide the City with both short term and long range planning for the Sanitary Sewer Collection System for those undeveloped lands within the northern areas of the City. More particularly, the study was to determine requirements for servicing the northeast sector of the City, which was not included in the service area of the original Butler's Creek Trunk Sewer design.

#### TERMS OF REFERENCE

The Terms of Reference for the study are based on the Proposal, dated January 6, 1978, submitted to the City of Brockville by Gore & Storrie Limited and are summarized as follows:

1. *Review the drainage areas and area land uses in the light of the new Zoning Plan for the City.*
2. *Review the residential and industrial sewage flow units.*
3. *Calculate design sewage flows and compare with sewer capacities.*
4. *Determine requirements for sewer services for the northeast area Industrial Lands.*
5. *Review the requirements for alternatives to relieve any projected overloading which might be anticipated in the main Trunk Sewer.*
6. *Provide a final report describing the findings of the study.*



SECTION 2

DESIGN CRITERIA

SECTION 2  
DESIGN CRITERIA

STUDY AREA

The area for the investigation of the Sanitary Trunk Sewer System includes all lands within the present City of Brockville Boundary. The area north of Highway No. 401 was considered in more detail. Lands east of the City, in the Township of Elizabethtown, have also been considered but only to a limited extent.

LAND USE

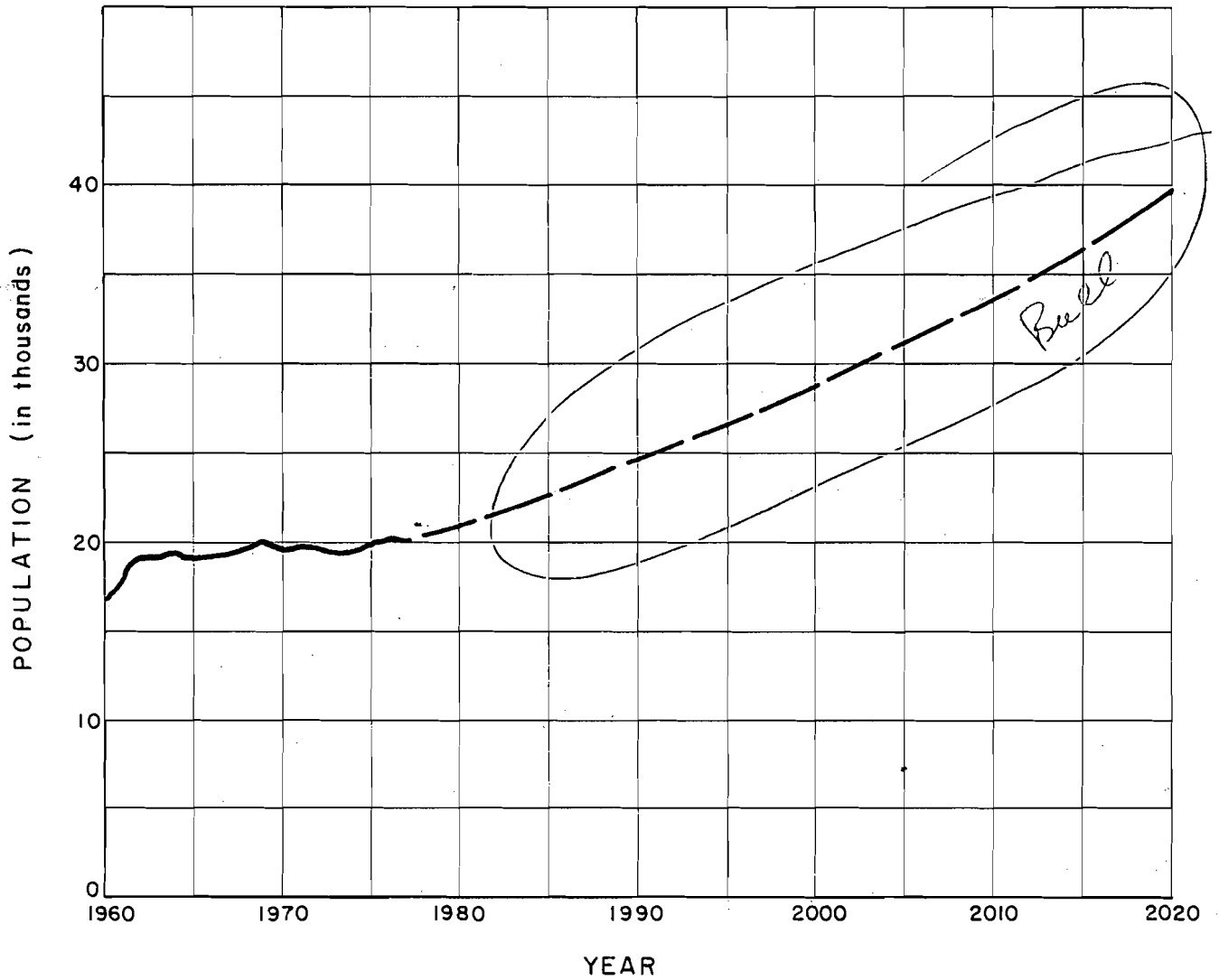
The land use designations used for the City of Brockville are in accordance with the current Official Plan of the Brockville and Elizabethtown Planning Area, as well as the City of Brockville Zoning By-Law and the Future Land Use Plan, provided by the City.

The City of Brockville contains approximately 2 064 ha (5100 acres). The Land Use plan shows this area divided as follows:

Domestic	(Residential) (Commercial) (Institutional)	950 ha	(2350 acres)
Industrial		445 ha	(1100 acres)
Others	(Open Space) (Vacant) (Rural)	669 ha	(1650 acres)
Total		<u>2 064 ha</u>	<u>(5100 acres)</u>

# CITY OF BROCKVILLE

*Review: based on what*



## POPULATION FORECAST

GORE & STORRIE LIMITED

FIGURE No. 1

For the purpose of this study, approximately 304 ha (750 acres) of land north of Highway No. 401, zoned rural in the current Official Plan, have been considered as residential. Land use for all of the lands north of Highway No. 401 within the City boundaries is summarized as follows:

Domestic	675 ha	(1670 acres)
Industrial	300 ha	( 740 acres)
Total	<u>975 ha</u>	<u>(2410 acres)</u>

#### POPULATION

*terrible*

The existing population in the City of Brockville is approximately 20,000 persons. The future population for the study area, considering only lands presently zoned, is expected to be 35,250 persons, according to the Official Plan. This projection is based on an average residential density of 37 persons per hectare (15 persons per acre). Added to this is an equivalent population of 11,250 persons projected for the area north of Highway No. 401, presently zoned rural, for a total anticipated population of approximately 46,500 persons.

Based on the analysis of past population, done by others for the Official Plan, an approximate annual projected growth rate of 1.6% was established. Figure No. 1 opposite, shows the past growth rate of the City of Brockville, as well as a future projected growth rate. It shows that the projected population for the service lands within the present City Boundaries, should not be reached for about 30 years.

#### DESIGN CRITERIA

The design values used for the evaluation of the sewer system are based on a review of present and projected water use, as well as waste water production statistics of the different consumers. These design flows are considered to be adequate to ensure that the major trunk facilities will be able to handle all anticipated flow from the fully developed service area.

SECTION 3

TRUNK SEWER SERVICES

TABLE NO. 1

## SUMMARY OF SUB-DRAINAGE AREAS

Area No.	Res. Ha. Ac.	Ind. Ha. Ac.	Others Ha. Ac.	Total Ha. Ac.	Area No.	Res. Ha. Ac.	Ind. Ha. Ac.	Others Ha. Ac.	Total Ha. Ac.
1	41 101	- -	1 3	42 104	12	2 4	- -	- 1	2 5
1a	1 3	- -	11 27	12 30	13	3 8	- -	- -	3 8
1b	17 41	6 15	22 54	45 110	14	27 66	- -	3 8	30 74
2a	41 102	- -	4 9	45 111	15	3 7	- -	1 3	4 10
2b	4 10	- -	1 2	5 12	16	6 15	- -	- -	6 15
3	21 51	3 7	5 13	29 71	17	4 10	- -	- 1	4 11
3a	7 19	- -	1 1	8 20	18	2 4	- -	4 10	6 14
3b	17 41	- -	4 10	21 51	19	6 14	- -	- 1	6 15
3c	5 13	- -	1 3	6 16	20	11 26	- -	1 3	12 29
4	27 68	- -	6 14	33 82	21	6 15	- -	1 2	7 17
4a	6 16	- -	1 2	7 18	22	69 170	5 13	18 43	92 226
5	15 38	10 24	1 1	26 63	23a	20 50	- -	3 7	23 57
5a	4 11	- -	1 1	5 12	101	12 30	89 220	- -	101 250
6	23 56	- -	- -	23 56	102	- -	16 40	16 40	32 80
6a	2 4	9 21	2 6	13 31	103	- -	99 245	12 30	111 275
7	- -	89 220	37 91	126 311	104	- -	83 205	41 100	124 305
8	57 140	- -	17 43	74 183	105	92 226	8 20	16 40	116 286
8a	1 2	- -	1 2	2 4	106	76 188	- -	45 110	121 298
9	14 35	- -	6 15	20 50	107	36 90	4 10	- -	40 100
9a	1 3	- -	2 4	3 7	108	21 52	- -	- -	21 52
9b	38 94	- -	5 13	43 107	109	82 203	- -	4 10	86 213
9c	9 21	20 50	2 6	31 77	110	37 91	- -	24 60	61 151
10	32 80	- -	4 10	36 90	111	89 220	- -	20 50	109 270
10a	- -	- -	5 12	5 12	112	89 220	- -	- -	89 220
11	17 43	- -	- -	17 43	113	142 350	- -	- -	142 350
11a	20 49	4 10	16 39	40 98	Total	1255 3100	455 1100	365 900	2065 5100

## SECTION 3

### TRUNK SEWER SERVICES

#### GENERAL

The study area has been divided into sub-drainage areas as shown on Figure No. 2 found in the pocket at the back of this report. The sub-drainage area boundaries and numbers in the area south of Highway No. 401, are the same as those used in Data Book No. 2 - Sanitary Sewer Systems, supplementary to the Final Report on Sewer Separation 1973, by Gore & Storrie Limited. Several changes have been made due to improvements in the local sanitary sewer system by the City since 1973, and these are indicated below.

1. The City has diverted approximately 65% of sub-area 11 from Brock Street at Dales Street to the Butler's Creek Sanitary Trunk Sewer at Downey Street (Point F). This area is shown as sub-drainage area 11a on the General Plan.
2. Approximately 35% of the sub-area 6 now reaches the trunk sewer south of Hubbell Street along the extension of Strowger Boulevard (Point G) instead of along Perth Street. This area is shown as sub-drainage area 6a on the General Plan.
3. Approximately 60% of Area 9 flows through the new 450 mm (18-inch) sewer from the Phillips Cable plant, north to the CPR and then to the trunk sewer at Church Street and is shown as sub-drainage area 9c on the General Plan.

The sub-drainage areas north of Highway No. 401, are also shown on Figure No. 2 and are numbered from 101 to 113 inclusive. This area is referred to as sub-area No. 2 in Data Book No. 2 accompanying the 1973 report.

A summary of the sub-drainage areas, describing the areas and land use designations are shown on Table No. 1, opposite.

TABLE NO. 2  
SUMMARY OF HYDRAULIC ANALYSIS

Location on Trunk	Average Capacity		Scheme No. 1					Scheme No. 2					Scheme No. 3					Scheme No. 4				
			Flow		% of capacity	Sur-charge		Flow		% of capacity	Sur-charge		Flow		% of capacity	Sur-charge		Flow		% of capacity	Sur-charge	
	L/s	cfs	L/s	cfs		m	ft.	L/s	cfs		m	ft.	L/s	cfs		m	ft.	L/s	cfs		m	ft.
A Orchard St.	1192	42.1	1311	46.3	110	--	--	1311	46.3	110	--	--	1189	42.0	100	--	--	1189	42.0	100	--	--
B John St.	1169	41.3	1280	45.2	109	0.16	0.52	1280	45.2	109	0.16	0.52	1158	40.9	99	0.0	0.0	1158	40.9	99	0.0	0.0
C King St.	1509	53.3	1237	43.7	82	0.23	0.76	1237	43.7	82	0.23	0.76	1113	39.3	74	0.01	0.03	1113	39.3	74	0.01	0.03
D Church St.	824	29.1	1184	41.8	146	0.09	0.30	1079	38.1	131	0.09	0.30	1059	37.4	129	0.0	0.0	895	31.6	109	0.0	0.0
E Pearl St.	1000	35.3	1147	40.5	115	0.58	1.91	1065	37.6	106	0.41	1.36	1025	36.2	103	0.28	0.93	881	31.1	88	0.07	0.24
F Downey St.	926	32.7	1127	39.8	122	0.93	3.04	1045	36.9	113	0.58	1.90	1005	35.5	109	0.37	1.20	861	30.4	93	0.0	0.0
G Allen St.	1178	41.6	929	32.8	79	1.41	4.61	929	32.8	79	0.94	3.10	804	28.4	68	0.68	2.24	804	28.4	68	0.0	0.0
H Perth St.	674	23.8	911	32.2	135	0.97	3.17	911	32.2	135	0.51	1.66	787	27.8	117	0.10	0.34	787	27.8	117	0.0	0.0
I Stewart St.	1065	37.6	886	31.3	83	1.33	4.37	886	31.3	83	0.87	2.86	765	27.0	72	0.23	0.76	765	27.0	72	0.15	0.49
J CPR	801	28.3	864	30.5	108	1.55	5.10	864	30.5	108	0.71	2.32	742	26.2	93	0.0	0.0	742	26.2	93	0.0	0.0
K Park St.	255	9.0	187	6.6	73	1.16	3.79	187	6.6	73	0.69	2.28	65	2.3	26	0.0	0.0	65	2.3	26	0.0	0.0
L N. Augusta St.	303	10.7	161	5.7	53	0.0	0.0	161	5.7	53	0.0	0.0	37	1.3	12	0.0	0.0	37	1.3	12	0.0	0.0
M First Ave.						0.0	0.0				0.0	0.0				0.0	0.0				0.0	0.0



### BUTLER'S CREEK SANITARY TRUNK SEWER

An hydraulic analysis was undertaken to determine the flows related to system capacity and to identify problem areas which may result in sewer surcharging and associated basement flooding when all lands in the City are developed and contributory to the trunk. The capacity of the Butler's Creek Sanitary Trunk Sewer was determined from information given in Data Book No. 2 from the 1973 Report on Sewer Separation and the future flows contributory to the trunk sewer were calculated using the land use designations, population densities and flow rates indicated earlier in this report. The points at which the sub-drainage areas flow into the trunk sewer are indicated on the plan by an arrow.

Four different alternative schemes were analysed, based on full development within the municipal boundaries. In the analyses, all sub-areas north of Highway No. 401, with the exception of areas 101, 102 and 113 will be contributory to the Butler's Creek Trunk Sewer via the 750 mm (30-inch) Sanitary Trunk Sewer on Park Street. Table No. 2 opposite, shows the flow and surcharge information for points A to M, along the Butler's Creek Trunk Sewer, for the four alternative servicing schemes. This information is summarized also on the profile drawing of the Butler's Creek Trunk Sewer, Figure No. 3 at the back of this report.

#### Scheme No. 1

The first scheme of servicing considers the trunk system as it presently exists and providing for all lands to drain to the Butler's Creek Trunk Sewer, as shown on the plan. Sub-areas 101 and 102 will be connected to the trunk at First Avenue (point M) while sub-area 113 will be connected to the trunk at Allan Street, south of Hubbell Street (point G). It is noted on Table No. 2 opposite and on Figure No. 3, that all of the trunk sewer from Park Street to the Main Pumping Station (point K to point A) is under a surcharged condition. The section of the trunk from Park Street south to Pearl Street (point K to point E) is under a surcharge of more than 0.9 metres (3 feet) and could result in flooded basements in some areas.

#### Scheme No. 2

The second scheme provides for all flow to be directed to the trunk sewer, the same as in the first scheme, with one modification. Sub-area 113 is diverted along Centre Street south of the CNR through sub-areas 8 and 9c to the trunk sewer at Church Street (point D). This will reduce the surcharging somewhat in the area from Pearl Street to Park Street (points D to G). It is calculated that surcharging in this section would be reduced somewhat but not necessarily enough to eliminate all basement flooding problems.

#### Scheme No. 3

The third scheme is basically the same as Scheme No. 1, with the exception of the servicing for areas 101 and 102. In Scheme No. 3, these areas will be pumped from First Avenue at the trunk sewer, easterly to Oxford Avenue (point N) and then by gravity through the Ontario Psychiatric Hospital property to the Water Pollution Control Plant, as shown on the plan, Figure No. 2. This will not be necessary until flows increase to the extent as to create a surcharged condition in the trunk. Diversion of these areas will reduce the ultimate flow in the trunk sewer by approximately 122 L/s (4.3 cfs). This will reduce considerably the surcharging in the trunk sewer but not eliminate it completely. It is noted on Table No. 2 and the profile, Figure No. 3, that the surcharging expected with this scheme is confined to the low areas of the Butler's Creek Valley, where there are few connections to the trunk. Basement floor elevations are generally higher than the calculated hydraulic grade line and it is expected that basement flooding should be eliminated with this scheme.

#### Scheme No. 4

Scheme No. 4 combines the proposals of both Scheme No. 2 and Scheme No. 3. Area No. 113 flows are directed by a sewer tributary to the trunk sewer at Church Street (point D). Area Nos. 101 and 102 are pumped from First Avenue to Oxford Avenue (point N) and then by gravity, south to the Water Pollution Control Plant. It is noted on Table No. 2 and the profile, Figure No. 3, that all significant surcharging is eliminated with this scheme.

## Discussion

Scheme No. 4 is the most desirable scheme in terms of reducing surcharging on the Butler's Creek Trunk Sewer and only minimal surcharging is expected in isolated areas for Scheme No. 4. Scheme No. 3 will result in somewhat more surcharging than Scheme No. 4 but as noted earlier, this is confined to the low areas of the Butler's Creek Valley and the predicted surcharging through this area should not create basement flooding problems. Scheme No. 4 has a distinct disadvantage in that, the route for the westerly trunk sewer servicing, Area No. 113, will require an additional crossing of the Canadian National Railway, in a rock tunnel, at significant capital cost. This additional crossing is difficult to justify in terms of the minimal benefits achieved.

## NORTH AREA SERVICING

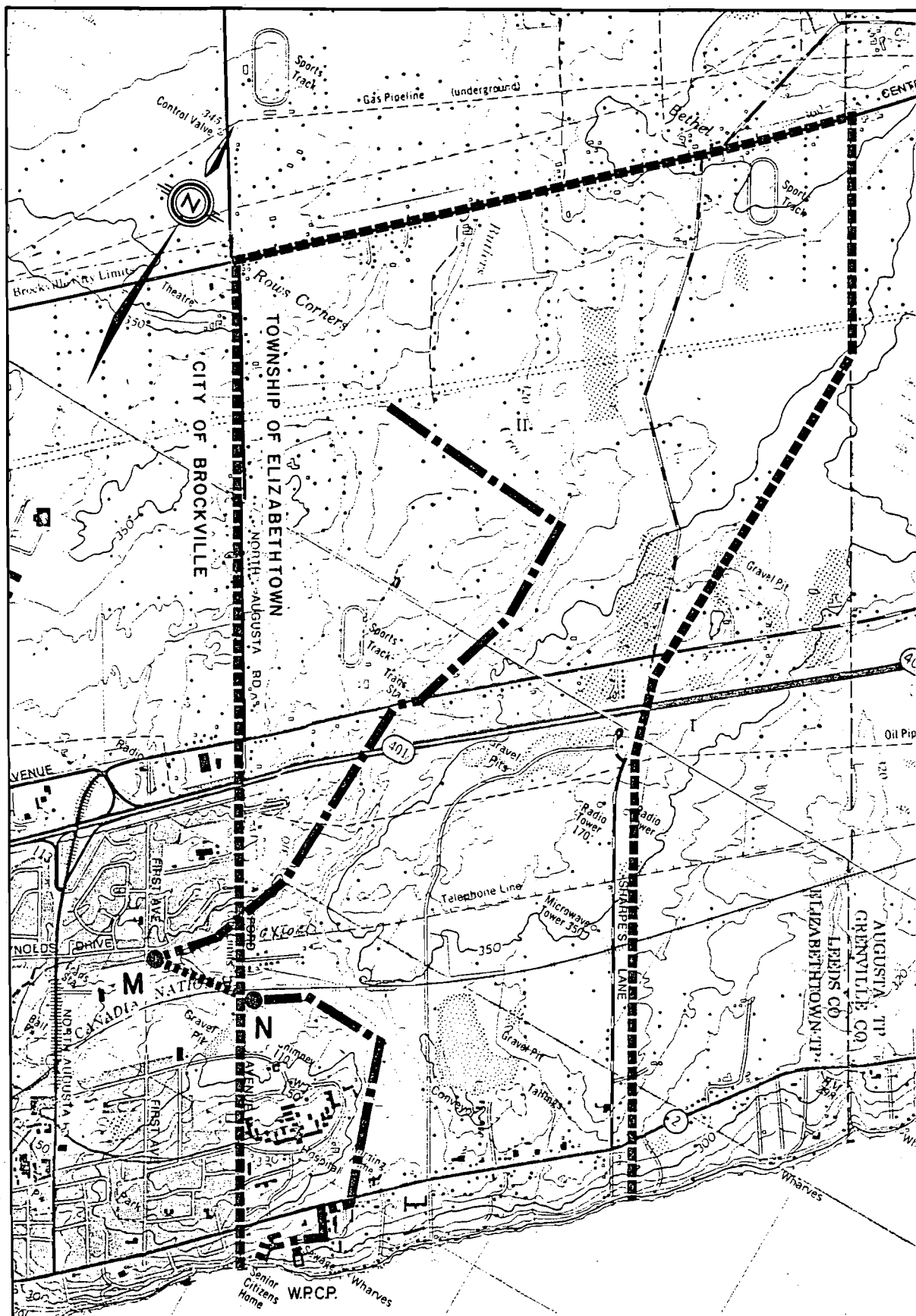
### Northeast Industrial Lands Within City

The proposed industrial area north of Parkdale Avenue and east of the CPR is presently served by a sanitary sewer on California Avenue and Parkdale Avenue draining to the Butler's Creek Trunk Sewer via Park Street. Approximately 105 ha (260 acres) on the east side of this industrial area cannot be served by gravity to the existing local system. This is shown as area 101 and 102 on Figure No. 2.

This area can be served by a gravity sewer along Broome Road, southerly to Highway No. 401 and along First Avenue to the Butler's Creek Trunk at point M, as shown on Figure No. 2. Area 102 would require a pumping station on North Augusta Road, south of Centennial Road and a forcemain south and west to the height of land on Broome Road.

There is, presently, capacity available in the Butler's Creek Trunk Sewer for the peak 122 L/s (4.3 cfs) expected flow from the ultimate development of this area.

However, in the future, when development increases in other tributary areas and the flow in the Butler's Creek Trunk Sewer approaches the sewer capacity, the flow from areas 101 and 102 should be diverted by pumping from the end of the trunk sewer at First Avenue, easterly to Oxford Avenue (point N) as shown on Figure No. 2. It is proposed that the flow would be directed by gravity sewer



# PROPOSED SERVICING IN ELIZABETHTOWN TOWNSHIP

SCALE 1: 25,000

through the Ontario Psychiatric Hospital property, southerly to Highway No. 2 and then to the Water Pollution Control Plant. This diversion is not expected to be required for a good number of years and will depend largely on future development in the northwest area of the City, primarily west of Stewart Boulevard.

Alternatively, if desired to keep the route within the City Boundaries, the forcemain could be extended south along Oxford Avenue to the height of land. A gravity sewer would be required to direct the flow southerly along Oxford Avenue to King Street and then to the Water Pollution Control Plant. This would increase the pumping station lift requirements by approximately 30.5 m (100 ft.) but would result in an overall shorter length of pipe.

#### Northeast Area Lands Within Elizabethtown Township

An area of approximately 1215 ha (3000 acres) in the Township of Elizabethtown, adjacent to the east boundary of the City, was identified as a possible future development area which could be readily serviced. If, in the overall planning of the Brockville Area, this land is found desirable for development, it should be considered for servicing at the same time as the northeast industrial lands within the present City Boundaries. Two schemes for servicing this area to provide treatment at the City of Brockville Water Pollution Control Plant, have been examined.

The first scheme involves a gravity sanitary sewer system servicing the northerly lands in the Township of Elizabethtown. The sewer follows Butler's Creek to the existing trunk sewer in the City, at First Avenue. The flow would then be pumped easterly to Oxford Avenue along with the flow from the north-east industrial lands. From there, it would be directed by a gravity sewer through the Ontario Psychiatric Hospital property to the Water Pollution Control Plant. This scheme would also eliminate the need for the pumping station and forcemain on North Augusta Road, just south of Centennial Road, within the present City Boundaries, as this area is naturally tributary to Butler's Creek in Elizabethtown Township. The sewer system proposed for this scheme is shown on Figure No. 4 opposite. The profile for the proposed sewers is shown on Figure No. 5 at the back of the report.

A second scheme was investigated which involved a gravity sewer servicing all of the Township lands, as shown on Figure No. 4 and directing flows southerly to the Water Pollution Control Plant. This scheme, however, would require a pumping station at the Water Pollution Control Plant, as well as a very deep sewer through the area of the Ontario Psychiatric Hospital. The second scheme is considered to be more costly and less desirable overall and was not, therefore, considered further.

If the area in Elizabethtown Township is deemed desirable for development, a detailed servicing plan for this area should be considered with the Township before sizing the proposed Pumping Station on First Avenue and the Forcemain to Oxford Avenue, as well as the proposed trunk sewer southerly through the Ontario Psychiatric Hospital property to the Water Pollution Control Plant.

It is recognized that a large portion of the land within the Township is in the upstream areas of the Butler's Creek Watershed. Normal urban development in this area will naturally tend to increase both peak and base rates of flow in the Butler's Creek downstream through the City with associated detrimental effects, such as increased flooding, stream erosion, etc. If urban development of this area is considered, then runoff control and management techniques should be applied in the development of the urban drainage system in an effort to maintain a "Zero Increase" in runoff from the present undeveloped state of the land and thus minimize adverse downstream effects.

#### Other Areas North of Highway No. 401

In addition to the northeast industrial area, the other areas in the City north of Highway No. 401, have also been considered in some detail. All of the developed area west of the CPR and east of Stewart Boulevard presently flows to the 750 mm (30 inch) Sanitary Sewer on Ormond Street, to the Butler's Creek Trunk Sewer. Areas 111 and 112 west of Stewart Boulevard will also be serviced by this sewer at such time as they are developed.

Area 113 west of Stewart Boulevard, which contains approximately 142 ha (350 acres) of land presently zoned as vacant, naturally slopes to the south and west. This area may be serviced by a gravity sewer, south along Centre Street, across Highway No. 401, into sub-area 7 and then easterly to the Butler's Creek Trunk Sewer at point G. Most of sub-area 7 will also be served by this sewer and provision has been made for this connection by the City.

Area 111 in the northwest corner of the City will eventually be served by a gravity sewer to the east through the existing 525 mm (21-inch) sanitary sewer in the Windsor Heights subdivision (area 110) and then southerly through the Buell's Creek Trunk Sewer. The existing development within area 110, is presently serviced on a temporary basis through the local sanitary sewer system flowing south through the Loyalist Phase 1 and 2 Subdivisions (area 109). A check of the capacities of these local sewers shows that there is no spare capacity available here for this extra flow. Therefore, the proposed sewer connecting area 110 to the existing Buell's Creek trunk sewer in area 105, is required as soon as possible and certainly before any additional development takes place within area 110 or 111. The proposed sewer is shown on Figure No. 2 as a 525 mm (21-inch) diameter and the route for this sewer is schematic only and is dependent on the subdivision road layouts ultimately adopted for that area. This could affect the route, as well as the size shown on the General Plan, Figure No. 2

An hydraulic analysis was undertaken for the trunk sewer serving the area north of Highway No. 401. The analysis shows that at full development, there will be some surcharging (up to 0.35 m (1.2 ft.)) in the 525 mm (21-inch) sewer on Parkdale Avenue near the Buell's Creek Trunk Sewer. The 525 mm (21-inch) sewer on Parkdale Avenue creates somewhat of a constriction in the trunk sewer system which will result in local surcharging through this area for ultimate development conditions. However, the present development within the immediate area of this sewer is generally industrial and institutional buildings, with little danger of damage in terms of basement flooding. This area should, however, be monitored as development increases in the northwest, so as to forecast and determine possible future problems and the need for remedial works.

#### MAIN PUMPING STATION

All of the City of Brockville Sanitary Sewer System presently flows to the Main Pumping Station, located on Water Street at Orchard Street. From there, the sewage is pumped through a 600 mm (24-inch) forcemain to a point 120 m (400-feet) west of Oxford Avenue on King Street and then by gravity, through a 900 mm (36-inch) sewer to the Water Pollution Control Plant.

The pumping station has a present total pumping capacity of approximately 40.9 ML/d (9.0 mgd). This will be increased to a pumping capacity of 54.6 ML/d (12.0 mgd) with the addition of 2 more 20.5 ML/d (4.5 mgd) pumps, by the year 1984.

The 600 mm (24-inch) forcemain on Water Street, Ford Street and King Street, has an approximate capacity of 45.0 ML/d (12 mgd). When this capacity is reached, a second parallel 600 mm (24-inch) forcemain will be required. It would appear that this new forcemain will have to go on King Street, although it is recognized that this routing will be difficult. It is expected that the new forcemain will be required by about the year 2000.

The expected ultimate sanitary flow in the City of Brockville is approximately 120 ML/d (26.5 mgd) of which approximately 109 ML/d (24 mgd) will have to be pumped through the Main Pumping Station to the Water Pollution Control Plant. This station will eventually have to be doubled in size to handle the expected ultimate flow.



SECTION 4

RECOMMENDATIONS AND PHASING

SECTION 4  
RECOMMENDATIONS AND PHASING

GENERAL

In the preceding sections, the proposed Sanitary Trunk Sewer System is developed and discussed. A brief summary of the major recommendations is given below for convenience.

SUMMARY OF RECOMMENDATIONS

It is recommended that:

- a) The northeast industrial area (area Nos. 101 and 102) be served by a gravity sewer on Broome Road and First Avenue, discharging on a temporary basis to the existing Butler's Creek Sanitary Trunk Sewer.

When development and flows increase to the extent that the Butler's Creek Sanitary Trunk Sewer reaches capacity, a pumping station will be required at First Avenue and the Butler's Creek Trunk Sewer, to divert flow from the northeast industrial area, directly to the Water Pollution Control Plant. For this, we propose a forcemain to Oxford Avenue, south of the CNR and then a gravity sewer to direct the flows through the Ontario Psychiatric Hospital property to King Street and then to the Water Pollution Control Plant.

- b) Area 113, north of Highway No. 401 and west of Stewart Boulevard, should be serviced southerly through a trunk sewer crossing under Highway No. 401 and discharging into the Butler's Creek Trunk Sewer at point G, immediately north of the CNR tracks. It would be more desirable to make the connection to the Butler's Creek further south at Church Street (point D) but this will require an additional crossing of the CNR in rock tunnel, at considerable expense, which is difficult to justify on the basis of the analysis undertaken. However, if problems are experienced in this section of the

Butler's Creek Trunk Sewer as the north area develops, then the westerly trunk sewer, servicing the northwest area lands may be diverted southerly to connect to the Butler's Creek trunk sewer at Church Street at that time.

- c) The remainder of the north area should continue to be serviced southerly through the Parkdale Avenue and Ormond Street trunk sewers to the Butler's Creek Trunk Sewer, in accordance with the system of existing and proposed sewers shown on Figure No. 2.

The Windsor Heights development within area 110, is serviced southerly through the Loyalist Phase I and Phase II system of local sewers (area 108 and 109). This system of local sewers does not have excess capacity and the Buell's Creek Trunk Sewer should be extended northerly to service the Windsor Heights subdivision as soon as possible and certainly before any additional development takes place in that area.

- <sup>2</sup>d) An area of approximately 1215 ha (3000 acres) within Elizabethtown Township, immediately east of the present City Boundary, has been identified as a potential development area which is readily serviceable. A servicing scheme for this area has been developed as part of this study and would combine with the proposed pumping station, forcemain and gravity sewer required to service the northeast Industrial Lands. The Township and the City should, therefore, give consideration to a joint overall planning of development in this area prior to finalizing requirements for the First Avenue Pumping Station and forcemain and the gravity sewer southerly through the Psychiatric Hospital property proposed to service the northeast Industrial Lands.

- e) The existing 600 mm (24-inch) forcemain from the Main Pumping Station to the Water Pollution Control Plant, must be twinned before the flow to the Station reaches 54 ML/d (12 mgd). It is expected that this will occur by about the year 2000, on the basis of the population forecast presented in this report.

## PHASING OF WORKS

The required capital works to serve the City of Brockville, when all lands within the City are developed, are shown on the General Plan, Figure No. 2, found at the back of the report. Phasing of these works is based on a recognition of the present and predicted future problem areas and planning for development. The priorities of most works will be influenced by the planning and location of new development and, therefore, should be reviewed frequently and when planning and zoning changes are considered.

The following trunk services are considered to be necessary to service the City of Brockville when fully developed. They are listed in the order in which they are expected to be required, based on the analysis undertaken as part of this report.

1. Construction of a 525 mm (21-inch) sanitary sewer, east from the end of the existing 525 mm (21-inch) sewer on Windsor Drive to the proposed Bridlewood Subdivision and then south, connecting to the end of the existing 750 mm (30-inch) Buell's Creek Sanitary Trunk Sewer. The length, slope and route is dependent on the layout of the Bridlewood subdivision.

Total Estimated Cost      \$515,000.

2. Construction of a 450 mm (18-inch) sanitary sewer in the north-east industrial area, south on Broome Road to Crocker Crescent, approximately 790 m (2600-ft.) and then, as a 525 mm (21-inch) south on Broome Road, across Highway No. 401 and south on First Avenue to the existing 600 mm (24-inch) trunk sewer at the Butler's Creek, approximately 1310 m (4300-feet).

Total Estimated Cost      \$475,000.

3. Construction of a 600 mm (24-inch) forcemain from the Main Pumping Station, parallel to the existing forcemain on King Street, approximately 1370 m (4500-feet).

Total Estimated Cost      \$475,000.

4. Construction of a 10.9 ML/d (2.4 mgd) sewage pumping station on First Avenue at the Butler's Creek Trunk Sewer and a 300 mm (12-inch) forcemain to Oxford Avenue, south of the CNR, approximately 400 m (1300-feet). In conjunction with the pumping station and forcemain, a 600 mm (24-inch) gravity sewer is required to be constructed southerly through the Ontario Psychiatric Hospital property, to the Water Pollution Control Plant, approximately 1740 m (5700-feet) long.

Total Estimated Cost - P.S. & F.M.	\$360,000.
- Sewer	<u>470,000.</u>
TOTAL	\$830,000.

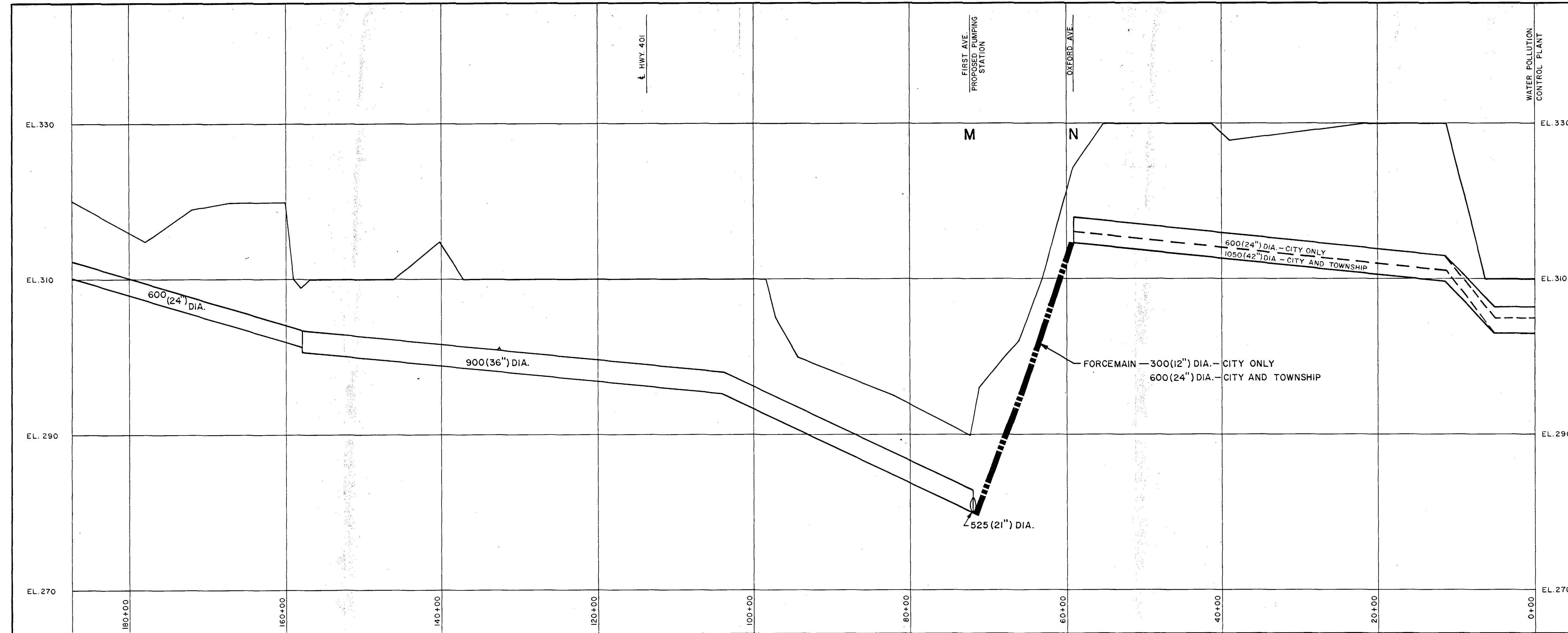
The costs indicated here for the pumping station, forcemain and sewer do not provide service capacity for possible future development within Elizabethtown Township east of the present City Boundaries.

5. A 600 mm (24-inch) sanitary sewer will be required to service sub-area 7 and will connect to the Butler's Creek Trunk Sewer at point G, for a total approximate length of 823 m (2700-feet). This sewer will also have capacity to service Area 113 if and when this area develops.

Total Estimated Cost \$225,000.

6. A 450 mm (18-inch) sanitary sewer will be required to service sub-area 113, if and when this area develops. The route of the sewer will be south, along Centre Street, from Parkdale Avenue, across Highway No. 401 into sub-area 7, for a total approximate length of 823 m (2700-feet).

Costs have been estimated based on tender prices currently being received for this type of work. Although rock excavation is expected to be encountered in a number of areas, the scope of this is difficult to determine without a detailed geo-technical assessment. However, some allowance has been made for rock excavation in the estimates. An allowance for engineering and other contingencies has also been included in the estimated costs. No Allowance has been included for escalation of construction costs.



CITY OF BROCKVILLE  
NORTH AREA SANITARY SEWER SERVICES

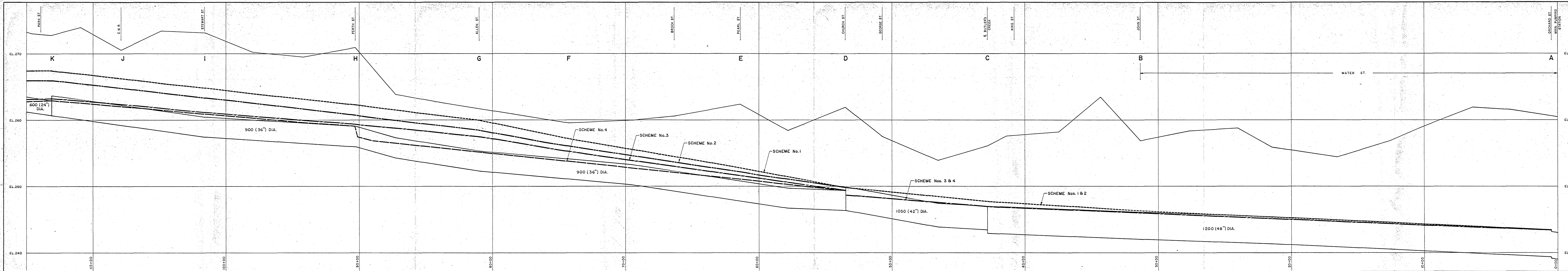
PROPOSED SEWER PROFILE  
FOR  
ELIZABETHTOWN TOWNSHIP

GORE & STORRIE LIMITED  
CONSULTING ENGINEERS

DATE : MAR. 1979

SCALE = HOR. 1" = 800'  
VERT. 1" = 8'

FIG. NO. 5



CITY OF BROCKVILLE  
NORTH AREA SANITARY SEWER SERVICES

HYDRAULIC PROFILE

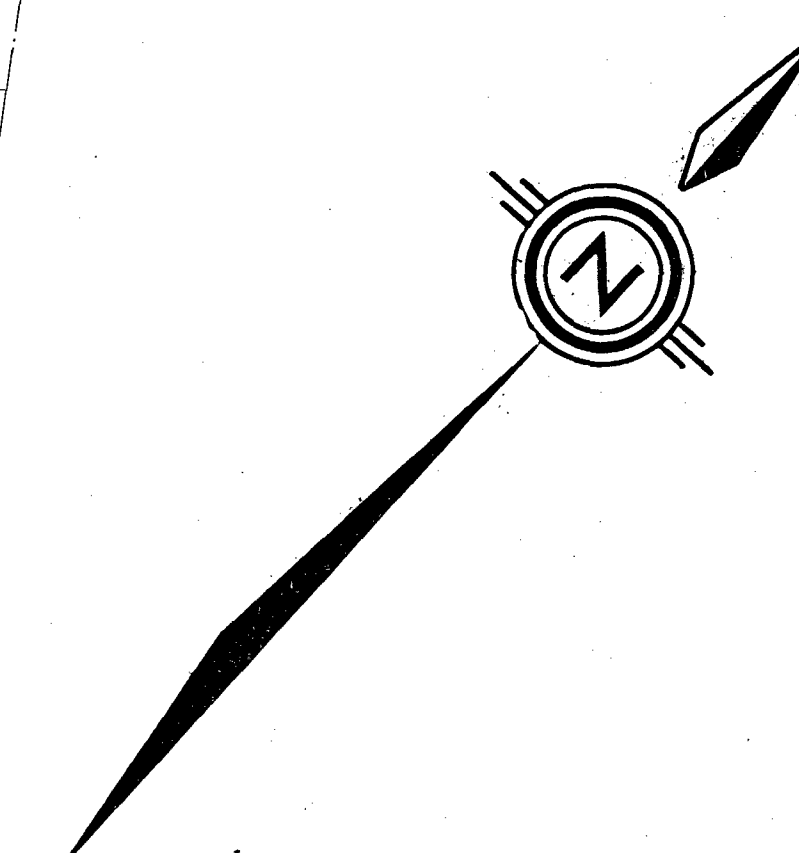
GORE & STORRIE LIMITED  
CONSULTING ENGINEERS

DATE: MAR. 1979

SCALE: HOR. 1" = 200'  
VERT. 1" = 4'

FIG. NO. 3





LEGEND

- EXISTING TRUNK SEWERS
- EXISTING FORCEMAIN
- PROPOSED TRUNK SEWERS
- PROPOSED FORCEMAINS
- 1a SUB-DRAINAGE AREAS
- SUB-DRAINAGE AREA BOUNDARIES
- ▲ SUB-DRAINAGE AREA ENTERING TRUNK

NOTE: PIPE SIZES ARE GIVEN IN MILLIMETRES

CITY OF BROCKVILLE  
NORTH AREA SANITARY SEWER SERVICES

GENERAL PLAN

GORE & STORRIE LIMITED  
CONSULTING ENGINEERS

