

ANNUAL REPORT
OF THE
CITY ENGINEER

1986

EDAS

Служба инженеров города Фредериктон по праву считается самой старой в провинции Нью-Брансуик. Важнейшими задачами инженеров являются предотвращение и тушение пожаров, поддержание и улучшение состояния городских сооружений, а также обеспечение безопасности водопроводной и канализационной систем. Важнейшими задачами инженеров являются предотвращение и тушение пожаров, поддержание и улучшение состояния городских сооружений, а также обеспечение безопасности водопроводной и канализационной систем.

CITY OF FREDERICTON

PUBLIC WORKS DEPARTMENT

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TO HIS WORSHIP THE MAYOR & COUNCILLORS
OF THE CITY OF FREDERICTON

I submit herewith this report which is a statement of work done under the direct supervision of the City Engineer.

This report covers the period from 1986 01 01 to 1986 12 31 and is written for the purpose of maintaining an accurate record on file of the activities and costs associated with the various operations.

During the year, along with regular maintenance, City forces and contractors constructed the following works:

Concrete Curb and Gutter	6.447 km
Sidewalk Reconstruction	0.750 km
New Concrete Sidewalk	1.517 km
New Street Construction	3.239 km
New Pavement - Type "B" Asphalt Concrete	3.002 km
Resurface - Type "D" Asphalt Concrete	5.689 km
Resurface - Type "E" Asphalt Concrete	7.523 km
Gravity Sanitary Sewer Mains	5.050 km
Storm Sewer Mains	5.784 km
Water Mains	5.648 km
Double Chip Sealed Streets	4.009 km
Street Reconstruction	0.782 km

ALSO

- 227 Water services were installed
- 273 Sanitary sewer services were installed
- 4 Sprinkler lines were installed
- 22 Water services were renewed
- 1 Sanitary sewer service was renewed
- 240 New water meters were installed
- 7 Existing services were extended
- 16 Frozen services thawed

Contractors under contract with the Engineering Department of the City of Fredericton in 1986 constructed, completed construction or began construction, on the following projects:

WENDELL THOMAS & SONS LTD.	-	supply and delivery of bedding sand
WENDELL THOMAS & SONS LTD.	-	supply and delivery of topsoil
NORTHSIDE READY MIX	-	supply and delivery of concrete
JOHN MacBEAN	-	supply and delivery of granular material

GORMAN CONSTRUCTION LTD.	-	supply and placement of asphalt concrete
SANDI-CO LTD.	-	supply and delivery of winter sand
IROQUOIS SALT PRODUCTS LTD.	-	supply and delivery of highway salt
NORLANTIC PAINTS (A DIVISION OF IBIS PRODUCTS LTD.)	-	supply of traffic lane striping paint
P.D. MOORE LANDSCAPING LTD.	-	supply and delivery of cover material at sanitary landfill
GERARD BURNS	-	bulldozing services - sanitary landfill
BUILTECH CONSTRUCTION LTD.	-	supply and construction of Equipment Storage Building (St. Mary's Street Depot)
MULTI-VENTURES LTD.	-	supply and installation of Centralized Power System Water Treatment Plant and Wilmot Park Wells
CHARMAC CONSTRUCTION COMPANY LIMITED	-	installation of sanitary sewer and water mains and culvert construction on Kimble Road extension from Wilsey Road to CPR
R.C. BIRD CONSTRUCTION LTD.	-	installation of services in Rainsford Lane Park
MARITIME SANITATION SERVICES	-	garbage collection services
ATLANTIC COLAS LIMITED	-	supply and placement of double chip seal

General Fund expenditures for the period 1986 01 01 to 1986 12 31 were as follows:

Item	Budget	Net Expenditure	Over	Under
<u>COMMON SERVICES</u> (Public Works)	\$2 237 425	\$2 305 310	\$ 67 885	-
<u>ROAD TRANSPORT SERVICES</u>				
Administration	29 350	26 865	-	2 485
Roadway Surfaces	1 009 465	821 695	-	187 770
Sidewalk Maintenance	55 900	72 208	16 308	-
Culverts, Ditching	36 725	40 946	4 221	-
Storm Sewer Maintenance	127 000	116 531	-	10 469
Street Cleaning	282 250	314 196	31 946	-
Spring Cleanup	23 280	17 090	-	6 190
Sanding & Salting & Snow Control	980 629	1 056 557	75 928	-
Street Lights	492 346	469 306	-	23 040
Traffic Services	361 500	369 784	8 284	-
<u>ENVIRONMENTAL HEALTH SERVICES</u>				
Garbage & Waste Disposal	419 425	373 311	-	46 114
Garbage & Waste Collection	337 000	360 140	23 140	-
<u>PUBLIC HEALTH SERVICES</u>				
Old Burial Ground	14 160	17 997	3 837	-
Loyalist Burial Ground	353	326	-	27
<u>PARKS & TREES SERVICES</u>				
Wilmot Park	35 935	23 976	-	11 959
Odell Park	55 700	51 364	-	4 336
Carleton Park	13 440	9 768	-	3 672
Riverfront Greens	40 300	40 145	-	155
Other Parks	17 140	18 632	1 492	-
Trees	316 345	286 210	-	30 135
Greens, Benches, etc.	51 800	57 259	5 459	-
<u>TOTALS</u>	\$6 937 468	\$6 849 616	\$238 500	\$326 352

Utility Fund expenditures for the period 1986 01 01 to 1986 12 31 were as follows:

Item	Budget	Net Expenditure	Over	Under
COMMON SERVICES				
General Equipment	\$ 395 000	\$ 380 530	-	\$ 14 471
Safety & Benefits	176 300	189 075	12 775	-
Administration	103 150	95 872	-	7 278
WATER				
Purification & Treatment	250 800	207 485	-	43 31
Source of Supply	401 200	402 241	1 041	-
Power & Pumping	60 700	56 651	-	4 049
Maintenance of Equipment (Plant)	25 695	65 764	40 069	-
Transmission & Distribution (Oper)	164 500	154 979	-	9 521
Transmission & Distribution (Maint)	629 900	530 461	-	99 439
Billing & Collection	183 800	174 890	-	8 910
Meters	186 200	159 839	-	26 361
SANITARY SEWER				
Operation (Lift Stations)	106 200	67 327	-	38 873
Maintenance	360 600	360 889	289	-
Treatment & Disposal	1 043 000	1 065 512	22 512	-
TOTALS	\$4 087 045	\$3 911 515	\$76 686	\$252 211

Following is a table giving total kilometrage of municipal roads and streets, provincial routes, by-passes, and ramps divided with respect to type of surface on the various streets.

Location	MUNICIPAL ROADS & STREETS				DESIGNATED ROUTES				T.C.H., By-Passes & Ramps
	Asphalt	Gravel	Chip Seal	TOTAL	Asphalt	Chip Seal	TOTAL		
Fredericton South	91.126	3.192	8.471	102.789	20.067	2.583	22.650		22.234
Fredericton North	19.224	0.029	1.189	20.442	4.770		4.770		3.701
Nashwaaksis	40.044	2.100	9.522	51.666	2.533		2.533		8.214
Marysville	16.151	1.415	4.919	22.485	8.216		8.216		3.460
Barker's Point	3.568		2.839	6.407	4.671		4.671		1.275
Silverwood	3.473	0.085	0.644	4.202					2.757
Garden Creek	7.564	1.612	6.739	15.915	6.294		6.294		8.771
Douglas	0.405	0.191	3.505	4.101	2.554		2.554		
Lincoln	4.255	1.494	1.700	7.449	1.332		1.332		
Lower St. Marys	1.138		0.832	1.970					
Killarney Road	0.332			0.332	4.230		4.230		
TOTALS	187.280	10.118	40.360	237.758	54.667	2.583	57.250	50.412	

TOTAL (Municipal and Designated Routes) = 295.008 km

Following in the body of this report is a detailed statement of the work done, comparative expenditures and unit costs for the various operations. The report of any particular division may be found by referring to the index.

Respectfully submitted,



E. J. BLISS, P. ENG.
CITY ENGINEER

COMMON SERVICES (PUBLIC WORKS)

The total net expenditure under this heading was \$2 305 310 made up as follows:

Administration	\$ 52 619
Engineering Services	217 352
General Equipment	1 218 066
Service Depots	287 516
Safety & Benefits	<u>529 757</u> \$ 2 305 310

ROAD TRANSPORT SERVICES

Road Transport Services is made up of the following items:

Administration	\$ 26 865
Roads & Streets	2 439 223
Street Lighting	469 306
Traffic Services	369 784
Recovery Account - Rentals	<u>(830 417)</u> \$ 2 474 761

(a) Administration: The total net expenditure under this heading amounted to \$26 865 for wages, pensions, general services, etc.

(b) Roads & Streets: The total net expenditure under this item was made up as follows:

(1) Roadway Surfaces (maintenance)	\$ 821 695
(2) Sidewalk Maintenance	72 208
(3) Culverts & Ditching	40 946
(4) Storm Sewer Maintenance	116 531
(5) Street Cleaning (includes Spring cleanup)	331 286
(6) Snow Control (snow & ice removal)	726 759
(7) Sanding & Salting	<u>329 798</u> \$ 2 439 223

The expenditures for the above items, as well as a brief description of work done, are summarized as follows:

(1) Roadway Surfaces (maintenance)

The net expenditure of \$ 821 695 was made up as follows;

Gravel Roads	\$ 32 700
Paved Streets	670 208
Curb & Gutter Repair	48 335
Driveway Entrances	5 092
Rights-of-way Maintenance	<u>65 360</u> \$ 821 695

Gravel Roads - general maintenance and repairs to gravel roads and roadway surfaces.

Paved Streets - this includes the patching and repairing of pavement, the asphalt resurface program and the chip seal program.

The following streets were double chip sealed in 1986:

Location	Length (metres)
Biggs Street	401
* Broad Street - near Staples Ct. to dead end	210
Chippins Access Road - Forest Hill Rd. to Pugsley St.	586
* Estey Lane	340
* Evans Street	303
Forest Hill Road - Kimble Rd. to Biggs St.	148
* Gervais Court	108
* Marlborough Drive	283
** McLeod Hill Road	782
* Pederson Crescent	170
* Ridgewell Place	87
* Staples Court	180
VanHorne Court	52
* Wiggins Drive	272
York Arena Entrance	87
TOTAL	4009

4009 metres = 4.009 kilometres

* Paid for by developer through Local Improvement Agreement
** Paid for under capital street reconstruction.

The shoulders of Lincoln Road were also double chip sealed in 1986.

The following streets were resurfaced with Type "D" asphalt concrete in 1986.

<u>Location</u>	<u>Length (metres)</u>
Charles Avenue	277
MacKay Drive	449
Glasier Road	1168
Rowan Street	164
River Street - Allen St. to Bridge St.	162
Maple Street - Fulton Ave. to Douglas Ave.	<u>1085</u>
TOTAL	3305

3305 metres = 3.305 kilometres

Also, selected sections of Rainsford Lane, Brookside Drive, River Street, Claudie Road, Hanwell Road, and Royal Road were padded utilizing a spreader.

The following streets were resurfaced with Type "E" (10 mm) asphalt concrete in 1986.

<u>Location</u>	<u>Length (metres)</u>
College Hill Rd. - Priestman St. to the T.C.H.	150
Smythe Street - Priestman St. to Prospect St.	391
Beaverbrook Street - Regent St. to University Ave.	640
Queen Street - Northumberland St. to Smythe St.	213
York Street - Aberdeen St. to Dundonald St.	366
Westmorland Street - Brunswick St. to Aberdeen St.	488
Irvine Street	899
Hillcrest Drive	421
Forbes Street	241
Clark Street - MacLaren Ave. to Hillcrest Dr.	174
Dedham Street	183
Saunders Street - York St. to Westmorland St.	206
Noble Street	570
Westmorland Street - Dundonald St. to Connaught St.	125
George Street - York St. to University Ave.	1030
Charlotte Street - York St. to Regent St.	402
Main Street - Douglas Ave. to Lynn St.	131
Douglas Avenue - Main St. to R.R. Tracks	82
* Forest Hill Road - Beaverbrook St. to Civic #90	457
Albert Street - Regent St. to Windsor St.	<u>354</u>
TOTAL	7523

7523 metres = 7.523 kilometres

* Done under Designated Route Program

Curb and Gutter Repair - replacement of sections of curb and gutter on various streets.

Driveway Entrances - placement of asphalt between curbline and street right-of-way primarily on streets curbed in recent years.

Rights-of-way Maintenance - sodding and seeding, rip rapping, grass cutting, repair and placement of guide rails and clearing of rights-of-way.

(2) Sidewalk Maintenance

The net expenditure of \$ 72 208 for sidewalk repairs was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 33 928
Materials	31 053
General Services (trucking & equipment). .	<u>7 227</u>
	\$ 72 208

(3) Culverts and Ditching - the maintenance and installation of culverts and ditches

The net expenditure of \$ 40 946 was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 20 690
Materials	6 289
General Services (trucking & equipment). .	<u>13 967</u>
	\$ 40 946

(4) Storm Sewer Maintenance - the flushing of mains, cleaning and repair of catch basins and the repair of mains

The net expenditure of \$ 116 531 was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 56 250
Materials	34 079
General Services (trucking & equipment). .	<u>26 202</u>
	\$ 116 531

(5) Street Cleaning and Flushing

The City of Fredericton used sweeper #51, Vac-all unit #54, and trackless units #122, #127, and #129 for street cleaning purposes in 1986. These pieces of equipment worked a combined total of 1454.5 hours in this operation. A contractor was also engaged to sweep major streets on a regular basis in 1986.

The net expenditure under this heading amounted to * \$ 331 286 and was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 180 643
General Services (trucking & equipment & contract services	145 769
Brooms - main & gutter	2 277
Brooms - hand	672
Anti-litter cans	1 024
Dust Control	<u>901</u> \$ 331 286

* Includes an amount of \$ 17 090 for Spring Cleanup

(6) and (7) Sanding & Salting and Snow Control(a) Sanding and Salting Streets and Sanding Sidewalks

Storing sand and salt in winter storage piles and spreading same on slippery streets and sidewalks.

(b) Snow Control

Blowing, shovelling and hauling snow, plowing or scraping roads, cleaning gutters, thawing catch basins and any other means of snow control.

The City of Fredericton was responsible for plowing, sanding, and salting 311.897 km of roads and streets in 1986 (149.467 km on the north side and 162.430 km on the south side). Included in these figures is the Westmorland Street Bridge along with adjacent highways and ramps which are maintained through an agreement with the Department of Transportation.

During the winter months of 1986, 148.453 km of sidewalk were plowed and sanded. (49.905 km on the north side and 98.548 km on the south side)

Streets:

The total net cost of snow control (streets) amounted to \$ 607 076 and was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 365 429
General Services (trucking & equipment, hired trucks and machinery) ...	232 986
Fixed Assets (new equipment)	8 284
Goods	<u>377</u> \$607 076

The total net cost of sanding and salting streets amounted to \$293 380 and was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 106 030
General Services (trucking & equipment) ..	53 566
Materials (salt and sand)	131 164
Fixed Assets (new equipment)	<u>2 620</u> \$293 380

The overall net expenditure of \$900 456 for plowing, sanding, and salting City roads and streets was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 471 459
General Services (trucking & equipment, hired trucks & machinery)	286 552
Fixed Assets (new equipment)	10 904
Materials (salt & sand)	131 164 (1)
Goods	<u>377</u> \$900 456

Sidewalks:

The total net expenditure for plowing sidewalks amounted to \$119 683 and was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 73 086
General Services (trucking & equipment). .	<u>46 597</u> \$119 683

The total net expenditure for sanding sidewalks amounted to \$36 418 and was made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 21 206
General Services (trucking & equipment). .	10 714
Materials (sand)	<u>4 498</u> \$ 36 418

The overall net expenditure for snow control and sanding of sidewalks was \$156 101 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 94 292
General Services (trucking & equipment).	57 311 (2)
Materials (sand)	<u>4 498</u> \$156 101

TOTAL NET COST OF SNOW CONTROL - ADD (1) & (2) ...\$1 056 557

Snowfall in Fredericton for the last five years was as follows:

1982	Agriculture Canada Airport Weather Office	305.10 cm 297.20 cm
1983	Agriculture Canada Airport Weather Office	139.30 cm 179.20 cm
1984	Agriculture Canada Airport Weather Office	297.50 cm 332.90 cm
1985	Agriculture Canada Airport Weather Office	178.90 cm 198.20 cm
1986	Agriculture Canada Airport Weather Office	193.10 cm 259.70 cm

(c) Street Lighting

The multiple lighting system for the City of Fredericton as of 1986 12 31 consisted of:

5 - 100 Watt H.P. Wood	at	\$138.09 per light per year
1 - 150 Watt H.P. Wood	at	184.16 per light per year
87 - 100 Watt H.P. Sodium	at	107.38 per light per year
1 - 180 Watt L.P. Sodium	at	208.33 per light per year
36 - 400 Watt L.P. Sodium	at	245.97 per light per year
10 - 125 Watt M.V. Wood	at	115.05 per light per year
2 - 175 Watt M.V. Concrete	at	163.40 per light per year
201 - 175 Watt M.V. Wood	at	138.09 per light per year
350 - 175 Watt Ref. M.V.	at	107.38 per light per year
12 - 250 Watt M.V. Concrete	at	205.44 per light per year
4 - 250 Watt M.V. Wood	at	180.13 per light per year
1710 - 250 Watt M.V.	at	149.42 per light per year
573 - 400 Watt Ref. M.V.	at	209.21 per light per year
1 - 500 Watt Ref. M.V.	at	180.89 per light per year
2 - 400 Watt Flood Lights	at	0.67 per Watt per year
1 - 150 Watt H.P. Sodium	at	153.45 per light per year
19 - 150 Watt H.P.S.	at	60.42 per light per year

The total street lighting costs for 1986 were as follows:

Salaries & Benefits	\$ 1 785
Multiple Lighting System Contract	464 703
Government Services (Other Power)	478
New Poles	<u>2 340</u> \$469 306

(d) Traffic Services

The expenditure under this heading is made up as follows:

- (1) Street Signs
- (2) Painting & Striping
- (3) Traffic Signals
- (4) Railway Crossings

(1) Street Signs

Purchasing, repairing and installing street signs on City Streets.

The net expenditure under this heading amounted to \$28 184 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 2 056
General Services (repairs & maintenance, trucking & equipment)	5 437
Goods (posts, street sign purchases, etc.)	<u>20 691</u>
	\$ 28 184

(2) Painting & Striping

The net expenditure under this heading was \$133 770 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 57 653
General Services (truckng & equipment).	14 990
Goods (paint, misc. supplies, signs) ...	39 334
Fixed Assets (new equipment)	<u>21 793</u>
	\$133 770

(3) Traffic Signals

The net expenditure under this heading was \$164 831 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 45 167
General Services (truckng & equipment).	7 018
Government Services (electric power) ...	61 727
Goods (materials)	49 766
Fixed Assets (new equipment)	<u>1 153</u>
	\$164 831

(4) Railway Crossings

The net expenditure under this heading was \$42 999 for maintenance.

ENVIRONMENTAL HEALTH SERVICES

The following items are included under the above heading:

- (1) Garbage and Waste Collection
- (2) Garbage and Waste Disposal

(1) Garbage and Waste Collection

In 1986, the net amount paid for the garbage and waste collection operation was \$360 140 made up as follows:

General Services - (Contract Services) ...	\$359 666
General Services - (Advertising).....	<u>474</u>
	\$360 140

(2) Garbage and Waste Disposal

The net expenditure under this section was \$373 311 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 8 179
General Services (equipment services, diversion fees, solid waste commission payments, and land rentals)	223 918
Government Services (taxes)	1 540
Goods (gravel and cover material)	<u>139 674</u>
	\$373 311

PUBLIC HEALTH SERVICES

The following items are included under the above heading:

- (1) Old Burial Ground
- (2) Loyalist Burial Ground

(1) Old Burial Ground

The net expenditure under this section was \$17 997 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 15 027
General Services (trucking & equipment)	696
Government Services (lighting)	545
Goods (materials)	<u>1 729</u> \$ 17 997

(2) Loyalist Burial Ground

The net expenditure under this section was \$326 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ <u>326</u> \$ 326
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PARKS AND TREES SERVICES

The following items are included under the above heading:

- | | |
|-----------------------|-----------------------------|
| (1) Wilmot Park | (5) Other Parks |
| (2) Odell Park | (6) Trees |
| (3) Carleton Park | (7) Greens, Benches & Other |
| (4) Riverfront Greens | |

(1) Wilmot Park

The net expenditure for this item was \$23 976 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 15 234
General Services (trucking & equipment).	4 178
Government Services (water & sewer rates, light & power)	2 349
Goods (materials)	<u>2 215</u> \$ 23 976

(2) Odell Park

The net expenditure for this item was \$ 51 364 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 35 896
General Services (trucking & equipment).	10 618
Government Services (water & sewer rates, lights & power) ...	677
Goods (materials)	<u>4 173</u> \$ 51 364

(3) Carleton Park

The net expenditure for this item was \$ 9 768 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 5 471
General Services (trucking & equipment & land rental)	3 980
Goods (materials)	<u>317</u> \$ 9 768

(4) Riverfront Greens

The net expenditure for this item was \$ 40 145 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 23 258
General Services (trucking & equipment)	6 909
Goods (materials, new trees)	<u>9 978</u>
	\$ 40 145

(5) Other Parks

The net expenditure for this item was \$ 18 632 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 13 692
General Services (trucking & equipment)	3 720
Goods (materials)	<u>1 220</u>
	\$ 18 632

(6) Trees

The net expenditure for this item was \$286 210 made up as follows:

Personnel (labour, pensions, UIC, workmen's compensation)	\$204 788
General Services (trucking & equipment)	47 158
Goods (gas & oil, materials, new trees, small tools)	<u>34 264</u>
	\$286 210

In 1986, 91 trees were removed. These trees were either in a decadent condition, a menace to public safety or possible breeding places for the Elm Bark Beetle.

Following is a list of trees removed in 1986:

<u>Species</u>	<u>Number Removed</u>
Elm	74
Maple	10
Poplar	3
Willow	1
Spruce	2
Oak	<u>1</u>
TOTAL	91

In 1986, 45 trees were removed because of Dutch Elm Disease.

Following is a summary of Elm trees removed from 1964 to 1986:

Year	No. Lost To Dutch Elm Disease	% Lost To Dutch Elm Disease	Other Causes	Total
1964	14	29	34	48
1965	8	24	25	33
1966	12	21	44	56
1967	18	20	73	91
1968	33	16	174	207
1969	30	21	108	138
1970	49	39	78	127
1971	57	42	77	134
1972	61	42	84	145
1973	92	46	108	200
1974	132	33	266	398
1975	75	19.6	307	382
1976	118	28.2	300	418
1977	681	91.6	62	743
1978	680	92	56	736
1979	937	91.8	84	1021
1980	1146	95.7	51	1197
1981	500	59.7	327	827
1982	487	90.7	50	537
1983	133	36.5	231	364
1984	121	63.4	70	191
1985	77	80.2	19	96
1986	45	60.8	29	74
TOTALS	5506	67.5	2657	8163

Trees were planted (first planting) at the following locations in 1986:

Location	Number of Trees
Bailey Avenue	20
Barton Crescent (134 & 272)	2
Blair Street	8
Broad Street	17
Brunswick Street Cemetery	3
Canada Street (280)	1
Charing Crescent (195)	1
Charlotte Street (505)	1
Cherry Avenue	8
Christ Church Cathedral	2
Church Street	4
City Hall	14
Clanfield Street	28
Connaught Street	14
Eagle Court (7 & 52)	4
Emmerson Street	13
Flemming Road Park	18
Forest Hill Road (515)	1
Foster Street	23
Garden Creek Lagoon	6
Gloucester Crescent	24
Grandame Street	2
Greenfields Drive	4
Greens	5
Hatheway Street	4
Henry Park	36
Islandview Drive (10)	2
Juniper Court	3
King Street at Church Street	2
Legion Drive (108)	1
Linden Crescent (153)	1
Maple Street	2
MacPherson Street	15
McEvoy Street	3
McGrand Court	11
McKeen Street	7
McNair Drive (145)	1
Mitchell Street (850 & 880)	3
Moores Drive (74)	1
Mountain Drive (25)	1
Nashwaaksis Jr. High	10
Norfolk Drive (176)	1
Odell Park	8
Other Greens	15
Oxford Street	2
Parkhurst Drive	3
Parkside Drive	4
Police Station	10
Preston Drive (122 & 155)	2

Trees (first planting) 1986 (continued):

Location	Number of Trees
Prospect Street	2
Queen Square	6
Rankin Street (95)	1
Reading Street	16
Riverfront Drive	60
Riverside Court	4
Saunders Street	14
Shore Street	3
Southampton Drive (295)	1
St. John Street	3
Sunset Drive	72
Surrey Crescent (135)	1
Tamarack Terrace (7)	1
Tilley Drive (126)	1
Tower Road	11
University Avenue (186)	1
Water Treatment Plant	3
Willis Street	8
Wilmot Park	6
Woodbine Court corner Parkhurst Drive	1
Woodbine Court (15 & 25)	2
TOTAL	588

163 trees were planted at various locations to replace losses due to dry weather and vandalism.

60 trees were planted on the Riverfront Drives. (included in first planting)

A number of trees were also trimmed in 1986. The number and class of trees were made up as follows:

- (a) Trees above 14 m in height - approximately 300 mixed species
- (b) Trees 6 m to 14 m in height - approximately 700 mixed species
- (c) Trees under 6 m in height - approximately 3000 mixed species

Stumps removed, topsoiled and seeded - 82

Shrubs planted on City park land - 1105

(7) Greens, Benches & Other

The net expenditure for this item was \$57 259 made up as follows:

Personnel (labour, pensions, workmen's compensation)	\$ 21 730
General Services (communications, trucking & equipment,	11 511
Goods (gas & oil, materials, small tools)	16 238
Fixed Assets (new equipment)	<u>7 780</u> \$ 57 259

UTILITY FUND

The above item is made up of the following headings:

- (1) Common Services
- (2) Sanitary Sewer
- (3) Water

(1) COMMON SERVICES

The net expenditure for this item in 1986 was \$665 477.
This expenditure was made up as follows:

General Equipment	\$ 380 530
Safety & Benefits	189 075
Administration	<u>95 872</u> \$665 477

(2) SANITARY SEWER

In 1986 the net expenditure for this item was \$1 766 093
made up as follows:

Operating: Lift Stations

Personnel (labour, pensions, workmen's compensation)	\$ 39 887
General Services (trucking & equipment).	11 391
Government Services (light & power)	<u>3 131</u> \$ 67 327

Maintenance:

Personnel (labour, pensions, workmen's compensation)	\$214 861
General Services (trucking & equipment).	71 367
Government Services (telephone)	453
Goods (materials & tools)	74 088
Fixed Assets (new equipment)	<u>120</u> \$360 889

Sewage Treatment & Disposal:

Personnel (labour, workmen's compensation)	\$ 9 314
General Services - repairs & maintenance	19 352
- treatment (contract services) 998 324	
Government Services: Water & Sewer Rates ..	3 106
Lights & Power...	34 500
Goods (Chlorine & Miscellaneous Supplies	<u>916</u> \$1 065 512

Debt Charges:

Principal	\$150 830
Interest	<u>121 535</u> \$ 272 365
TOTAL	\$1 766 093

New customers connected to the City sewer system in 1986 273

The Fredericton sanitary sewer system consists of approximately 249 kilometres of mains made up as follows:

Size	Silverwood Garden Creek	Nashwaaksis	Marysville	Barker's Point	Fredericton	Total
100 mm	-	0.158	-	-	-	0.1 3
100 mm F.M.	0.013	-	-	-	1.103	1.1 5
150 mm	-	1.433	0.314	-	0.108	1.855
150 mm F.M.	0.031	0.417	0.539	0.068	3.008	4.0 3
200 mm	11.910	32.951	17.523	7.559	110.815	180.7 8
200 mm F.M.	0.254	-	0.314	-	0.064	0.6 2
250 mm	1.959	3.158	0.851	0.298	8.761	15.027
250 mm F.M.	1.178	-	-	-	-	1.1 8
300 mm	1.267	3.200	1.006	1.868	14.484	21.8 5
300 mm F.M.	0.420	-	-	-	0.739	1.15
350 mm	0.287	0.686	-	-	0.713	1.6 5
350 mm F.M.	-	-	0.528	-	0.254	0.7 2
375 mm	1.138	2.163	0.500	0.174	2.449	6.424
400 mm	0.018	0.076	-	-	0.193	0.287
450 mm	1.039	0.031	1.350	-	3.463	5.8 3
500 mm	2.979	-	-	-	-	2.9 9
600 mm	0.156	-	-	-	1.510	1.666
750 mm	-	-	-	-	0.322	0.3 2
900 mm	-	-	-	-	1.432	1.4 2
TOTALS	22.649	44.273	22.925	9.967	149.418	249.232

NOTE: Fredericton includes the Lincoln area.

The above kilometrages do not include mains at the Fredericton Exhibition Grounds, U.N.B. and St. Anne's Point on the Woodstock Road or the Fredericton Area Pollution Control Commission sewer system which has approximately 11.4 kilometres of main.

(3) WATER

There are at present 23 wells (19 active), 16 reservoirs, and 5 booster stations in the City of Fredericton water supply system as noted below.

Location	Wells	Reservoirs	Booster Stations
South Fredericton System	6	8	5
Hanwell System	1	1	0
Rainsford Lane Park Area	1	0	0
Silverwood System	2	1	0
North Fredericton Low Level System	8	4	0
Killarney System	2	1	0
Marysville System	3	1	0
TOTALS	23	16	5

Following is a list of reservoirs and their capacities which provide water storage for the City of Fredericton water system:

FREDERICTON SOUTH

Location	No. of Reservoirs	Full Capacity (kilolitres)	Useful Capacity (kilolitres)
Silverwood	1	245	245
Regent Street	1	1140	1140
Montgomery Street	2	9090	4545
Smythe Street	2	18180	18180
Forest Hill- (Canterbury Drive)	2	1105	1105
Flemming Road	1	3750	1880
Hanwell Road	1	460	270
SUB TOTAL	10	33970	27365

FREDERICTON NORTH

Location	No. of Reservoirs	Full Capacity (kilolitres)	Useful Capacity (kilolitres)
Nashwaaksis	2	2865	2865
Barker's Point	1	1140	1140
Marysville	1	2840	2840
Devon	1	4545	4545
Killarney Road	1	3750	3750
SUB TOTAL	6	15140	15140
TOTALS	16	49110	42505

The water account includes all expenditures other than capital expenditures for water.

Water costs for the City of Fredericton were made up as follows:

(1) Water Administration (Billing & Collection)	\$ 174 890
(2) Water Ordinary (including meters)	845 279
(3) Water Treatment Facility & Well Production Costs	732 141
(4) Debt Charges - Principal	329 481
(5) Debt Charges - Interest	<u>256 234</u> \$ 2 338 025

(1) WATER ADMINISTRATION (BILLING & COLLECTION)

The net expenditure of \$174 890 was made up as follows:

Office salaries & benefits	\$ 100 378
Postage	19 115
Machinery Rental	3 000
Professional Services	<u>11 587</u>
Materials	11 226
New Equipment	27 584
Communications	<u>2 000</u> \$ 174 890

(2) WATER ORDINARY (INCLUDING METERS)

The net expenditure of \$845 279 was made up as follows:

Transmission & Distribution (Operation)

Labour - Boosters	\$ 62 092
Trucking and Machinery	11 928
Equipment Maintenance - Boosters	2 982
Power - Boosters	57 223
Taxes - Boosters	11 265
Materials - Boosters	<u>9 489</u> \$ 154 979

Transmission & Distribution (Maintenance)

Personnel (labour, pensions, U.I.C., Workmen's Compensation)	\$ 288 492
General Services (trucking & equipment)	135 434
Goods (gas & oil, tools, materials, parts)	101 064
Fixed Assets (new equipment)	<u>5 471</u> \$ 530 461

Meters

Personnel (labour, pensions, etc.) ...\$ 89 558	
Meter Parts, miscellaneous supplies, & tools	5 986
Trucking	16 108
Fixed Assets (new meters)	<u>48 187</u> \$ 159 839
TOTAL	\$ 845 279

On 1986 12 31 there were 11330 water services on meter and 326 on flat rate, making a total of 11656.

231 new meters were installed in 1986, 265 regular meters changed to TRT or RRT, and 22 ARB meters changed to TRT or RRT. 9 flat rate services were metered.

In 1986, 8 discontinued services were excavated and shut off at the main, 129 stopped meters replaced and 22 frozen meters replaced.

The following sprinklers were installed in 1986:

N.B. Power Energy Control Centre	-	Canada Street
R.C.M.P. Headquarters	-	Regent Street
Sealand Services Ltd.	-	975 Hanwell Road
S.M. White Woodworking	-	Carson Avenue

There are in the City as of 1986 12 31, 1419 hydrants situated in the following areas:

Fredericton South	661
Fredericton North	145
Nashwaaksis	257
Marysville	142
Barker's Point	66
Silverwood	<u>22</u>
 SUB TOTAL	
1293	
 LOCATED ON PRIVATE PROPERTY	
126	
 TOTAL	
1419	

Hydrants were installed or added to City totals at the following locations in 1986:

Location	Number
Amberwood Lane	1
Baxter Court	2
Canada Street	1
Coronation Court	2
Cowperthwaite Street	1
Coburn Drive	3
Estey Lane	2
Evans Street	2
Gervais Court	1
Golf Club Road	2
Hearne Street	4
Kingswood Drive	2
Malibu Street	1
Maliseet Drive	2
Mason Avenue	1
Staples Court	1
Sutton Street	2
Wetmore Road	1
Wiggins Drive	1
 SUB TOTAL (City Owned)	
32	

PLUS: PRIVATE HYDRANTS

R.C.M.P. Headquarters - Regent Street	5
Sealand Services Ltd. - 975 Hanwell Rd.	1
Maritime Forestry Complex	<u>8</u>
	14
OVERALL TOTAL	46

The Fredericton distribution system consists of approximately 265 kilometres of water main, made up as follows:

Size	Marysville	Nashwaaksis	Barker's Pt.	Silverwood	Garden Creek	Fredericton	TOTAL
32 mm	-	0.153	-	-	-	-	0.153
38 mm	-	0.072	-	-	-	-	0.072
50 mm	-	-	-	0.154	-	-	0.154
75 mm	-	-	-	-	-	0.435	0.435
100 mm	0.753	2.232	-	2.508	10.401	-	15.894
150 mm	12.316	20.736	3.915	4.619	56.847	-	98.433
200 mm	5.991	18.700	0.954	4.689	40.470	-	70.804
250 mm	2.951	6.546	5.163	0.964	19.781	-	35.405
300 mm	1.050	2.074	0.031	4.558	25.325	-	33.038
350 mm	-	0.207	-	-	-	3.466	3.673
400 mm	-	-	-	-	-	4.079	4.079
450 mm	-	-	-	-	-	1.965	1.965
500 mm	-	-	-	-	-	0.035	0.035
600 mm	-	-	-	-	-	0.395	0.395
Unknown	0.146	-	-	-	-	-	0.146
TOTAL	23.207	50.720	10.063	17.492	163.199	264.681	

Kilometrages for Marysville, Nashwaaksis, Barker's Point, and Silverwood are approximate only, due to measurement from maps in some instances.

The above kilometrages do not include water mains installed at the Exhibition Grounds; the University of New Brunswick; St. Anne's Point Barracks on the Woodstock Road and the low rental housing development in Fredericton North.

(3) WATER PRODUCTION COSTS

The net expenditure of \$732 141 was made up as follows:

Source of Supply

Labour - Wells	\$ 83 257
Trucking & Machinery	10 324
Maintenance - Wells	81 657
Communications	8 806
Power - Wells	211 179
Materials - Wells	<u>7 018</u> \$ 402 241

Power & Pumping (Plant)

Labour	\$ 48 380
Communications	1 104
Light & Power	4 138
Supplies	<u>3 029</u> \$ 56 651

Maintenance of Equipment

Labour	\$ 4 323
Insurance (Plant)	21 895
Maintenance (Equipment)	33 156
Taxes (Plant)	3 000
Materials	<u>3 390</u> \$ 65 764

Purification & Treatment

Labour	\$ 100 694
Maintenance of Equipment	15 646
Power	20 822
Provincial Taxes	22 127
Goods (chlorine, soda ash, lime, etc.)	<u>48 196</u> \$ 207 485

TOTAL

\$ 732 141

The total amount of water pumped from 1986 01 01 to 1986 12 31 for the entire City was 7 781 000 kilolitres. The amount of water produced by the five Wilmot wells in 1986 was 5 480 000 kilolitres or 70% of the total City supply. The average daily demand for the City is 21 300 kilolitres.

The following table gives a comparison of water production costs for the last ten years:

WATER PRODUCTION COSTS

Year	kilolitres Produced	Production Expenditure	Production Cost per kilolitre
1977	6 463 520	\$ 215 683.16	\$ 0.033
1978	6 307 295	246 509.77	0.039
1979	6 628 241	303 364.45	0.046
1980	7 037 407	360 611.00	0.051
1981	6 907 216	355 321.00	0.051
1982	7 029 560	432 326.00	0.062
1983	7 225 102	435 929.00	0.060
1984	7 368 351	523 393.00	0.071
1985	7 880 000	646 991.00	0.082
1986	7 781 000	732 141.00	0.094

The total net expenditure for transmission and distribution of water for the City from 1986 01 01 to 1986 12 31 was determined from the following:

Transmission & Distribution (operation).... \$ 154 979
 Transmission & Distribution (maintenance).. 530 461 \$ 685 440

Therefore, the net expenditure for transmission and distribution of one kilolitre of water from 1986 01 01 to 1986 12 31 was:

$$\frac{\$ 685 440}{7 781 000} = \$ 0.088$$

The following table gives a comparison of net expenditures for transmission and distribution of one kilolitre of water for the last ten years:

Transmission and Distribution Costs

<u>YEAR</u>	<u>NET EXPENDITURE per kilolitre</u>
1977	\$ 0.048
1978	0.048
1979	0.057
1980	0.072
1981	0.070
1982	0.074
1983	0.087
1984	0.092
1985	0.099
1986	0.088

The total net expenditure for administration costs and debt charges for the City from 1986 01 01 to 1986 12 31 was determined from the following:

Water Administration

(1) Billing & Collection	\$ 174 890
(2) Meters (Installation, Reading, Repairs)	159 839
<u>Debt Charges (Principal & Interest)</u>	<u>585 715</u> \$ 920 444

Administration costs per kilolitre of water produced:

$$\frac{\$ 334 729}{7 781 000} = \$ 0.043$$

Debt Charges per kilolitre of water produced:

$$\frac{\$ 585 715}{7 781 000} = \$ 0.075$$

The following table gives a comparison of administration costs and debt charges per kilolitre of water produced for the last ten years:

Administration Costs and Debt Charges per kilolitre

<u>Year</u>	<u>Administration (Billing & Collection & Meters)</u>	<u>Debt Charges</u>
1977	\$ 0.038	\$ 0.132
1978	0.039	0.125
1979	0.042	0.119
1980	0.039	0.104
1981	0.044	0.100
1982	0.044	0.096
1983	0.051	0.107
1984	0.042	0.097
1985	0.043	0.094
1986	0.043	0.075

The following table gives a comparison of total water costs per kilolitre of water produced for the last ten years:

Total Costs per kilolitre

<u>Year</u>	<u>Production Costs</u>	<u>Transmission & Distribution Costs</u>	<u>Administration Costs</u>	<u>Debt Charges</u>	<u>*TOTAL</u>
1977	\$ 0.033	\$ 0.048	\$ 0.038	\$ 0.132	\$ 0.251
1978	0.039	0.048	0.039	0.125	0.251
1979	0.046	0.057	0.042	0.119	0.264
1980	0.051	0.072	0.039	0.104	0.266
1981	0.051	0.070	0.044	0.100	0.265
1982	0.062	0.074	0.044	0.096	0.276
1983	0.060	0.087	0.051	0.107	0.305
1984	0.071	0.092	0.042	0.097	0.302
1985	0.082	0.099	0.043	0.094	0.318
1986	0.094	0.088	0.043	0.075	0.300

* TOTAL COST = Production Costs + Transmission & Distribution Costs
+ Administration Costs + Debt Charges

S U M M A R YWATER AND SEWER REVENUE & EXPENDITURES

1986

Item	Net Expenditure	Revenue
<u>COMMON SERVICES (WATER & SEWER)</u>		
General Equipment	\$ 380 530	\$ 236 558
Safety & Benefits	189 075	
Administration	95 872	
<u>WATER</u>		
Water Administration (Billing & Collection)	174 890	
Water Ordinary (Including Meters)	845 279	3 312 896
Water Treatment Facility & Well Production Costs	732 141	
Debt Charges - Principal & Interest	585 715	
<u>SANITARY SEWER</u>		
Operating & Maintenance	428 216	2 574 194
Sewage Treatment & Disposal	1 065 512	
Debt Charges	272 365	
<u>TOTALS</u>		
	\$ 4 769 595	\$ 6 123 648
<u>SURPLUS: \$ 1 354 053</u>		

NOTE: \$ 629 320 of the above notes surplus was appropriated for Utility Capital expenditures.

CAPITAL PROGRAMS

The following gives brief descriptions of capital projects begun or completed in 1986.

WATER:

In 1986, water mains were upgraded on Queen Street (in conjunction with the Main Street Program), in Rainsford Lane Park Subdivision and on Coronation Court.

New mains were installed in the Chippin Riverview Subdivision (Wetmore Road, Hearne Street, Baxter Court, Baxter Street, and Sutton Street), Gervais Subdivision (Gervais Court), Cowperthwaite Subdivision (Mason Avenue, Malibu Street, and Cowperthwaite Street), Kimble Road from Wilsey Road to the CPR tracks in conjunction with Chippins Riverview Subdivision, Springhill Place Subdivision (Amberwood Lane), Golf Club Road Estates Subdivision (Golf Club Road, Kingswood Drive, and Coburn Drive), and completed in the Chippin Subdivision in Nashwaaksis (Broad Street, Wiggins Street, etc.).

Following are lengths and sizes of mains installed in 1986:

Location	LENGTH OF MAINS - metres			
	150 mm D.I.	200 mm D.I.	250 mm D.I.	300 mm D.I.
* Chippin Subdivision (Broad, Wiggins, etc.)	15	464		
✓ ** Queen St.-York St. Intersection Area	30		125	
* Gervais Court	2	89		
* Cowperthwaite Subdivision (Mason, Malibu, Cowperthwaite)	18	142		434
Kimble Road - Wilsey Rd. to CPR Tracks		152		
* Chippin's Riverview Subd. (Wetmore, Hearne, Baxter, Sutton, etc.)	53	1191	118	
*** Devon Indian Reserve (Maliseet Drive)	10	361		
✓ Rainsford Lane Park	506	759		
* Amberwood Lane (Springhill Place Subdivision)	6	163		
* Golf Club Road Estates Subd. (Golf Club Road, Kingswood Drive, Coburn Drive)	33	887		
✓ Coronation Court	90			
TOTALS	763	4208	243	434

OVERALL TOTAL = 5648 metres or 5.648 kilometres

- * Entire cost paid by developers through Local Improvement Agreements
- ** Upgrading in conjunction with the Main Street Revitalization Program (approximately 107 m of old 200 mm and 250 mm main were removed from service)
- *** Paid for by the Department of Indian and Northern Affairs

SANITARY SEWER:

In 1986, sanitary sewer mains were installed in the Chippin Riverview Subdivision (Wetmore Road, Hearne Street, Baxter Court, Baxter Street, and Sutton Street), Gervais Subdivision (Gervais Court), Cowperthwaite Subdivision (Mason Avenue, Malibu Street, and Cowperthwaite Street), Kimble Road from Wilsey Road to the CPR tracks in conjunction with Chippins Riverview Subdivision, Springhill Place Subdivision (Amberwood Lane), Golf Club Road Estates Subdivision (Golf Club Road, Kingswood Drive, and Coburn Drive), Rainsford Lane Park, and completed in the Chippin Subdivision in Nashwaaksis (Broad Street, Wiggins Street, etc.)

Following are lengths and sizes of mains installed in 1986:

Location	LENGTH OF MAINS - metres		
	200 mm PVC	250 mm PVC	375 mm PVC
* Chippin Subdivision (Broad, Wiggins, etc.)	365		
* Gervais Court	101		
* Cowperthwaite Subdivision (Mason, Malibu, Cowperthwaite)	496		
Kimble Road - Wilsey Rd. to RR Tracks		153	
* Chippins Riverview Subdivision (Wetmore, Hearne, Baxter, Sutton, etc.)	1118	130	
*** Devon Indian Reserve (Maliseet Drive)	361		
** Rainsford Lane Park	1032		
* Amberwood Lane (Springhill Place Subdivision)	162		
* Golf Club Road Estates Subdivision (Golf Club Road, Kingswood Drive, Coburn Drive)	868		
TOTALS	14503	283	264

OVERALL TOTAL = 5050 metres or 5.050 kilometres

- * Entire cost paid by developers through Local Improvement Agreements
- ** Portion cost shared through agreement with Environment New Brunswick
- *** Paid for by the Department of Indian and Northern Affairs

STORM SEWER:

In 1986, storm sewer mains were installed in the Chippin Riverview Subdivision (Wetmore Road, Hearne Street, Baxter Court, Baxter Street, and Sutton Street), Gervais Subdivision (Gervais Court), Cowperthwaite Subdivision (Mason Avenue, Malibu Street, and Cowperthwaite Street), Kimble Road in conjunction with Chippins Riverview Subdivision, Springhill Place Subdivision (Amberwood Lane), Golf Club Road Estates Subdivision (Golf Club Road, Kingswood Drive, and Coburn Drive), Rainsford Lane Park, and completed in the Chippin Subdivision in Nashwaaksis (Broad Street, Wiggins Street, etc.)

Following are lengths and sizes of mains installed in 1986:

Location	LENGTH OF MAINS - metres							
	250 mm	300 mm	375 mm	450 mm	600 mm	750 mm	900 mm	1800 mm
* Chippin Subdivision (Broad, Wiggins, etc.)	136	133	199	77				
* Gervais Court	7	92	33					
* Cowperthwaite Subdivision (Mason, Malibu, Cowperthwaite)	99	152	69	92	160	144		
Kimble Road - Wilsey Rd. to R.R. Tracks								88
* Chippins Riverview Subd. (Wetmore, Hearne, Baxter, Sutton, etc.)	414	777	465	34	211	80		
** Devon Indian Reserve (Maliseet Drive)	14			372				
Rainsford Lane Park	86	123	222	25			345	
* Amberwood Lane (Springhill Place Subdivision)	34	55	106					
* Golf Club Road Estates Subdivision (Golf Club Road, Kingswood Drive, Coburn Drive)			393	411	67	40		1
*** Dundonald Street		28						
TOTALS	790	1753	1505	667	411	224	346	88

OVERALL TOTAL = 5784 metres or 5.784 kilometres

- * Entire cost paid by developers through Local Improvement Agreements
- ** Paid for by the Department of Indian and Northern Affairs
- *** Installed under General Fund Storm Sewer O & M budget

CURB AND GUTTER:

Concrete curb and gutter was constructed at the following locations in 1986:

Location	Length (metres)
Willis Street - McGrand Ct. to dead end	474
Forestview Court	196
Elm Court	139
Hemlock Avenue	927
River Street - Allen Street to end 1985 construction	669
Pugsley Street	877
Wetmore Road - Chandler Dr. to Pugsley St.	310
Castleton Court	374
Canterbury Drive - Woodbridge St. to Kimble Rd.	572
Birmingham Court	387
Mitchell Street - Near Squires St. to #827	305
* Main Street - Brookside Drive intersection	184
** Gibson Street - Union St. to CPR Tracks	569
*** Marlborough Drive - Woodstock Rd. to Railway Tracks	158
Centennial Court	<u>306</u>
TOTAL	6447

6447 metres = 6.447 kilometres

* Done under Traffic Management (Intersection Improvements)

** Done under Designated Route Program

*** Developer advanced \$12 000 towards the construction
(including paving)

PAVING:

In 1986, Gorman Construction Limited was awarded a contract to supply and place asphalt concrete on a number of City streets.

The street preparatory work, was done by regular City forces.

The paving program required the supply and placement of the following grades of asphalt concrete:

- 1) Binder Course (20 mm) - Type "B" at \$37.50 per tonne in place
- 2) Surface Course (13 mm)- Type "D" at \$41.50 per tonne in place

(1) BINDER COURSE - TYPE "B"

The following streets were paved with Type "B" asphalt concrete in 1986:

<u>Location</u>	<u>Length (metres)</u>
Willis Street - McGrand Ct. to dead end	258
/Forestview Court	92
/Elm Court	67
/Hemlock Avenue	485
/River Street - Allen Street to end 1985 construction	498
/Pugsley Street	403
/Wetmore Road - Chandler Dr. to Pugsley St.	192
/Castleton Court	155
/Canterbury Drive - Woodbridge St. to Kimble Rd.	290
/Birmingham Court	235
/Mitchell Street - Near Squires St. to #827	167
/Marlborough Drive - Woodstock Rd. to Railway Tracks	79
/Centennial Court	81
TOTAL	3002

3002 metres = 3.002 kilometres

(2) SURFACE COURSE - TYPE "D"

The following streets were paved with Type "D" asphalt concrete in 1986:

Location	Length (metres)
* Hanwell Road - Woodstock Road to former City line	1356
* Gibson Street - Union Street to CPR Tracks	285
* Union Street - Gibson Street to Watters Drive	719
Brookside - Main Intersection	<u>24</u>
TOTAL	2384
2384 metres = 2.384 kilometres	

* Done under Designated Route Program

CONCRETE SIDEWALKS:

Sidewalks were constructed at the following locations in 1986:

Location	Length (metres)
* River Street - Allen St. to end of 1985 construction	495
* Gibson Street - Union St. to CPR Tracks	255
Willis Street - McGrand Ct. to Dead End	215
Forest Hill Road - Rankine St. to Kimble Rd.	207
Grant Street	152
Wetmore Road - Chandler Dr. to Pugsley St. (incomplete)	107
Pugsley Street	399
Canterbury Drive - Woodbridge St. to Kimble Rd.	275
Reading Street	<u>162</u>
TOTAL	2267

2267 metres = 2.267 kilometres

* Reconstruction of existing

WORKS FACILITIES:

In 1986, a new equipment storage building was constructed at the St. Marys Street depot.

TRAFFIC MANAGEMENT (SIGNALS):

In 1986, a complete upgrading of signals was done at the George Street - York Street intersection.

A new controller was also purchased for the Gibson Street-Union Street intersection. This intersection will have signals upgraded in future in conjunction with intersection radii and lane improvements.

TRAFFIC MANAGEMENT (INTERSECTION IMPROVEMENTS):

In 1986, improvements to intersection radii and lane upgrading was proposed for the Gibson Street - Union Street intersection. Land acquisition is required to do the work properly. This could not be obtained in 1986.

MAIN STREET PROGRAM:

1986 saw the continuation of upgrading in the downtown area of the City through the Main Street Program. Due to limited funds, work was concentrated in front of City Hall. Further work is planned for this area in 1987.

NEW STREET CONSTRUCTION:

The following new streets were constructed in 1986:

<u>Location</u>	<u>Length (metres)</u>
Amberwood Lane	167
Baxter Court	173
Baxter Street	115
Cowperthwaite Street - Hollybrook St. to Mason Ave.	197
Estey Lane	334
Evans Street	315
Gervais Court	108
Hearne Street - Limerick Rd. to Wetmore Rd.	504
Kimble Road near Sutton Street	113
Malibu Street	105
Mason Ave. - Canada Street to Cowperthwaite St.	250
Staples Court	201
Sutton Street	241
Wetmore Road - Pugsley St. to Hearne St.	137
Wiggins Drive	279
TOTAL	3239

3239 metres = 3.239 kilometres

NOTE: All the above streets were constructed through Local Improvement Agreements

DESIGNATED ROUTES

The City of Fredericton has a total of 57.250 km of provincial designated highways within its boundaries. In 1986, the Provincial Government paid \$299.34 (winter) and \$75.53 (summer) per lane kilometre towards maintenance of the routes respectively. If any improvements such as new curb and gutter, paving or storm sewer installations are done to these routes, authorization by the Department of Transportation is required.

The following authorized projects were undertaken in 1986:

(1) Resurfacing - Route 640 - Hanwell Rd. from Woodstock Rd. to former City line	\$ 64 509.58
(2) Resurfacing - Forest Hill Arterial Access - Beaverbrook St. to #90	19 080.99
(3) Resurfacing - Route 105 - Union St. from Gibson St. to Watters Dr.	36 731.43
(4) Installation of Curb & Gutter & Resurfacing - Route 8 - Gibson St. from Union St. to CPR Tracks	66 698.80
(5) Resurfacing - Forest Hill Arterial Access at the Intersection of Waterloo Row	4 135.89
(6) Resurfacing - Route 640 - Hanwell Rd. south of T.C.H.	15 918.15
(7) Resurfacing - Route 620 - Royal Rd.	21 248.11
(8) Resurfacing - Route 101 - Regent St.- Prospect St. Intersection ..	3 861.99
(9) Route 102 - Lincoln Rd.- Chip seal of shoulders ...	<u>26 390.60</u>
TOTAL	\$ 258 575.54

CAPITAL PROGRAMSSUMMARY OF EXPENDITURES

Item	Budget	Expenditure	Remarks
<u>UTILITY FUND</u>			
Silverwood Reservoir	\$ 250 000	\$ 2 367	work to be continued in 1987
Water Plant & Wells (Centralized Power)	150 000	117 673	
Cleaning & Replacement of Old Mains	100 000	80 994	
Rainsford Lane Park (Water and sanitary sewer)	700 000	463 602	
Phoenix Square (Queen St. water)	50 000	55 903	Associated with paving
Riverview Subdivision Access	30 000	96 683	Associated with paving
<u>GENERAL FUND</u>			
Rainsford Lane Park storm sewer	270 000	235 613	
Central Devon Area (Pine, Gill, Babbitt - storm sewer)	110 000	3 814	work to be done in 1987
McLeod Hill Rd. Street reconstruction	100 000	117 786	
Willis St. - Forestview Ct.- Elm Ct. (curb, gutter, paving, sidewalk)	90 000	81 941	
Hemlock Ave. (curb, gutter, paving)	110 000	93 132	
Centennial Court (curb, gutter, paving)	20 000	39 365	
River St. - Allen to end of 1985 construction (curb, gutter, paving, sidewalk)	120 000	111 460	

SUMMARY OF EXPENDITURES (continued)

Location	Budget	Expenditure	Remarks
Pugsley St. (curb, gutter, paving, sidewalk)	110 000	82 415	some topsoiling req'd. in 1987
Wetmore Rd. - Chandler to Pugsley (curb, gutter, paving, sidewalk)	50 000	34 018	sidewalk to be completed in 1987
Castleton Court - curb, gutter, paving	40 000	35 131	
Canterbury Dr. - Woodbridge to Kimble (curb, gutter, paving & sidewalk)	80 000	60 008	
Birmingham Ct. - curb, gutter, paving	50 000	43 462	
Mitchell St. - curb, gutter, paving	30 000	20 858	some topsoiling req'd. in 1987
Forest Hill Rd.- Rankine to Kimble - sidewalk	10 000	16 062	
Hanwell Rd.- Woodstock Rd. to Inglewood Dr.(sidewalk)	10 000	26 40	Cantilevered
Grant St. - sidewalk	10 000	9 082	
Equipment Storage Bldg. (North Side)	220 000	157 309	
Gibson St. & Union St. Traffic Signals & Intersection Improvements	100 000	19 283	
George St. & York St. Traffic Signals	30 000	32 265	
Preliminary Engineering	30 000	11 575	
Vanier Hwy. Landfill Close Out	188 000	137 826	

SUMMARY OF EXPENDITURES (continued)

WATER QUALITY - 1986BACTERIAL ANALYSIS

Coliform bacteria are accepted as a good index of the degree of bacteriologic safety of water. Although they are not themselves disease producers, coliform bacteria are found in densities roughly proportional to the degree of fecal pollution in polluted water. When members of the coliform group are present, other kinds of microorganisms capable of causing disease may also be present. The absence of coliform bacteria from water is an indication that the water is bacteriologically safe for human consumption, since coliform bacteria are more hardy than disease-causing bacteria.

Samples for coliform analysis were taken monthly from the wells in service and various distribution points in the City water system. All samples were tested for total coliform by the membrane filtration technique.

The following is a description of those samples which developed coliform colonies:

Date	Location	No. Coliform/100 mL
86 01 06	Maple #1 Well	10
	Silverwood #2 Well	1
86 01 08	Silverwood #2 Well	1
86 02 10	Highland Well	1
	Cameron Ct. Well	1
86 04 07	Silverwood #3 Well	2
86 05 14	Cameron Ct. Well	5
86 06 09	Silverwood #3 Well	1
	Cameron Ct. Well	11
86 07 21	Silverwood #2 Well	2
	Duval Well	1
	Cameron Ct. Well	1
86 07 22	Silverwood #2 Well	1
86 09 08	Killarney K-10 Well	2
	Silverwood #2 Well	1
	Cameron Ct. Well	2

Date	Location	No. Coliform/100 mL
86 10 09	Wilmot #3 Well	8
	Silverwood #2 Well	2
	Silverwood #3 Well	3
	Cameron Ct. Well	1
86 12 09	Highland Well	3
	Silverwood #2 Well	10+
	Silverwood #3 Well	3
	Silverwood Reservoir	1
	Cameron Court Well	2

In most cases, positive tests were followed by negative tests for each location, and those locations which had consecutive positive tests have since produced negative results.

The positive tests may be due to the following factors:

- a) poor sampling conditions
- b) less care in sampling
- c) increased involvement of operators in laboratory

With the low counts experienced, gross fecal contamination cannot be suspected.

WATER TREATMENT PLANT

Fredericton's new water treatment plant was put on line in July of 1984 and is now treating 97% of the water produced on the south of Fredericton and 70% of the City's potable water. The plant removes iron and manganese and raises the pH to approximately 8 pH units, thus decreasing corrosion rates. The chlorine content of the effluent is 0.80 mg/L measured as free chlorine. This water is odourless, colourless, and has an agreeable taste.

Impurities which may coat the inside of pipelines can combine with this water to form trichloramines, which may have a metallic or chemical taste, and an odour similar to that given off by bleaching agents. This effect seems to be occurring in Fredericton and is expected to decline over a two year period. We expect to be left with a free chlorine residual throughout our system, without objectionable tastes.

CHEMICAL ANALYSIS

Samples for chemical analysis were taken from all wells in May 1986 and analysed by Environment New Brunswick's laboratory. Results are displayed on the following page.

Three columns concerning pumpage and output are added for quick reference. The first column provides the present output (some wells are throttled), the second provides total 1986 pumpage and the third provides the percentage of total supply.

CITY OF FREDERICTON WATER ANALYSES, 1986 05 08

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LOCATION	#	Conductivity (µS/CM)	Turbidity (NTU)	Hardness as CaCO ₃ (mg/L)	Alkalinity as CaCO ₃ (mg/L)	TDS as Residue	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Chloride (mg/L)	Sulfate-Nitrate (mg/L)	Iron (mg/L)	Manganese (mg/L)	Zinc (mg/L)	Aluminum (ug/L)	Lead (ug/L)	Present Output (L/s)	1986 Pumpage (ML)	# of Total Supply		
Wilmot #1 Well	7.11	16.3	0.1	65	49	114	21.7	2.7	6.9	1.23	10.1	0.12	0.12	<.05	0.95	0.01	<.01	<2.0	68	16.37	21.0	
Wilmot #2 Well	6.99	21.0	6.2	79	69	152	25.8	3.5	10.6	0.96	10.0	0.16	<.05	16.8	0.61	4.62	0.01	0.04	<2.0	68	222	2.9
Wilmot #3 Well	7.05	40.6	0.8	167	89	274	57.3	5.7	16.4	4.11	44.1	0.10	1.24	32.3	0.05	0.08	0.02	0.02	<2.0	68	842	10.8
Wilmot #4 Well	6.71	29.6	0.3	93	54	183	30.3	4.2	15.5	2.12	36.2	<.10	0.82	24.9	<.05	0.49	0.02	<.01	<2.0	18	730	9.4
Wilmot #5 Well	7.39	13.5	0.1	56	52	105	18.7	2.2	4.8	1.02	<5.0	0.10	<.05	10.4	<.05	1.86	0.02	<.01	<2.0	68	2040	26.2
WRP Influent	7.20	19.7	0.2	73	62	146	23.8	3.3	8.5	1.85	14	0.15	0.44	17.0	<.05	0.52	0.01	<.01	<2.0	4	34	<2.0
WRP Effluent	8.31	23.1	0.1	95	79	168	32.8	3.3	9.4	1.86	18.2	0.17	0.44	21.6	<.05	<.01	0.02	<.01	<2.0	10	36	0.5
Duval Well	7.95	33.7	0.1	107	113	251	37.8	3.0	28.6	1.09	25.3	0.19	<.05	18.1	<.05	0.06	0.01	<.01	<2.0	11	<2.0	<2.0
City Hall	8.32	22.9	0.2	88	75	174	31.0	2.5	11.3	1.32	20.6	0.11	0.22	15.6	<.05	<.01	0.04	<.01	0.01	40	<2.0	<2.0
Woodbridge St.	8.15	25.1	0.2	92	78	177	32.1	2.9	10.8	1.51	17.5	<.10	0.28	15.6	<.07	0.02	0.03	<.01	0.01	10	<2.0	9.8
Cameron Ct. Well	8.01	32.3	0.1	58	109	244	20.3	1.7	45.4	0.59	24.7	0.19	0.09	17.7	0.07	<.01	0.01	<.01	0.19	20	<2.0	1.7
Rainsford Well	7.56	21.7	2.2	89	81	171	31.3	2.7	7.1	0.53	13.4	0.11	0.09	16.8	<.05	<.01	0.01	0.19	0.12	16	<2.0	6.7
Silverwood #2 Well	8.23	34.0	0.3	117	159	288	19.8	16.5	28.2	1.11	<5.0	0.17	<.05	22.9	<.05	<.01	<.01	0.12	4	4	0.1	
Silverwood #3 Well	8.10	24.0	0.3	112	107	191	24.0	12.6	3.3	0.56	<5.0	0.11	0.07	14.8	<.05	<.01	0.02	<.01	6	<2.0	10	
Highland Well	8.32	30.4	0.3	37	117	243	13.7	2.5	17.7	0.58	14.7	0.20	<.05	16.7	<.05	<.01	0.07	<.01	0.02	11	50	0.6
Cliffe St. Well	7.82	32.7	0.1	148	106	338	53.9	3.2	43.0	0.84	57.1	0.21	0.07	50.3	<.05	0.10	0.03	<.01	1.2	<2.0	10	
Maple St. #1 Well	7.85	51.6	0.1	148	106	338	53.9	3.2	43.0	0.84	57.1	0.12	0.72	22.5	1.04	0.25	0.04	0.04	45	<2.0	3.5	
Maple St. #2 Well	7.39	48.0	6.6	201	124	333	69.6	6.5	22.4	1.48	56.8	0.12	0.33	<.05	70.5	<.05	0.06	<.01	0.01	28	<2.0	30
Maple St. #3 Well	7.89	42.4	0.4	135	100	302	50.4	2.1	29.5	0.73	26.0	0.33	<.05	70.5	<.05	<.01	<.01	0.01	38	<2.0	18	
Killarney #1 Well	7.91	221	0.1	81	84	176	29.4	1.8	17.2	0.64	5.5	0.17	<.05	18.6	<.05	0.02	0.01	<.01	74	<2.0	3.4	
Killarney #K10 Well	7.88	222	0.1	68	84	175	24.5	1.7	18.0	0.55	6.3	0.19	<.05	21.5	<.05	<.01	0.04	0.01	77	<2.0	12	
Greenwood #1 Well	9.11	33.5	8.7	12	119	238	4.4	0.2	70.2	0.71	19.0	0.95	<.05	18.0	0.23	0.12	<.01	<.01	39	<2.0	31	
Greenwood #2 Well	8.76	34.4	1.3	36	112	246	13.3	0.6	58.8	0.42	29.4	0.52	0.28	14.6	<.05	<.01	0.01	<.01	27	<2.0	6.7	
Tower Rd. #1 Well	7.84	31.6	0.2	104	85	233	36.9	2.8	19.8	0.57	21.2	0.19	<.05	48.5	<.05	0.03	0.02	<.01	11	<2.0	88	
Tower Rd. #2 Well	7.80	27.3	0.1	98	68	180	33.0	3.8	13.9	0.71	33.2	0.13	<.05	13.0	<.05	<.01	<.01	9	<2.0	17		
McGloin St. Well	7.25	34.6	16.8	91	85	238	31.3	3.2	33.1	1.12	33.5	0.20	0.17	31.2	1.75	0.39	<.01	0.09	233	<2.0	302	
MAXIMUM LIMITS			6.5 to 8.5		5.0	200 to 500	30	200	150	270	250	1.5	10	500	0.3	0.05	1.0	5.0			TOTAL	

