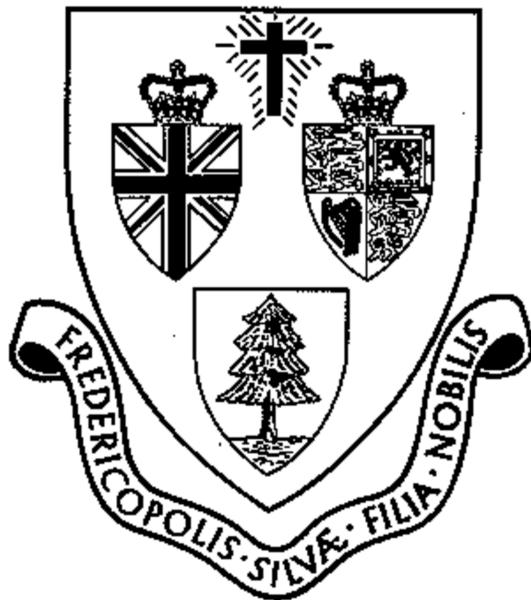


**ANNUAL REPORT  
OF THE ENGINEERING AND PUBLIC  
WORKS DEPARTMENT**

**1998**



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# TO HIS WORSHIP THE MAYOR AND COUNCILORS OF THE CITY OF FREDERICTON

I submit herewith this report which is a statement of work done under the supervision of the Director of Engineering and Public Works.

This report covers the period from 1998 01 01 to 1998 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	13.607 km
	Sidewalk	6.271 km
	New Street Construction	1.236 km
*	New Pavement - Type "B" Asphalt Concrete	5.214 km
	Resurface - Type "D" & "C" Asphalt Concrete	8.296 km
	Gravity Sanitary Sewer Mains	4.179 km
	Storm Sewer Mains	4.302 km
	Water Mains	7.336 km
	Sanitary Sewer Force main	- km

\* Type "D" asphalt concrete was also placed on streets in new subdivisions. This was paid for by developers under Local Improvement Agreements.

## ALSO

- 197 Water services were installed
- 198 Sanitary sewer services were installed
- 183 Storm sewer services were installed
- 1518 New water meters were installed

At the end of 1998, the City of Fredericton Roads and Streets and Utility infrastructure quantities were as follows:

Note: Quantities shown are reasonably accurate.

<b>Infrastructure Item</b>	<b>Quantity</b>
Local Streets	384.100 lane km
Collector Streets	122.642 lane km
Arterial Streets	154.467 lane km
Concrete Curb & Gutter	480.920 km
Concrete Sidewalk	186.144 km
Decorative Sidewalk	18600 square metres
Water Distribution Mains	207.754 km
Water Transmission Mains	125.227 km
Collector Sewer	214.730 km
Trunk Sewer	76.692 km
Force Main Sewer	11.180 km
Storm Sewer	234.352 km
Water Wells (Production)	9
Water Wells (Standby)	13
Water Booster Stations	8
Water Reservoir Cells	20
Water Treatment Plants	1
Sewage Lift Stations	27
Sewage Treatment Plants	1
Sewage Lagoons	3
Water & Sewer Services	13875

Note: Provincially Designated Highways are shown as part of the streets inventory.

**Contractors under contract with the Engineering and Public Works Department of the City of Fredericton in 1998 supplied materials, completed construction or began construction, as follows:**

Hogan Paving Ltd.	-	Supply of Asphalt Concrete for Patching
Charmac Construction Company Limited	-	Fredericton North High School Water & Sewer Services --Phase 2
Diamond Construction (1961) Limited	-	Supply and Delivery of Granular Material
MacBean Sand & Gravel Ltd.	-	Supply and Delivery of Granular Material
Charmac Construction Company Limited	-	Supply and Delivery of Bedding Sand
Dunham's Contracting Limited	-	Supply and Delivery of Subsoil
Fairville Construction Ltd.	-	Brunswick Street Trunk Sewer and Water Main Upgrading Phase 10
Goodfellow's Trucking Ltd.	-	Fredericton North High School – Contract 1 Water, Sewer & Roadway Services
LaFarge Canada Ltd.	-	Supply and Delivery of Concrete
Elm City Paving Ltd.	-	Supply and Placement of Asphalt Concrete
Safeway Shouldering	-	Supply and Delivery of Winter Sand
Cargill Salt	-	Supply and Delivery of Highway Salt
Laurentide Atlantic Limited	-	Supply of Traffic Lane Striping Paint
Trius Taxi Ltd.	-	Garbage Collection Services
Olympian Slipform Company Limited	-	Installation of Curb and Gutter and Sidewalk
Rainsford Contracting Ltd.	-	Contract Services
Charmac Construction Company Limited	-	Water and Sewer Services Douglas Area Phase 9
Charmac Construction Company Limited	-	Vanier Highway (Liverpool Street to Kimble Drive) Sanitary Sewer & Water Main
Hogan Paving Ltd.	-	Supply and Placement of Asphalt Concrete on Municipal Trenches

Charmac Construction Company Limited	-	Bishop Drive Roadway Reconstruction
Goodfellow's Trucking Ltd.	-	Marysville Trunk Water Main (Young Street to Bridge Street)
King Construction Ltd.	-	Wilmot Park Well House No. 8
Charmac Construction Company Limited	-	TCH Trunk Sewer (Hanwell Road to Garden Creek)

**General Fund** expenditures for the period 1998 01 01 to 1998 12 31 were as follows:

ITEM	BUDGET	NET EXPENDITURE	OVER	UNDER
<b><i>Common Services</i></b>				
Administration	\$125 371	\$115 552	\$ -	\$9 819
Engineering Services	\$570 256	\$558 242	\$ -	\$12 014
General Equipment	\$1 972 051	\$1 976 288	\$4 237	\$ -
Regent Street Depot	\$130 346	\$109 064	\$ -	\$21 282
St. Mary's Street Depot	\$190 309	\$198 890	\$8 581	\$ -
Sign Shop	\$17 900	\$20 333	\$2 433	\$ -
Safety & Benefits	\$1 127 216	\$1 186 436	\$59 220	\$ -
<b><i>Road Transport</i></b>				
Administration	\$236 295	\$208 618	\$ -	\$27 677
Roadway Surfaces:				
(a) Paved Streets Maintenance	\$396 428	\$260 163	\$ -	\$136 265
(b) Curb & Gutter Repair	\$113 762	\$137 223	\$23 461	\$ -
(c) Rights-of-way Maintenance	\$164 231	\$175 260	\$11 029	\$ -
Sidewalk Maintenance	\$170 994	\$129 640	\$ -	\$41 354
Sidewalk – Special Projects	\$245 000	\$169 363	\$ -	\$75 637
Culverts; Ditching	\$55 846	\$35 201	\$ -	\$20 645
Storm Sewer Maintenance	\$148 942	\$144 739	\$ -	\$4 203
Street Cleaning	\$422 844	\$394 926	\$ -	\$27 918
Snow Control	\$890 637	\$1 142 748	\$252 111	\$ -
Sanding & Salting	\$490 867	\$712 435	\$221 568	\$ -
Street Lights	\$757 052	\$788 320	\$31 268	\$ -
Traffic Services				
(a) Street Signs	\$114 319	\$110 013	\$ -	\$4 306
(b) Paint Division	\$131 312	\$119 994	\$ -	\$11 318
(c) Traffic Signals	\$207 131	\$186 134	\$ -	\$20 997
<b><i>Environmental Health Services</i></b>				
Garbage & Waste Collection	\$464 000	\$472 005	\$8 005	\$ -
Garbage & Waste Disposal	\$483 700	\$551 878	\$68 178	\$ -
Recycling	\$136 000	\$114 857	\$ -	\$21 143
Hazardous Waste	\$5336	\$3163	\$ -	\$2 173
<b>TOTALS</b>	<b>\$9 768 145</b>	<b>\$10 021 485</b>	<b>\$690 091</b>	<b>\$436 751</b>

Utility Fund expenditures for the period 1998 01 01 to 1998 12 31 were as follows:

ITEM	BUDGET	NET EXPENDITURE	OVER	UNDER
<b><i>Common Services</i></b>				
General Equipment	\$539 792	\$499 578	\$ -	\$40 214
Safety & Benefits	\$359 991	\$470 687	\$110 696	\$ -
Administration	\$218 726	\$249 550	\$30 824	\$ -
<b><i>Water</i></b>				
Purification & Treatment	\$362 181	\$312 076	\$ -	\$50 105
Source of Supply	\$412 101	\$397 159	\$ -	\$14 942
Power & Pumping	\$48 553	\$48 889	\$336	\$ -
Maintenance of Equipment (Plant)	\$74 112	\$44 820	\$ -	\$29 292
Transmission & Distribution (Oper)	\$267 052	\$244 558	\$ -	\$22 494
Transmission & Distribution(Maint)	\$915 736	\$681 841	\$ -	\$233 895
Billing & Collection	\$141 562	\$112 063	\$ -	\$29 499
Meters	\$373 063	\$414 181	\$41 118	\$ -
<b><i>Sanitary Sewer</i></b>				
Operation (Lift Stations)	\$107 148	\$53 693	\$ -	\$53 455
Maintenance	\$579 626	\$461 109	\$ -	\$118 517
Treatment & Disposal	\$1 546 523	\$1 548 345	\$1 822	\$ -
<b><i>Fiscal Services</i></b>				
Funding (Current Year's Capital Projects)	\$4 200 000	\$3 360 974	\$ -	\$839 026
<b>TOTAL</b>	<b>\$10 146 166</b>	<b>\$8 899 523</b>	<b>\$184 796</b>	<b>\$1 431 439</b>

\*Surplus does not take into account revenues (budgeted or actual)

Following is a table giving total kilometrage (as of 98 12 31) of municipal roads and streets, provincial designated and regional highways and provincial by-passes & ramps divided with respect to type of surface on the various streets.

<b>LOCATION</b>	<b>MUNICIPAL ROADS &amp; STREETS</b>			<b>DESIGNATED &amp; REGIONAL HIGHWAYS (Asphalt)</b>		<b>T.C.H. BY-PASSES &amp; RAMPS (Asphalt)</b>
	<b>Asphalt</b>	<b>Gravel</b>	<b>Chip Seal</b>	<b>TOTAL</b>		
Fredericton South 27.932	111.618	-	3.423	115.041	21.191	
Fredericton North	21.856	0.029	0.578	22.463	9.008	1.378
Nashwaaksis	58.386	1.669	1.700	61.755	2.580	8.194
Marysville	24.609	0.304	0.792	25.705	5.563	3.007
Barker's Point	8.267	-	0.418	8.685	2.037	4.428
Silverwood	4.428	-	0.184	4.612	-	2.748
Garden Creek	17.883	1.145	1.734	20.762	-	2.482
Douglas	4.191	0.191	0.359	4.741	2.560	-
Lincoln	3.633	0.502	0.720	4.855	6.695	2.458
Lower St. Marys	1.970	-	-	1.970	-	2.681
<b>TOTALS</b>	<b>256.841</b>	<b>3.840</b>	<b>9.908</b>	<b>270.589</b>	<b>49.634</b>	<b>55.308</b>

**TOTAL (Municipal, Designated & Regional Highways ) = 320.223**

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

Respectfully submitted,

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Garnet Hetherington, P. Eng.

## GENERAL FUND

### COMMON SERVICES

The total net expenditure under this heading was **\$ 4 164 805** made up as follows:

Administration	\$ 115 552
Engineering Services	\$ 558 242
General Equipment	\$1 976 288
Service Depots	
Regent Street	\$ 109 064
St. Mary's Street	\$ 198 890
Sign Shop	\$ 20 333
Safety & Benefits	<u>\$1 186 436</u>
	<b>\$ 4 164 805</b>

(a) **Administration:**

The net expenditure of **\$115 552** was made up as follows:

Personnel Costs	\$ 94 788
Office Supplies	\$ 4 802
Miscellaneous	<u>\$ 15 962</u>
(Equipment Repairs, Printing, Travel Expenses, Recruitment Services)	<b>\$ 115 552</b>

(b) **Engineering Services:**

The net expenditure of **\$558 242** was made up as follows:

Personnel Costs	\$ 470 620
Engineering and Office Supplies	\$ 7 380
Equipment Repairs & Maintenance	\$ 1 977
Professional Services	\$ 26 885
Use of Equipment	\$ 11 033
Purchases (Computers and Related Purchases; Office Furniture and Equipment)	<u>\$ 40 347</u>
	<b>\$ 558 242</b>

(c) **General Equipment:**

The net expenditure of **\$1 976 288** was made up as follows:

Personnel Costs	\$ 417 759
Fuels	\$ 294 683
Small Tools	\$ 13 118
Vehicle Repairs (Parts)	\$ 499 950
Use of Equipment	\$ 10 765
General Equipment (New Purchases)	<u>\$ 740 013</u>
	<b>\$ 1 976 288</b>

(d) **Regent Street Depot:**

The net expenditure of **\$109 064** was made up as follows:

Personnel Costs	\$ 22 072
Furnace Oil & Supplies	\$ 21 740
Communications (Telephone)	\$ 4 054
Building Repairs & Maintenance	\$ 8 826
Equipment Repairs & Maintenance	\$ 6 322
Insurance	\$ 3 175
Use of Equipment	\$ 36
Water & Sewer Rates	\$ 501
Lights and Power	\$ 16 119
Provincial Taxes	<u>\$ 26 219</u>
	<b>\$ 109 064</b>

**(e) St. Mary's Street Depot:**

The net expenditure of **\$198 890** was made up as follows:

Personnel Costs	\$ 34 171
Furnace Oil & Supplies	\$ 32 971
Small Tools	\$ 5 942
Communications (Telephone)	\$ 6 110
Building Repairs & Maintenance	\$ 15 698
Equipment Repairs & Maintenance	\$ 21 525
Insurance	\$ 5 128
Use of Equipment	\$ 162
Water & Sewer Rates	\$ 1 693
Lights and Power	\$ 34 762
Provincial Taxes	<u>\$ 40 728</u>
	<b>\$ 198 890</b>

**(f) Sign Shop:**

The net expenditure of **\$20 333** was made up as follows:

Personnel Costs	\$ 1 359
Furnace Oil & Supplies	\$ 3 228
Communications (Telephone)	\$ 2 146
Building Repairs & Maintenance	\$ 4 082
Equipment Repairs & Maintenance	\$ 877
Insurance	\$ 972
Water & Sewer Rates	\$ 260
Lights and Power	\$ 2 950
Provincial Taxes	<u>\$ 4 459</u>
	<b>\$ 20 333</b>

**(g) Safety & Benefits:**

The net expenditure of **\$1 186 436** was made up as follows:

Personnel Costs	\$ 1 020 430
Materials (Barricades & Signs)	\$ 5 542
Protective Clothing	\$ 15 407
Protective Equipment	\$ 6 326
Communications (Radio)	\$ 33 307
Insurance	\$ 81 396
Conferences	<u>\$ 24 028</u>
	<b>\$1 186 436</b>

### **ROAD TRANSPORT SERVICES**

The Road Transport Services net expenditure of **\$4 714 777** was made up of the following items:

Administration	\$ 208 618
Roads & Streets	\$3 301 698
Street Lighting	\$ 788 320
Traffic Services	<u>\$ 416 141</u>
	<b>\$ 4 714 777</b>

(a) **Administration:** The total net expenditure under this heading amounted to **\$ 208 618** for personnel costs, general services, etc.

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

(1) Roadway Surfaces (maintenance)	\$ 572 646
(2) Sidewalk Maintenance	\$ 299 003
(3) Culverts & Ditching	\$ 35 201
(4) Storm Sewer Maintenance	\$ 144 739
(5) Street Cleaning	\$ 394 926
(6) Winter Maintenance	<u>\$ 1 855 183</u>
	<b>\$ 3 301 698</b>

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 **\$ 572 646** was made up as follows:

Paved Streets Maintenance	\$ 260 163
Curb & Gutter Repair	\$ 137 223
Right-of-way Maintenance	<u>\$ 175 260</u>
	<b>\$ 572 646</b>

**Paved Streets** This includes the patching and repairing of pavement and the asphalt concrete resurfacing program.

Costs for streets or portions of streets resurfaced in 1998 fell under Capital Special Projects – Paving. (See list of streets resurfaced under Capital Accounts Paving on Page 40 of this report).

**(2) Sidewalk Maintenance**

The net expenditure of **\$ 299 003\*** for sidewalk repairs was made up as follows:

Personnel Costs	\$ 103 807
Materials, use of equipment & contract services	<u>\$ 195 196</u>
	<b>\$ 299 003</b>

\*Includes costs of \$169 363 associated with Special Projects - Sidewalk Maintenance

**(3) Culverts and Ditching -** The maintenance and installation of culverts and ditches.

The net expenditure of **\$ 35 201** was made up as follows:

Personnel Costs	\$ 12 907
Materials	\$ 8 125
General Services (use of equipment & contract services)	<u>\$ 14 169</u>
	<b>\$ 35 201</b>

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

The net expenditure of **\$ 144 739** was made up as follows:

Personnel Costs	\$ 53 786
Materials	\$ 39 597
General Services (use of equipment & contract services)	<u>\$ 51 356</u>
	<b>\$ 144 739</b>

**(5) Street Cleaning and Flushing**

The City of Fredericton used a number of sweepers, trackless units and a Vac-all unit for street cleaning purposes in 1998.

The net expenditure under this heading amounted to **\$ 394 926** and was made up as follows:

Personnel Costs	\$ 249 422
General Services (use of equipment & contract services)	\$ 133 920
Goods (brooms, litter cans, dust control)	<u>\$ 11 584</u>

**(6) Winter Maintenance**

**(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, shoveling 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 334.771 km of roads and streets in 1998 (160.250 km on the north side and 174.521 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 1998, 190.679 km of sidewalk were plowed and sanded. (74.696 km on the north side and 115.983 km on the south side).

**Streets:**

The total net cost for **plowing streets** amounted to **\$ 973 432** and was made up as follows:

Personnel Costs	\$ 529 757
General Services (use & maintenance of equipment)	\$ 317 865
Contract Services	\$ 111 044
General Equipment	<u>\$ 14 766</u> <b>\$ 973 432</b>

The total net cost of **sanding and salting streets** amounted to **\$ 617 342** and was made up as follows:

Personnel Costs	\$ 252 182
General Services (use & maintenance of equipment)	\$ 83 115
Materials (salt and sand)	<u>\$ 282 045</u> <b>\$ 617 342</b>

The overall net expenditure of **\$ 1 590 774** for **plowing, sanding and salting** City roads and streets was made up as follows:

Personnel Costs	\$ 781 939
General Services (use & maintenance of equipment)	\$ 400 980
General Equipment	\$ 14 766
Materials (salt & sand)	\$ 282 045
Contract Services	<u>\$ 111 044</u> <b>\$ 1 590 774</b>

**Sidewalks:**

The total net expenditure for **plowing sidewalks** amounted to **\$ 169 316** and was made up as follows:

Personnel Costs	\$ 105 952
General Services (use & maintenance of equipment)	\$ 63 364
	<b>\$ 169 316</b>

The total net expenditure for **sanding sidewalks** amounted to **\$ 95 093** and was made up as follows:

Personnel Costs	\$ 50 437
General Services (use & maintenance of equipment)	\$ 16 623
Materials (sand)	\$ 12 817
General Equipment	<u>\$ 15 216</u>
	<b>\$ 95 093</b>

The overall net expenditure for **snow plowing and sanding of sidewalks** was **\$ 264 409** and was made up as follows:

Personnel Costs	\$ 156 389
General Services (use & maintenance of equipment)	\$ 79 987
Materials (sand)	\$ 12 817
General Equipment	<u>\$ 15 216</u>
	<b>\$ 264 409</b>

**TOTAL NET COST OF WINTER MAINTENANCE - ADD (1) & (2)** **\$1 855 183**

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

1994	Airport Weather Office	250.4 cm
1995	Airport Weather Office	292.7 cm
1996	Airport Weather Office	214.8 cm
1997	Airport Weather Office	350.4 cm
1998	Airport Weather Office	232.0 cm

(c) **Street Lighting**

The total street lighting costs for 1998 were as follows:

Salaries & Benefits	\$ 7 004
Multiple Lighting System Contract	\$769 625
General Services (Standards & contract services)	\$ 6 559
Government Services (Power to City Owned Lights)	\$ 3 691
New Poles	\$ -
New Bulbs	<u>\$ 1 441</u>
	<b>\$ 788 320</b>

As of December 31<sup>st</sup>, 1998, the **Multiple Street Lighting System** contract was made up as follows:

493	-	100 watt HPS light only
400	-	100 watt HPS light with wood pole
2	-	120 watt FLR light only
1537	-	150 watt HPS light only
35	-	150 watt HPS light with concrete pole
604	-	150 watt HPS light with wood pole
21	-	150 watt HPS power usage only
6	-	175 watt MV light with wood pole
414	-	200 watt HPS light only
1	-	200 watt HPS light with concrete pole
142	-	200 watt HPS light with wood pole
2	-	250 watt HPS light only
4	-	250 watt MV light with wood pole
1	-	400 watt MV light only
9	-	400 watt MV light with wood pole
40	-	400 watt HPS light only
1	-	400 watt HPS light with wood pole
<u>2</u>	-	500 watt INC light only

**\*3 714**

\* Includes 12 lights utilized for area lighting.

**(d) Traffic Services**

The expenditure under this heading is made up as follows:

- 1) Street Signs
- 2) Paint Division
- 3) Traffic Signals

**(1) Street Signs**

Purchasing, repairing and installing street signs on City Streets.

The net expenditure under this heading amounted to **\$ 110 013** made up as follows:

Personnel Costs	\$57 442
General Services (use of equipment)	\$10 040
Goods (posts, street sign purchases, etc.)	<u>\$42 531</u>
	<b>\$ 110 013</b>

**(2) Paint Division**

The net expenditure under this heading was **\$ 119 994** made up as follows:

Personnel Costs	\$79 126
General Services (use & maintenance of equipment & contract services)	\$12 323
Goods (paint & miscellaneous supplies)	\$27 289
Fixed Assets (new equipment)	<u>\$ 1 256</u>
	<b>\$ 119 994</b>

**(3) Traffic Signals**

The net expenditure under this heading was **\$ 186 134** made up as follows:

Personnel Costs	\$49 433
General Services (use & maintenance of equipment & contract services)	\$28 105
Government Services (electric power)	\$88 123
Goods (material)	<u>\$20 473</u>
	<b>\$ 186 134</b>

## ENVIRONMENTAL HEALTH SERVICES

The following items are included under the above heading.

- 1) Garbage and Waste Collection
- 2) Garbage and Waste Disposal
- 3) Recycling
- 4) Hazardous Waste

**(1) Garbage and Waste Collection**

In 1998, the net amount paid for the garbage and waste collection operation was **\$ 472 005** made up as follows:

Garbage Collection Contract	\$ 462 328		
Advertising & Printing	<u>\$ 9 677</u>		
		<b>\$ 472 005</b>	

**(2) Garbage and Waste Disposal**

The net expenditure under this section was **\$ 551 878** made up as follows:

Solid Waste Commission payments	\$ 551 627		
Provincial Taxes	<u>\$ 251</u>		
		<b>\$ 551 878</b>	

**(3) Recycling**

The net expenditure under this section was **\$ 114 857** made up as follows:

Goods (Composters)	\$ (4 929)		
General Services (Recycling Collection Contract)	\$ 115 366		
General Services (Blue Boxes)	<u>\$ 4 420</u>		
		<b>\$ 114 857</b>	

**(4) Hazardous Waste**

Cleanup of oil spills from accidents, etc.

The net expenditure under this section was **\$ 3 163** made up as follows:

Personnel Costs	\$ 619		
Materials	\$ 884		
Contract Services	\$ 1 456		
Use of Equipment	<u>\$ 204</u>		
		<b>\$ 3 163</b>	

## UTILITY FUND

The above item is made up of the following headings:

1. Common Services
2. Sanitary Sewer
3. Water

**(1) COMMON SERVICES**

In 1998 the net expenditure for this item was **\$1 219 815** made up as follows:

**a) General Equipment**

Personnel Costs	\$ 61 856
Fuel	\$ 68 689
Parts	\$ 130 022
Insurance	\$ 15 308
General Equipment	<u>\$ 223 703</u> \$ 499 578

**b) Safety & Benefits**

Personnel Costs	\$ 434 462
Barricades; Signs; Clothing	\$ 18 172
Communications (Radio)	<u>\$ 18 053</u> \$ 470 687

**c) Administration**

Personnel Costs	\$ 172 167
Computer Supplies	\$ 851
Audit Fees & Recruitment Services	\$ 17 678
Conferences	\$ 27 504
Computers & Related Purchases	<u>\$ 31 350</u> \$ 249 550
	TOTAL      \$ 1 219 815

**(2) SANITARY SEWER**

In 1998 the net expenditure for this item was **\$ 2 063 147** made up as follows:

**Operating: Lift Stations**

Personnel Costs	\$ 15 090
General Services (use & maintenance of equipment)	\$ 9 793
Government Services (light & power)	\$ 28 324
Goods (materials)	<u>\$ 486</u>
	<b>\$ 53 693</b>

**Maintenance:**

Personnel Costs	\$ 294 316
General Services (use & maintenance of equipment & contract services)	\$ 94 939
Goods (repair parts & tools)	<u>\$ 71 854</u>
	<b>\$ 461 109</b>

**Sewage Treatment & Disposal**

Personnel Costs	\$ 31 603
General Services (use & maintenance of equipment) (Treatment (F.A.P.C.C.))	\$ 7 051 \$ 1 479 120
Government Services -Water & Sewer rates - Lights & Power	\$ 665 \$ 22 717
Goods (Miscellaneous Supplies)	<u>\$ 7 189</u>
	<b>\$1 548 345</b>
<b>TOTAL</b>	<b>\$ 2 063 147</b>

The Fredericton sanitary sewer system consists of approximately 303 kilometres of mains made up as follows:

SIZE	SILVERWOOD GARDEN CREEK	NASHWAAKSIS DOUGLAS	MARYSVILLE	LR.ST.MARYS BARKER'S PT.	FREDERICTON	TOTAL
100mm	-	0.158	-	-	-	0.158
100mm F.M.	0.013	-	-	-	1.103	1.116
150mm	-	1.433	0.314	-	0.316	2.063
150mm F.M.	0.031	1.071	0.539	0.712	3.008	5.361
200mm	16.045	43.892	18.567	10.864	123.141	212.509
200mm F.M.	0.254	0.463	0.314	-	0.064	1.095
250mm	1.959	6.676	0.955	0.298	10.247	20.135
250mm F.M.	1.178	-	-	-	-	1.178
300mm	1.267	4.301	1.006	1.868	18.778	27.220
300mm F.M.	0.420	0.489	-	-	0.739	1.648
350mm	0.287	0.843	-	-	0.713	1.843
350mm F.M.	-	-	0.528	-	0.254	0.782
375mm	1.138	5.503	0.500	0.174	2.368	9.683
400mm	0.018	0.147	-	-	0.210	0.375
450mm	1.039	0.117	1.350	-	2.654	5.160
500mm	2.979	-	-	-	-	2.979
525mm	-	2.420	-	-	0.310	2.730
600mm	0.156	0.964	-	-	3.693	4.813
750mm	-	-	-	-	0.322	0.322
900mm	-	-	-	-	1.432	1.432
<b>TOTALS</b>	<b>26.784</b>	<b>68.477</b>	<b>24.073</b>	<b>13.916</b>	<b>169.352</b>	<b>302.602</b>

**NOTE: Fredericton includes the Lincoln area.**

The above figures 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**

The City of Fredericton has two separate municipal water supply systems comprised of 22 wells (9 active), 20 reservoir tanks or cells on 13 reservoir sites, 8 active booster stations and the Water Treatment Plant. There are, within these two systems, at year's end, 15 separately monitored water pressure zones.

The Water Treatment Plant treats the water from the seven Wilmot Park wells, which provide 95% of the City's water. In 1998, an eighth well was added on Saint Annes Point. The following describes the 15 water zones and their normal sources.

ZONE	SOURCE	STORAGE
South Low	7 wells via W.T.P. 1 emergency standby well	18180 kL
North Low	South Low via River Crossing (same top reservoir elevations) 5 emergency wells	8540 kL
South Intermediate	South Low via Booster	9090 kL
South High	South Intermediate via Booster	4540 kL
Golf Club Road	South High via Pressure Reducing Valve	0 kL
Rosewood	South Low via Booster	0 kL
Lincoln	South Low via Booster	3750 kL
Alison	South High via Pressure Reducing Valve	0 kL
Hanwell	South High via Pressure Reducing Valve 1 Emergency Well	460 kL
Silverwood	2 Wells Direct	2250 kL
Rainsford	Golf Club road via Booster 1 Emergency Well	0 kL
Killarney	South Low via Booster 2 Emergency Wells	3750 kL
Marysville	North Low Via Booster 3 Emergency Wells	6600 kL
Canterbury	South High via Altitude Valve	1070 kL
Diamond	North Low via Booster	0 kL

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)	\$ 112 063
2. Water Ordinary (including meters)	\$1 340 580
3. Water Production Costs	<u>\$ 758 124</u>

**(1) WATER ADMINISTRATION (BILLING & COLLECTION)**

The net expenditure of \$ 112 063 was made up as follows:

Personnel Costs \$ 75 773  
 General Services (Postage, Professional Services,  
 Rental of Equipment, Computer External Services) \$ 33 364  
Goods (Computer & Office Supplies) \$ 2 926 \$ 112 063

**(2) WATER ORDINARY (INCLUDING METERS)**

The net expenditure of **\$1 340 580** was made up as follows:

## **Transmission & Distribution (Operation)**

Personnel Costs	\$ 52 917
General Services	\$ 53 354
(use & maintenance of equipment)	
Government Services (light & power, provincial taxes)	\$ 135 446
Goods (materials)	\$ 2 841
	<b>\$ 244 558</b>

## **Transmission & Distribution (Maintenance)**

Personnel Costs	\$ 415 621
General Services (use & maintenance of equipment & hydrants & contract services)	\$ 137 234
Goods (fuels & lubricants, tools, materials, parts)	\$ 128 986

## Meters

Personnel Costs	\$ 203 361
Goods (meter parts, miscellaneous supplies & tools)	\$ 35 110
General Services (use of equipment)	\$ 41 911
Fixed Assets (new meters)	\$ 133 799
	<b>\$ 414 181</b>

**TOTAL** **\$1 340 580**

At the end of 1998 there were 13 698 water services on meter and 177 on flat rate, making a total of 13 875.

210 new meters (new construction and former flat rate) were installed in 1998.

In 1998, 10 discontinued services were excavated and shut off at the main and 4 frozen meters were replaced. There were also 1304 meters replaced due to their age.

At the end of 1998 there were 5926 units on the Automated Meter Reading (AMR) System.

There are in the City, as of 1998 12 31, 1810 hydrants situated in the following areas:

Fredericton South	806
Fredericton North	173
Nashwaaksis/Douglas	392
Marysville	157
Barker's Point/Lower St. Marys	85
Silverwood/Garden Creek	27
<b>SUB TOTAL</b>	<b>1640</b>
<b>LOCATED ON PRIVATE PROPERTY</b>	<b><u>170</u></b>
<b>TOTAL</b>	<b>1810</b>

Hydrants were installed at the following locations in 1998:

<u>Location</u>	<u>Number</u>
Administration Building (DECH) (Private)	1
Canadian Tire (Smythe St.) (Private)	1
Clark Street	2
Clements Drive	1
Cliffe Street	2
Edward Street	1
Gilbert Street	2
Jasper Street	1
Kent Hardware (Bishop Drive) (Private)	4
Leo Hayes High School	5
Logan Street	2
Nethervue Mini-Home Park	2
Ruby Street	3
<b>TOTAL</b>	<b>27</b>

The Fredericton distribution system consists of approximately 333 kilometres of water main, made up as follows:

SIZE	MARYSVILLE	NASHWAAKSIS DOUGLAS	LR. ST. MARYS BARKER'S POINT	SILVERWOOD GARDEN CREEK	FREDERICTON	TOTAL
32mm	-	0.153	-	-	-	0.153
38mm	-	0.072	-	-	0.153	0.225
50mm	-	-	-	0.154	-	0.154
75mm	-	-	-	-	0.205	0.205
100mm	0.753	2.232	-	2.508	11.172	16.665
150mm	12.619	21.580	4.053	4.835	57.531	100.618
200mm	7.424	26.210	2.266	7.812	46.022	89.734
250mm	3.431	9.410	5.169	0.966	26.610	45.586
300mm	3.296	12.180	1.070	7.776	32.390	56.712
350mm	-	0.840	-	-	6.605	7.445
400mm	-	2.241	-	-	7.303	9.544
450mm	-	-	-	-	1.965	1.965
500mm	-	-	-	-	3.402	3.402
600mm	-	-	-	-	0.427	0.427
Unknown	0.146	-	-	-	-	0.146
<b>TOTALS</b>	<b>27.669</b>	<b>74.918</b>	<b>12.558</b>	<b>24.051</b>	<b>193.785</b>	<b>332.981</b>

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

The above figures do not include water mains installed at the Exhibition Grounds; the University of New Brunswick and St. Anne's Point Barracks on the Woodstock Road.

**(3) WATER PRODUCTION COSTS**

The net expenditure of **\$ 758 124** was made up as follows:

**Source of Supply**

Personnel Costs	\$ 106 713
Use of Equipment	\$ 12 161
Maintenance - Wells	\$ 54 609
Power - Wells	\$ 222 393
Materials - Wells	<u>\$ 1 283</u> \$ 397 159

**Power & Pumping (Plant)**

Personnel Costs	\$ 46 340
Communications	\$ 303
Light & Power	\$ 2 076
Supplies	<u>\$ 170</u> \$ 48 889

**Water Treatment Plant**

Personnel Costs	\$ 138 657
Insurance	\$ 4 701
Maintenance	\$ 59 243
Power	\$ 8 050
Taxes	\$ 29 726
Goods (Chlorine, Soda Ash, Lime, etc.)	<u>\$ 71 699</u> \$ 312 076

**TOTAL**      **\$ 758 124**

The total amount of water pumped into the City's distribution systems from 1998 01 01 to 1998 12 31 for the entire City was 8660 megalitres. The amount of water produced by the Water Treatment Plant in 1998 was 8595 megalitres or 99% of the total City demand. The average daily demand for the City is 23.7 megalitres.

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

### WATER PRODUCTION COSTS

YEAR	MEGALITRES PRODUCED	PRODUCTION EXPENDITURE	PRODUCTION COST PER MEGALITRE
1989	8440	\$734 658	\$87
1990	8600	\$679 440	\$79
1991	8450	\$823 353	\$97
1992	8570	\$828 783	\$97
1993	8023	\$794 406	\$99
1994	8340	\$874 562	\$105
1995	8160	\$839 058	\$103
1996	8270	\$827 735	\$100
1997	8560	\$827 339	\$97
<b>1998</b>	<b>8660</b>	<b>\$758 124</b>	<b>\$88</b>

The total net expenditure for transmission and distribution of water for the City from 1998 01 01 to 1998 12 31 was determined from the following:

#### Transmission & Distribution:

Operation	\$ 244 558	
Maintenance	<u>\$ 681 841</u>	
		<b>\$ 926 399</b>

Therefore, the net expenditure for transmission and distribution of one megalitre of water from 1998 01 01 to 1998 12 31 was:

$$\frac{\$ 926 399}{8660} = \$ 106.97$$

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

### TRANSMISSION AND DISTRIBUTION COSTS

YEAR	NET EXPENDITURE PER MEGALITRE
1989	\$ 126
1990	\$ 106
1991	\$ 117
1992	\$ 121
1993	\$ 147
1994	\$ 125
1995	\$ 114
1996	\$ 127
1997	\$ 116
<b>1998</b>	<b>\$ 107</b>

The total net expenditure for water administration costs for the City from 1998 01 01 to 1998 12 31 was determined from the following:

### Water Administration

(1) Billing & Collection	\$ 112 063	
(2) Meters (Installation, Reading, Repairs)	<u>\$ 414 181</u>	
		<b>\$ 526 244</b>

Administration costs per megalitre of water produced:

$$\frac{\$ 526\,244}{8660} = \$60.77$$

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

**ADMINISTRATION COSTS AND DEBT CHARGES PER MEGLITRE**  
**(Rounded to nearest dollar)**

YEAR	ADMINISTRATION (BILLING & COLLECTION & METERS)	DEBT CHARGES
1989	\$ 44	\$ 46
1990	\$ 44	\$ 43
1991	\$ 45	\$ 43
1992	\$ 46	\$ 38
1993	\$ 62	\$ 24
1994	\$ 63	\$ 19
1995	\$ 67	\$ 12
1996	\$ 70	\$ -
1997	\$ 58	\$ -
1998	\$ 61	\$ -

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

### TOTAL COSTS PER MEGALITRE

YEAR	PRODUCTION COSTS	TRANSMISSION & DISTRIBUTION COSTS	ADMINISTRATION	DEBT CHARGES	*TOTAL
1989	\$ 87	\$ 126	\$ 44	\$ 46	\$ 303
1990	\$ 79	\$ 106	\$ 44	\$ 43	\$ 272
1991	\$ 97	\$ 117	\$ 45	\$ 43	\$ 302
1992	\$ 97	\$ 121	\$ 46	\$ 38	\$ 302
1993	\$ 99	\$ 147	\$ 62	\$ 24	\$ 332
1994	\$ 105	\$ 125	\$ 63	\$ 19	\$ 312
1995	\$ 103	\$ 114	\$ 67	\$ 12	\$ 296
1996	\$ 100	\$ 127	\$ 70	\$ -	\$ 297
1997	\$ 97	\$ 116	\$ 58	\$ -	\$ 271
1998	\$ 88	\$ 107	\$ 61	\$ -	\$ 256

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

**SUMMARY****WATER AND SEWER REVENUE & EXPENDITURES  
1998**

ITEM	NET EXPENDITURE	REVENUE
<b><u>COMMON SERVICES (WATER &amp; SEWER)</u></b>		
General Equipment	\$ 499 578	\$ 445 326
Safety & Benefits	\$ 470 687	
Administration	\$ 249 550	
<b><u>WATER</u></b>		
Water Administration (Billing & Collection)	\$ 112 063	\$ 5 109 471
Water Ordinary (Including Meters)	\$ 1 340 580	
Water Treatment Facility & Well Production Costs	\$ 758 124	
<b><u>SANITARY SEWER</u></b>		
Operating & Maintenance	\$ 514 802	
Sewage Treatment & Disposal	\$1 548 345	\$4 237 387
<b>TOTAL</b>	<b>\$ 5 493 729</b>	<b>\$ 9 792 184</b>

1998 SURPLUS: \$4 298 455

**PLUS:** SECOND PREVIOUS YEAR'S  
SURPLUS @ BEGINNING OF YEAR \$ 909 161

OVERALL SURPLUS: \$5 207 616  
**LESS:** CAPITAL PROJECT FUNDING \$3 360 974

NET SURPLUS \$1 846 642

**NOTE:** \$ 3 360 974 of the above noted overall surplus was appropriated for utility capital expenditures.

## **CAPITAL PROGRAMS**

The following gives brief descriptions of capital projects begun or completed in 1998.

### **WATER**

In 1998, water mains were installed on Brunswick Street between Westmorland Street and Northumberland Street; in the Douglas Area (Jasper Street; Ruby Street); on Cliffe Street Extension and on an easement from Clark Street to Cliffe Street Extension associated with the Fredericton North High School; on the former railway right-of-way in Marysville between Young Street and Bridge Street; and along the Vanier Highway between Liverpool Street and Kimble Drive.

Streets such as Queen Street between St. John Street and Church Street; and Church Street between King Street and Brunswick Street, had their water mains upgraded or installed under the System Replacement and Oversizing Account.

New mains were also installed in the Chippin's Limited Real Estate Lincoln Heights Subdivision (Edward Street; Logan Street) by the developer under a Local Improvement Agreement. A new water main was installed along Vanier Industrial Drive between Edward Street and Lincoln Road in conjunction with the Lincoln Heights Subdivision.

Water mains were also installed in conjunction with the installation of Wilmot Park Well #8 and in conjunction with the new Knowledge Park along Knowledge Park Drive.

The following are lengths and sizes of water mains installed in 1998.

**LENGTH OF MAINS - metres**

LOCATION	150mm D.I. P.V.C.	200mm D.I. & P.V.C.	250mm D.I.	300mm D.I.	350mm D.I.	400mm D.I.	500mm D.I.
(1) Queen Street – St. John Street to Church Street			220				
(1) Church Street-King Street to Brunswick St.		96					
Wilmot Park Well #8 Piping		14				176	
Fredericton North High School (Cliffe St.)	8	301		346	99		
Fredericton North High School (Clark Ext.)	6	403					
Marysville Trunk (Young St. to Bridge St.)	36	48	230	1 860			
Brunswick Trunk (Westmorland to Northumberland)	6		44				205
Douglas Area (Jasper;Ruby)	127			738			
Vanier Highway (Liverpool to Kimble)				1 127			
(2) Lincoln Heights Subdivision (Edward St.;Logan St.)	16	259			84		
Vanier Industrial Drive				2	200		
Knowledge Park Drive	75	14		596			
<b>TOTALS</b>	<b>274</b>	<b>1 135</b>	<b>494</b>	<b>4 669</b>	<b>383</b>	<b>176</b>	<b>205</b>

**OVERALL TOTAL – 7 336 metres = 7.336 kilometres**

- (1) Done under system replacement and oversizing.
- (2) Paid for by the developer through Local Improvement Agreement.

**SANITARY SEWER:**

In 1998, sanitary sewer mains were installed on Brunswick Street between Westmorland Street and Northumberland Street; in the Douglas Area (Jasper Street; Ruby Street); on Cliffe Street Extension and on an easement from Clark Street to Cliffe Street Extension associated with the Fredericton North High School; at the Hanwell Road/TCH intersection area in conjunction with the work being done by MRDC with respect to the Fredericton to Moncton Highway; and along the Vanier Highway between Liverpool Street and Kimble Drive.

New mains were also installed in the Chippin's Limited Real Estate Lincoln Heights Subdivision (Edward Street; Logan Street) by the developer under a Local Improvement Agreement.

Sanitary sewer mains were also installed along Knowledge Park Drive in conjunction with the new Knowledge Park.

The following are lengths and sizes of sanitary sewer mains installed in 1998.

**LENGTH OF MAINS - metres**

LOCATION	200mm PVC	250mm PVC & D.I.	300mm PVC	375mm PVC & D.I.	450 mm P.V.C.	600mm PVC
Fredericton North High School (Cliffe St.)	554					
Fredericton North High School (Clark Street)	273	146				
(1) Hanwell Road/TCH				326		
Brunswick Trunk (Westmorland to Northumberland)	39				24	185
Douglas Area (Jasper;Ruby)	533					
Vanier Highway (Liverpool to Kimble)			1 129			
(2) Lincoln Hts. Subdivision (Edward St.;Logan St.)	444					
Knowledge Park Drive	526					
<b>TOTALS</b>	<b>2 369</b>	<b>146</b>	<b>1 129</b>	<b>326</b>	<b>24</b>	<b>185</b>

**OVERALL TOTAL – 4 179 metres = 4.179 kilometres**

- (1) Done under System Replacement and Oversizing
- (2) Paid for by the developer through Local Improvement Agreements

**STORM SEWER:**

In 1998, storm sewer mains were installed on Nethervue Street near the TCH with a portion along the TCH; on Brunswick Street between Westmorland and Northumberland Street; in the Douglas Area (Jasper Street;Ruby Street); and on Cliffe Street extension and on an easement from Clark Street to Cliffe Street Extension associated with the Fredericton North High School.

Some storm sewer work was done at the Beaverbrook/Forest Hill/Waterloo intersection in conjunction with the reconstruction of this area.

New storm sewer mains were also installed in the Chippin's Limited Subdivision (Edward Street;Logan Street) by the developer under a Local Improvement Agreement.

New storm sewer mains were also installed in conjunction with the new Knowledge Park along Knowledge Park Drive.

The following are lengths and sizes of storm sewer mains installed in 1998.

LOCATION	250mm	300mm	375mm	450mm	525mm	600mm	750mm	900mm	1050mm
(1) Nethervue/TCH			4	44		39			
(1) Brunswick St. (Westmorland to Northumberland)	169					38			
Douglas Area (Jasper; Ruby)	83	303	229	64					
(1) Beaverbrook – Forest Hill – Waterloo		207		36					26
(3) Fredericton North High School (Cliffe Street)	235	213	334	458		301	10	121	
(3) Fredericton North High School (Clark Extension)	11	196	85	75		124			
(2) Lincoln Hts. Subdivision (Edward St.; Logan St.)	57	453							
Knowledge Park Drive	71		4	139	16	157			
<b>TOTALS</b>	<b>626</b>	<b>1 372</b>	<b>656</b>	<b>816</b>	<b>16</b>	<b>659</b>	<b>10</b>	<b>121</b>	<b>26</b>

**OVERALL TOTAL - 4302 metres = 4.302 kilometres**

- (1) Done under System Replacement and Upgrading
- (2) Paid for by developer through Local Improvement Agreement
- (3) Done under Special Projects

**CURB AND GUTTER:**

Concrete curb and gutter was constructed at the following locations in 1998. (Notes indicate budget item under which work was done)

	<b>Location</b>	<b>Length (metres)</b>
(6)	Amberwood Lane (Turning Circle)	98
(6)	Beaverbrook Street (Sections-Windsor to University)	361
(6)	Beechwood Crescent (In front of Civic 6 & 16)	68
(1)	Bishop Drive (Hanwell Rd. to Acorn St.)	1292
(1)	Brookside Drive (Oakland Ave. to Rte. 105)	581
(1)	Brunswick Street (Westmorland St. to Northumberland St.)	453
	Cliffe Street Extension/MacLaren Avenue Intersection	725
	Dedham Street at St. Mary's Street	52
(1)	Diamond St.; Emerald St.; Garnet Ln.; McGregor St.	1822
(2)	Douglas Avenue/Fulton Avenue Extensions	2413
(2)	Edward Street/Logan Street	652
(3)	Forest Hill/Waterloo Row/Beaverbrook Intersection	882
(1)	Kaine Street (Canada St. to Miller St.)	560
	King Street (Church St. to Underpass)	235
	Knowledge Park Drive	559
(2)	McGregor Street Extension	616
	McLeod Avenue (Regent St. to Civic 649)	353
(1)	Miller Street (Canada St. to Foster St.)	186
(1)	Princess Court	246
(5)	Railway Crossing Improvement (Charlotte St.)	439
(5)	Railway Crossing Improvement (George St.)	424
(2)	Ridgewell Place/Fleet Court	469
(7)	Woodstock Road (Civic 942 to Civic 980)	121
		<hr/>
	<b>TOTAL</b>	<b>13 607</b>

- 1) Done under Capital Street Reconstruction.
- 2) Paid for by developer through Local Improvement Agreements.
- 3) Done under Capital Traffic Management.
- 4) Done in conjunction with sidewalk construction.
- 5) Done under Capital Special Projects.
- 6) Done under O & M Curb and Gutter Repair.
- 7) Associated with work on the Valley Trail.

**PAVING:**

In 1998, **Elm City Paving Ltd.** was awarded a contract to supply and place asphalt concrete on a number of City Streets.

The street preparatory work was done by City forces.

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

- |    |                  |  |
|----|------------------|--|
| 1) | Binder Course -  | Clase I Type "B" @ \$41.25 plus H.S.T. per tonne in place  |
|    |                  | Class II Type "B" @ \$41.25 plus H.S.T. per tonne in place |
| 2) | Surface Course - | Class I Type "C" @ \$42.25 plus H.S.T. per tonne in place  |
|    |                  | Class II Type "D" @ 43.00 plus H.S.T. per tonne in place   |

#### **BINDER COURSE - TYPE "B"**

The following streets were paved with Class I or Class II Type "B" asphalt concrete in 1998.

	<b>Location</b>	<b>Length (metres)</b>
	Amberwood Lane (Court Portion)	10
(1)	Bishop Drive (Hanwell Rd. to Acorn St.)	320
(1)	Brookside Drive (Oakland Ave. to Rt. 105)	264
(1)	Brunswick Street (Westmorland to Northumberland)	204
(4)	Charlotte Street (RR Crossing Improvement)	213
(1)	Diamond St.; Emerald St.; McGregor St.; Garnet Ln.	972
(2)	Douglas Avenue/Fulton Avenue Extensions	1191
(2)	Edward Street/Logan Street	362
(3)	Forest Hill/Waterloo Row/Beaverbrook Intersection	219
(4)	George Street (RR Crossing Improvement)	213
(1)	Kaine Street (Canada Street to Miller Street)	226
	McLeod Avenue (Regent to Civic 649)	110
(2)	McGregor Street Extension	300
(1)	Miller Street (Canada St. to Foster St.)	47
(1)	Princess Court	107
(2)	Ridgewell Place/Fleet Court	256
	Wilsey Road South (Selected Section)	<u>200</u>
<b>TOTAL</b>		<b>5 214</b>

1. Done under Capital Street Reconstruction. Included both binder and surface courses.
2. Paid for by developer through Local Improvement Agreements.  
Type "D" or "C" Asphalt was also placed on these streets.
3. Done under Traffic Management.
4. Done under Capital Special Projects.

#### **SURFACE COURSE – TYPE "C" AND TYPE "D"**

The following streets were paved with Class I Type "C" or Class II Type "D" asphalt concrete in 1998.

Location	Length (metres)
Alison Boulevard (Selected Sections)	162
Beaverbrook Street (Regent St. to University Ave.)	646
Brookside Drive (Hawkins St. to Oakland Ave.)	567
Canada Street (Young St. to Civic 129)	1 111
Canada Street (Marysville St. to Civic 589)	1 375
Cityview Avenue	137
Clements Drive (Grasse Circle to Spencer St.)	547
Dedham Street	201
Gibson Street (Civic 475 to Young St.)	288
Greenwood Drive (Marysville By-Pass Rd. to City Line)	460
Hickory Lane	95
Hilton Road (Selected Sections)	65
Kimble Drive (End of Curb to Fire Station)	165
McKeen Street (Union Street to Walking Trail)	110
McLeod Hill Road (Selected Sections)	216
Mitchell Street (Kings College Rd. to the Bulb)	253
Priestman Street (College Hill Rd. to Regent St.)	615
Prospect Street (Civic 439 to Smythe St.)	674
Smythe Street (Priestman St. to Prospect St.)	396
St. Mary's Street (Selected Sections)	<u>213</u>
<b>TOTAL</b>	<b>8 296</b>

**CONCRETE SIDEWALKS:**

New sidewalks were constructed or reconstructed at the following locations in 1998.

Location	Length (metres)
(3) Brunswick Street (Westmorland St. to Northumberland St.)	485
(4) Charlotte Street (near former RR Tracks)	427
(3) Diamond St.; Emerald St.; McGregor St.; Garnet Ln.	827
(2) Forest Hill Rd./Barbara Ct.	510
(5) Forest Hill Rd./Waterlow Row/Beaverbrook St. Intersection	300
(4) George Street (Near former RR Tracks)	261
(1) Gibson Street (East side MacLaren Northward)	217
(2) Goodine Street/Rhonda Lane/Leisure Avenue)	852
(2) Granada Avenue/Cowperthwaite Street	142
(6) Knowledge Park Drive	136
(7) MacLaren Avenue/Cliffe Street	503
(2) Manresa Drive	183
(1) McEvoy Street (near MacLaren Ave.)	148
(2) McGregor Street Extension	157
(3) Miller Street (Foster St. to Canada St.)	60
(8) Regent St./McLeod Ave. Intersection	226
(1) Town Plat (Sections of King, Church, George, Westmorland, Argyle, etc.)	639
(1) Union Street (Cliffe St. to Civic 550)	<u>198</u>
<b>TOTAL</b>	<b>6 271</b>

- 1) Capital Sidewalk Construction done under O & M Budget.
- 2) Paid for by developer through Local Improvement Agreement.
- 3) Done under Capital Street Reconstruction.
- 4) Done in conjunction with Railway Crossing Improvements.
- 5) Done under Capital Traffic Management.
- 6) Done in conjunction with construction of Knowledge Park Drive.
- 7) Done under Capital Special Projects.
- 8) Done under Designated Provincial Routes.

**NEW STREET CONSTRUCTION:**

The following new streets or portions of streets were constructed in 1998.

Location	Length (metres)
Amberwood Lane (Turning Circle)	10
Cliffe Street Extension	1020
Knowledge Park Drive	159
Miller Street Extension	47
<hr/>	
<b>TOTAL</b>	<b>1 236</b>
<b>1 236 metres = 1.236 kilometres</b>	

**PROVINCIAL DESIGNATED AND REGIONAL HIGHWAYS**

In 1998 the City of Fredericton had a total of 49.634 km of provincial designated and regional highways within its boundaries. In 1998, the Provincial Government paid \$312.13 (winter) and \$78.76 (summer) per lane kilometre towards maintenance of the routes. 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 1998.

(1)	Route 8 - Canada Street Selected Sections - Resurfacing	\$ 81 072
(2)	Route 101 (Regent Street) & Arnold Drive Upgrading of Signals & Traffic Island	\$ 51 818
	TOTAL	\$132 890

ITEM	BUDGET	EXPENDITURE	REMARKS
<b>UTILITY FUND</b>			
System Replacement & Oversizing-Water & Sanitary Sewer	\$500 000	\$354 766	
Automation of Meter Reading – Water	\$300 000	\$271 905	
Wilmot Park Well No. 8-Water	\$300 000	\$357 303	
Fredericton North High School – Water & Sanitary Sewer	\$450 000	\$310 250	
College Brook (Regent to York) – Sanitary Sewer	\$150 000	\$34 003	To be finalized in 1999
Utility Billing System – Water	\$500 000	\$350 842	
Marysville Trunk (Young to Bridge) – Water	\$700 000	\$537 635	
Brunswick St. Trunk (Westmorland to Northumberland) Water & Sanitary Sewer	\$300 000	\$224 341	
Douglas Area (Jasper & Ruby) – Water & Sanitary Sewer	\$400 000	\$459 803	
Vanier Highway (Liverpool to Kimble)- Water & Sanitary Sewer	\$600 000	\$427 962	
<b>GENERAL FUND</b>			
Bishop Drive/St. Roch Street- Storm Sewer	\$50 000	\$44 176	
System Replacement & Upgrading – Storm Sewer	\$200 000	\$81 060	
College Brook (York to Regent) – Storm Sewer	\$300 000	\$44 439	Infrastructure Program Installation carried over to 1999.
Douglas Area (Jasper/Ruby) – Storm Sewer	\$200 000	\$95 284	
Bishop Drive (Hanwell to Acorn) – Street Reconstruction	\$374 615	\$379 209	
Brunswick Street (Westmorland to Northumberland)-Street Reconstruction	\$200 000	\$209 758	
Diamond; McGregor; Emerald; Garnet – Street Reconstruction	\$550 000	\$456 236	
Brookside Drive (Oakland Ave. to Route 105)-Street Reconstruction	\$180 000	\$169 518	
Kaine Street (Canada St. to Miller St.) –Street Reconstruction	\$120 000	\$162 535	Includes Miller/Canada Interconnection
Princess Court – Street Reconstruction	\$80 000	\$55 967	
Doak Road/Hodgson Road Link – Street Reconstruction	\$50 000	\$299	To be carried over to 1999

ITEM	BUDGET	EXPENDITURE	REMARKS
<b>GENERAL FUND (Continued)</b>			
Fulton Avenue/Main Street (Land Acquisition)-Traffic Management	\$80 000	\$18 414	Balance to be carried over to 1999
Beaverbrook/Forest Hill/Waterloo – Traffic Management	\$300 000	\$304 627	
Main Street (Design) – Traffic Management	\$50 000	\$55 906	
Fredericton North High School (Storm Sewer & Roadway Granulars) – Special Projects	\$1 100 000	\$1 204 296	
G.I.S. System Improvement – Special Projects	\$80 000	\$51 024	
Capital Paving – (Major Streets) – Special Projects	\$500 000	\$503 271	
Railroad Crossing Improvements – Special Projects	\$100 000	\$217 027	George St. & Charlotte St.
North Side Town Square (Phase 1) – Special Projects	\$50 000	\$98 346	\$50 000 Recovery
Regent Street & Arnold Drive – Designated Routes	\$80 000	\$51 818	
Regent Street (McLeod-Beaverbrook)- Designated Routes	\$80 000	\$79 077	McLeod Component
Canada Street (Resurface) – Designated Routes	\$100 000	\$81 072	
<b>NEW SIDEWALKS (DONE UNDER O &amp; M BUDGET)</b>			
Union Street (Civic 550 to Cliffe St.)	\$20 000	\$17 589	Money transferred from Henry St.
Gibson Street (East side MacLaren Northward)	\$20 000	\$16 538	
McEvoy Street (Near MacLaren Avenue)	\$20 000	\$21 289	

NEW SIDEWALK CONTINUED	BUDGET	EXPENDITURE	REMARKS
<b><u>Town Plat</u></b>			
King Street (Church St. to Underpass)	)		
Queen Street (Church St. to King St.)	)		
Argyle Street (North side – Northumberland to Smythe)	)		
<b><u>Selected Sections of:</u></b>			
George Street (York St. to Sunbury St.)	)		
St. John Street (Brunswick St. to Charlotte St.)	) \$185 000	\$ 113 947	
Church Street (Brunswick St. to Charlotte St.)	)		
Charlotte Street (University Ave. to Regent St.)	)		
<b><u>Access ramps (drop curbs)</u></b>			
Westmorland Street and Northumberland Street at:	)		
George Street			
Charlotte Street			
Saunders Street			
Aberdeen Street			
Argyle Street			
Victoria Street			

**CITY OF FREDERICTON**  
**1998 WATER PUMPING RECORD**

**WATER SUPPLY**

The City of Fredericton has two separate municipal water supply systems servicing ninety-eight percent of the City. The majority of the City is supplied by the Wilmot Park wells fed by the Fredericton South Aquifer. Silverwood has its own source of supply.

The water supply for the City of Fredericton is removed from the aquifer that is located under the downtown region. There are presently eight supply wells; four in Wilmot Park and four located on Saint Anne's Point. These wells supply water to a population of approximately 43 000 people in greater Fredericton.

Each well, excluding Well #4, can pump 68 litres of water per second from the aquifer. Well #4 can pump 20 to 40 litres per second. The amount of water removed from the aquifer is controlled by the demand of the system. A computer system, operated at the Water Treatment Plant, controls which wells are being pumped and for how long. The system demand is approximately 23 million litres per day. The City of Fredericton also has twelve (12) active stand-by wells that can be put into service at any time to supplement the park wells in the event of an emergency. The stand-by wells are located on both sides of the Saint John River, and do not receive treatment, other than disinfection, before entering the distribution system.

Silverwood is the only portion of the city water system which is not supplied with water from the Wilmot Park well field. The Silverwood water system is supplied by two wells; one at the intersection of Mountain Drive and Fairview Drive, and another above Silverwood, off Mary Ellen Drive, outside the City limits. This water system supplies the Silverwood subdivision with a population of approximately 1000 people.

The water analysis and 1998 pumpage for all wells are compiled in the last section of this report.

**THE FREDERICTON WATER TREATMENT PLANT**

The Water Treatment Plant was put on line in July of 1984. It initially treated water from five Wilmot Park wells. A sixth well was fully developed and running in January 1991, a seventh well was in production in May 1993 and an eighth well was constructed during 1998.

The Water Treatment Plant filter room was doubled in size during 1992, with equipment to double capacity added over the next two years, bringing capacity to 50 ML/d. The plant removes iron and manganese, stabilizes sulfur compounds, decreases corrosiveness, and provides water with a free chlorine residual which meets federal and provincial drinking water guidelines.

## DISTRIBUTION ZONES

The distribution system comprises two water systems; one with sixteen (16) pressure zones, and a second with two pressure zones. Together they make up the following statistics:

Total kilometres of mains	-	333
Hydrants	-	
City owned	-	1 640
Private	-	<u>170</u>
Total	-	1 810
Water Services	-	13 875
Sprinkler Services	-	198
Total Storage, ML	-	58

Detailed system descriptions follow:

### City of Fredericton System

The City of Fredericton water distribution system is composed of sixteen (16) zones, with fourteen of these being major areas which are individually metered and pressure regulated by reservoirs or specialty pressure regulating valves. The other two zones are small areas attached to larger metered zones with pressure reducing valves in place to limit excessive pressures.

The sixteen zones consist of approximately 328 kilometres of water transmission and distribution mains. Kilometridge of mains:

120 km transmission (pipe >200mm in diameter)  
 208 km distribution (pipe  $\leq$  200mm in diameter)

The pressure in each zone is controlled by reservoirs, booster stations, pressure reducing valves or altitude valves. The objective is to maintain the zone pressures between 550 kPa (80 psi) and 275 kPa (40 psi). The water system has twenty water reservoir cells located on thirteen sites around the City. These reservoirs can store, approximately 56 million litres of water.

#### 1. South Low Zone

The South Low zone services the south side of the City between the river and Kings College Road and from Monteith Drive to the Fredericton Boat Club on the Lincoln Road. There is one emergency stand-by well in this zone called the Duval Well. It is located opposite Angelview Court on the Woodstock Road. Pressure control and storage for this zone is provided by a 18180 kilolitre in-ground three cell reservoir, adjacent to Smythe Street, just above Kings College Road. Thirteen other water zones are directly or indirectly supplied by this zone. The Wilmot Park well field and the Water Treatment Plant are located in this zone.

## 2. South Intermediate Zone

The South Intermediate zone serves an area generally bounded by Kings College Road, Montgomery Street, Odell Park and the eastern side of the University of New Brunswick. The water is received via the Smythe Street Booster Station which draws water from the South Low zone. Pressure control and storage are provided by two 4545 kilolitre above-ground reservoirs located in Odell Park opposite the end of Montgomery Street. A large flow diesel pump is housed at Smythe Booster Station for power failure situations.

## 3. South High Zone

The Montgomery Street Booster Station draws water from the South Intermediate zone to supply the area of the City above Montgomery Street. The South High zone stretches from Hanwell Road to Kimble Drive and extends to the City's Regent Street Depot, including the upper portion of the Forest Hill area. Pressure control and storage are provided by two 2270 kilolitre tower reservoirs, one at the top of Smythe Street and a second one at the intersection of Regent Street and Prospect Street. A large capacity diesel pump at Montgomery Booster is available for emergency pumping situations.

## 4. Lincoln Zone

The Lincoln zone receives its water supply from the South Low zone, through the Lincoln Booster Station situated across from the Fredericton Boat Club on Lincoln Road. The zone extends eastward, almost to the City boundary, and includes the Vanier Industrial Park and the Wilsey Road area. The storage for this zone is provided by the 3750 kilolitre above-ground stand pipe style reservoir on Flemming Road. A backup diesel pump is located at the Lincoln Booster in case of power failure.

## 5. Forest Hill Zone (Canterbury)

The Forest Hill zone is supplied from the South High zone through an altitude valve at the Canterbury Reservoir which is located on Canterbury Drive opposite Bradford Street. The valve maintains the water level within the two underground cells, with a total capacity of 1070 kilolitres. This zone serves lower Skyline Acres, Dunns Crossing Road and the area eastward, to and including Wetmore Road.

## 6. Rosewood Zone

The Rosewood Booster Station draws water from the South Low Zone for use by the upper elevations of the Rosewood and Monteith Subdivisions. As the Rosewood Zone has no reservoir, a jockey pump system has been installed to maintain normal domestic pressure with larger capacity electric and diesel pumps for fire and power outage situations.

## 7. North Low Zone

In November 1987, a 600mm water main crossing the St. John River was activated and the North Low Zone began receiving water from the South Low Zone. This zone serves all areas of Fredericton North below Maple Street and includes Greater Nashwaaksis, Douglas, Devon and Barkers Point. Pressure control and storage for this zone is provided by three reservoir sites. There is a 4550 kilolitre underground reservoir with two cells near the new Fredericton North High School, a 1140 kilolitre above-ground reservoir at Dewitt Acres and two above-ground reservoirs north of Longwood Drive near the Nashwaaksis Junior High School, with a storage capacity of 2850 kilolitres.

There are five stand-by wells available in this zone for emergency situations. They are Nasis #1 Well, located on Fulton Avenue, Nasis #3 Well, located on Maple Street near Douglas Avenue, Highland Well, located adjacent to the Highland Reservoir, Cliffe Street Well and the Barker's Point #2 Well located near Dewitt Acres. As well, a pressure reducing valve can be activated to provide water to the North Low Zone from the North High Zone on an emergency basis.

## 8. North High Zone

The Longwood Booster Station, adjacent to the Longwood Reservoirs, pumps water to this zone from the North Low Zone. Storage for the North High Zone is provided by a 3800 kilolitre reservoir on the south side of Killarney Lake. This zone serves St. Mary's Street, Brookside Drive and Nashwaaksis above Maple Street. Longwood Booster Station houses an emergency back-up diesel pump.

Two emergency stand-by wells are situated on the west side of St. Mary's Street, 2.8 kilometres north of Maple Street. These wells are referred to as K-1 and K-10.

## 9. Hanwell Zone

A section of Hanwell Road, the upper reaches of Colonial Heights and Cameron, Foley, Burnham and Eagle Courts are served by the Hanwell zone. Supply is via a combined altitude/pressure reducing valve which allows water from the South High zone to flow down into this zone. Pressure control is also provided by a 460 kilolitre above-ground reservoir connected to the zone above Cameron Court.

A well located on Cameron Court provides emergency supply, although in the Summer of 1998, this emergency well was removed from service because of possible petroleum contamination.

## 10. Marysville Zone

The Marysville Zone is supplied with water from the North Low Zone via the Young's Crossing Booster Station. Storage for this zone is provided by the 6600 kilolitre above-ground Tower Road Reservoir. A back-up diesel pump at the Youngs Crossing Booster Station can pump water during power failures.

Two wells on Tower Road and one on McGloin Street serve as emergency supply wells for this zone. Also, a check valve separates this zone from the North Low Zone, on Irvine Street, and can provide water to a limited portion of Marysville should the booster station be out of service.

## 11. Rainsford Zone

The Rainsford zone supplies the Rainsford Park Subdivision only and has no reservoir. Prior to 1983, this zone was supplied by a privately owned single well which has since been decommissioned. Construction in 1991 provided a tie between this zone and the Golf Club Road Zone. This connection provides domestic flow through a small booster station located on Duncan Lane near the Trans Canada Highway and lower pressure fire flows through a full pipe size check valve.

## 12. Vanier South Zone (Alison Boulevard)

The Vanier South zone is an unmetered water zone along Alison Boulevard and is PRV regulated to control pressures. The water for this zone is supplied through a pressure reducing valve from the South High zone.

## 13. Golf Club Road/Glengarry Zone

The Golf Club Road/Glengarry zone serves the general area of Golf Club Road and Glengarry Place. It serves the same elevations as the South Intermediate zone, but presently has no storage. The zone receives water from the South High zone through a pressure reducing valve assembly in a vault near the Prospect/Hanwell intersection. This assembly has been designed to provide metered domestic flow with the capacity for reasonable fire protection.

## 14. Diamond Zone

The Diamond zone supplies the Diamond Street Subdivision only, and has no reservoir. It is supplied water from the North Low Zone via the Diamond Street Booster Station. The booster station uses a jockey pump system for domestic supply, plus a diesel pump for fire protection and power failures. There is a PRV on the discharge side of the diesel pump to control pressure.

## 15. Silverwood System

The Silverwood System is comprised of one reservoir, two pressure zones and 5 kilometres of distribution mains. The 2200 kilolitre two cell underground reservoir is located on the corner of Mary Ellen Drive and Team Drive. Presently, for better turn-over of storage to assure fresher domestic water, only one cell is in use. Pressure reducing control valves, halfway down Orchard Drive and Fairview Drive, separate the system into two zones, allowing both to maintain a reasonable static pressure and adequate fire protection.

TABLES

The following pages provide the pumpage from Wilmot Park Wells, the Net System Demands, the Annual Chemical Dosages and Costs for the Water Treatment Plant.

1998 PUMPAGE - WILMOT PARK WELLS, ML

MONTH	WELL 1	WELL 2	WELL 3	WELL 4	WELL 5	WELL 6	WELL 7	MONTHLY TOTALS
January	66.8	181.1	67.4	29.0	115.2	145.3	127.2	732.1
February	76.5	146.2	121.0	21.4	120.9	108.9	72.7	667.6
March	87.5	83.5	107.6	27.6	105.9	170.2	124.9	707.2
April	159.3	139.7	69.3	12.5	97.3	98.0	129.2	705.2
May	153.0	86.2	67.0	0.0	131.2	145.1	129.0	711.4
June	145.5	113.2	0.0	8.5	128.7	163.1	132.1	691.0
July	146.1	138.3	3.8	10.2	127.8	155.0	152.2	733.3
August	133.5	102.1	113.3	4.5	118.2	167.0	113.5	752.1
September	155.2	147.7	70.8	0.4	61.5	165.8	115.2	716.5
October	131.4	147.4	76.9	9.3	129.8	142.7	120.9	758.3
November	147.2	153.7	115.3	13.0	24.0	116.0	142.4	711.6
December	157.4	116.1	20.5	0.0	117.9	165.5	130.8	708.2
<b>TOTALS</b>	<b>1559.4</b>	<b>1555.2</b>	<b>832.8</b>	<b>136.3</b>	<b>1278.2</b>	<b>1742.5</b>	<b>1490.1</b>	<b>8594.5</b>

**1998 NET SYSTEM DEMANDS, ML**

SYSTEM ZONE	QUARTERS, 1998					AVERAGE DAILY DEMAND (ML)
	1ST	2ND	3RD	4TH	TOTALS	
SOUTH LOW	778.2	756.9	254.1	788.7	3093.2	8.5
SOUTH INTERMEDIATE	140.3	125.4	261.3	239.4	673.7	1.8
SOUTH HIGH	258.0	256.2	254.1	168.6	908.7	2.5
CANTERBURY	80.7	83.3	88.1	82.6	334.7	0.9
LINCOLN	58.5	63.2	74.3	68.3	264.3	0.7
ROSEWOOD	10.2	11.0	11.6	10.8	43.7	0.1
GLEN GARRY	14.3	16.7	16.3	15.0	62.4	0.2
HANWELL	5.0	9.6	10.5	9.2	34.4	0.1
RAINSFORD	4.1	5.5	4.1	3.8	17.4	0.0
SILVERWOOD	14.3	15.7	18.2	15.2	63.5	0.2
NORTH LOW	514.0	530.1	554.1	523.1	2121.3	5.8
NORTH HIGH	90.6	96.0	122.5	109.3	418.3	1.1
MARYSVILLE	90.1	92.8	92.3	88.2	363.4	1.0
DIAMOND	1.1	1.2	1.9	1.6	5.8	0.0
<b>QUARTERLY TOTALS</b>	<b>2058.2</b>	<b>2062.6</b>	<b>2155.9</b>	<b>2123.8</b>	<b>8404.7</b>	<b>23.0</b>

**FREDERICTON WATER TREATMENT PLANT  
CHEMICAL DOSAGE AND COSTS, 1998**

CHEMICAL	UNIT COST \$/t	ANNUAL USAGE, t	ANNUAL COST \$	DOSAGE mg/L	COST / ML OF WATER	AVERAGE COST / DAY \$
CHLORINE	839.00	26.81	24 700	3.1	2.97	68
SULFUR DIOXIDE	2490.00	4.32	12 400	0.5	1.49	34
LIME	133.09	175.22	26 500	20.4	3.19	73
SODA ASH	325.75	25.58	9 600	3.0	1.15	26
<b>TOTALS</b>			<b>73 200</b>		<b>8.80</b>	<b>201</b>

**NOTES:**

- (1) DOSAGES ARE BASED ON PLANT INFLUENT: 8595 ML
- (2) ANNUAL COSTS ARE CALCULATED INCLUDING HST

## WATER QUALITY - 1998

### General

Fredericton's Water Treatment Plant was put into service in July 1984, and with the commissioning of the pipeline to Fredericton North in late 1987, the commissioning of the Longwood Booster Station in late 1990, Young's Crossing Booster Station in January 1998 and Diamond Street Booster in 1998, is now treating approximately 99% of the City supply. The plant removes iron and manganese and raises the pH to approximately 8 pH units, thus reducing the damage by corrosion to the water system, and controlling the leaching of harmful heavy metals from plumbing. The chlorine content of the treated water is 1.0-1.4 mg/L as it leaves the Water Treatment Plant measured as free chlorine. This water is odourless, colourless, and has an agreeable taste.

Breakpoint chlorination began in Silverwood, the only area not served by the Water Treatment Plant, during March of 1988.

Layers of biofilm, manganese, and corrosion byproducts left in parts of the distribution system by less treated water supplies tend to decrease the free chlorine residual until their own chlorine demand is satisfied. When the resultant chlorine residual is low, reaction byproducts with chemical or bleach like odours can be sensed by the public. As chlorine residuals have continued to rise throughout the systems served by the Water Treatment Plant, complaints concerning objectionable tastes and odours have continued to decrease. Also, the annual Watermain Flushing Program, tends to remove the layers of biofilm and sediment buildup in the pipes.

### Bacterial Analysis

Coliform bacteria counts 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 water is bacteriologically safe for human consumption, since coliform bacteria are harder than disease-causing bacteria.

Nine (9) locations related to supply and treatment, twenty-six (26) distribution system locations, and twelve (12) emergency supply wells are each sampled by water operators, once per month. All samples are tested for total coliform using the membrane filtration technique, by the water operators, and results are monitored by the New Brunswick Department of Health and Community Services.

The test results indicated that all water which was delivered in 1998, was biologically safe. Further, tests done in conjunction with sampling indicate that a stable free chlorine residual was maintained within the distribution system.

Of special note was the positive coliform results found in one of the Silverwood wells. As the Silverwood water system is chlorinated, coliform found in the well posed no threat to the customers. Increased monitoring of the system was required by Water Treatment Plant staff.

## **WATER QUALITY 1998**

### **Inorganic Analysis**

Most recent samples for inorganic analysis were taken from wells and the distribution system in June, 1998 and analysed by the N.B. Department of the Environment Central Laboratory. Results are displayed on the following pages. All water delivered to the distribution system meets the Guidelines for Canadian Drinking Water Quality, Health & Welfare Canada.

### **Organic Analysis**

The nine (9) active wells, 12 stand-by wells, Water Treatment Plant influent and effluent, and five (5) distribution system locations were sampled and analysed for fifteen (15) contaminants in June, 1998. The results are displayed in the following table.

NOTE: Organic and inorganic analysis for stand-by wells is completed every other year.