

**ANNUAL REPORT
OF THE
CITY ENGINEER**

1994

CITY OF FREDERICTON

PUBLIC WORKS DEPARTMENT

MANUFACTURED BY
THE VITRO CORP.

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**TO HIS WORSHIP THE MAYOR AND COUNCILLORS
OF THE CITY OF FREDERICTON**

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

This report covers the period from 1994 01 01 to 1994 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	20.433	km
Sidewalk	10.529	km
New Street Construction	1.070	km
* New Pavement - Type "B" Asphalt Concrete	9.128	km
Resurface - Type "D" Asphalt Concrete	9.553	km
Gravity Sanitary Sewer Mains	3.903	km
Sanitary Sewer Force main	0.042	km
Storm Sewer Mains	4.111	km
Water Mains	4.422	km

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

ALSO

- 158 Water services were installed
- 158 Sanitary sewer services were installed
- 2 Sprinkler lines were installed
- 10 Water services were renewed
- 1211 New water meters were installed
- 11 Existing water service installations were extended
- 11 Existing sanitary sewer service installations were extended
- 118 Frozen services were thawed
- 141 Storm sewer services were installed
- 10 Sanitary sewer services were renewed

Contractors under contract with the Engineering Department of the City of Fredericton in 1994 supplied materials, completed construction or began construction, as follows:

- Smith Construction Ltd.** - Trunk Sanitary Sewer and Water Main Construction - Royal Road (from Hawkins Street to Barton Crescent)
- Gorman Paving Inc.** - Supply of Asphalt Concrete for Patching
- Charmac Construction Company Limited** Water & Sewer Services - Douglas Area Phase 5
- Diamond Construction (1961) Limited** Supply and Delivery of Granular Material
- Charmac Construction Company Limited** Supply and Delivery of Bedding Sand
- Wendell Thomas & Sons Ltd.** - Supply and Delivery of Topsoil
- Fairville Construction Ltd.** - Burpee Street Trunk Sewer
- Brunswick Street Trunk Sewer and Water Main Upgrading Phase 6
- Bemrose & Kilburn Ltd.** - Smythe Street/Odell Park Storm Sewer Upgrading Phase 3
- Storm and Sanitary Sewer and Water Main Construction - Willis Street Area
- Lafarge Construction Materials
(A Division of Lafarge Canada Inc.)** - Supply and Delivery of Concrete
- Gorman Paving Inc.** - Supply and Placement of Asphalt Concrete
- Sandi-Co Ltd.** - Supply and Delivery of Winter Sand

Akzo Nobel Salt Ltd.	-	Supply and Delivery of Highway Salt
Ibis Products Ltd.	-	Supply of Traffic Lane Striping Paint
Trius Taxi Ltd.	-	Garbage Collection Services
Mira Construction Ltd.	-	Installation of Curb and Gutter and Sidewalk
Rainsford Contracting Ltd.	-	Contract Services
Warren H. Dunn Construction Ltd.	-	Reconstruction of Floral Avenue
Redem Construction Ltd.	-	Design, Supply, and Construction of Traffic Division Storage Building
Hogan Paving Ltd.	-	Supply of Asphalt Concrete for Patching

General Fund expenditures for the period 1994 01 01 to 1994 12 31 were as follows:

Item	Budget	Net Expenditure	Over	Under
COMMON SERVICES (Public Works)	\$ 4 076 295	\$ 4 171 158	\$ 94 863	\$ -
ROAD TRANSPORT SERVICES				
Administration	262 594	271 672	9 078	-
Roadway Surfaces	1 226 427	1 766 618	* 540 191	-
Sidewalk Maintenance	561 376	472 473	-	88 903
Culverts, Ditching	42 752	46 971	4 219	-
Storm Sewer Maintenance	165 047	202 672	37 625	-
Street Cleaning	455 799	479 788	23 989	-
Spring Cleanup	30 350	21 431	-	8 919
Sanding & Salting & Snow Control	1 493 501	1 525 086	31 585	-
Street Lights	621 422	618 175	-	3 247
Traffic Services	517 247	453 663	-	63 584
ENVIRONMENTAL HEALTH SERVICES				
Garbage & Waste Disposal	511 600	527 716	16 116	-
Garbage & Waste Collection	369 000	376 813	7 813	-
Recycling	185 000	174 760	-	10 240
Hazardous Waste	4 657	3 103	-	1 554
Old Burial Ground	15 335	5 950	-	9 385
Loyalist Burial Ground	403	485	82	-
PARKS & TREES SERVICES				
Wilmot Park	62 447	47 886	-	14 561
Odell Park	90 336	87 203	-	3 133
Carleton Park	11 053	11 974	921	-
Old Government House	15 954	10 612	-	5 342
Trees	386 407	384 618	-	1 789
Greens, Benches, other parks, etc.	186 900	188 469	1 569	-
TOTALS	\$ 11 291 900	\$ 11 849 296	\$ 768 051	\$ 210 654

OVER: \$ 557 397 *

* Includes an appropriation of 1994 Operating Surplus (\$ 478 514) which was allocated by Council motion for Capital expenditure in 1995.

Utility Fund expenditures for the period 1994 01 01 to 1994 12 31 were as follows:

Item	Budget	Net Expenditure	Over	Under
COMMON SERVICES				
General Equipment	\$ 580 300	\$ 660 481	\$ 80 181	\$ -
Safety & Benefits	352 700	442 475	89 775	-
Administration	136 900	133 810	-	3 090
WATER				
Purification & Treatment	403 600	360 878	-	42 722
Source of Supply	507 800	436 450	-	71 350
Power & Pumping	43 600	40 040	-	3 560
Maintenance of Equipment (Plant)	82 900	37 194	-	45 706
Transmission & Distribution (Oper)	333 500	244 874	-	88 626
Transmission & Distribution (Maint)	791 500	797 275	5 775	-
Billing & Collection	185 928	199 993	14 065	-
Meters	301 400	323 212	21 812	-
SANITARY SEWER				
Operation (Lift Stations)	158 600	102 499	-	56 101
Maintenance	479 200	539 601	60 401	-
Treatment & Disposal	2 534 320	2 133 896	-	400 424
TOTALS				
	\$ 6 892 248	\$ 6 452 678	\$ 272 009	\$ 711 579

UNDER: \$ 439 570

Following is a table giving total kilometrage (as of 94 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.

LOCATION	MUNICIPAL ROADS & STREETS				DESIGNATED & REGIONAL HIGHWAYS			T.C.H. BY-PASSES & RAMPS
	Asphalt	Gravel	Chip Seal	TOTAL	Asphalt	Chip Seal	TOTAL	
Fredericton South	104.997	-	4.055	109.052	19.850	-	19.850	30.201
Fredericton North	20.106	0.029	0.578	20.713	9.729	-	9.729	2.407
Nashwaaksis	55.847	1.054	2.047	58.948	2.455	-	2.455	8.194
Marysville	22.259	0.304	0.792	23.355	7.827	-	7.827	3.007
Barker's Point	8.267	-	0.418	8.685	2.037	-	2.037	4.428
Silverwood	4.428	-	0.184	4.612	-	-	-	2.748
Garden Creek	15.216	1.101	2.203	18.520	-	-	-	2.482
Douglas	2.039	0.191	2.191	4.421	2.560	-	2.560	-
Lincoln	5.256	1.314	0.879	7.449	4.649	2.123	6.772	2.458
Lower St. Marys	1.970	-	-	1.970	-	-	-	2.681
TOTALS	240.385	3.993	13.347	257.725	49.107	2.123	51.230	58.606

TOTAL (Municipal, Designated & Regional Highways) = 308.955 km

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,



E. J. Bliss, P. Eng.
CITY ENGINEER

GENERAL FUND

COMMON SERVICES

The total net expenditure under this heading was **\$ 4 171 158** made up as follows:

Administration	\$ 144 577
Engineering Services	495 167
General Equipment	2 073 362
Service Depots	424 570
Safety & Benefits	<u>1 033 482</u> \$ 4 171 158

ROAD TRANSPORT SERVICES

Road Transport Services is made up of the following items:

Administration	\$ 271 672
Roads & Streets	4 515 039
Street Lighting	618 175
Traffic Services	<u>453 663</u> \$ 5 858 549

(a) **Administration:** The total net expenditure under this heading amounted to **\$ 271 672** 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)	\$ 1 766 618
(2) Sidewalk Maintenance	472 473
(3) Culverts & Ditching	46 971
(4) Storm Sewer Maintenance	202 672
(5) Street Cleaning (includes Spring Cleanup) ..	501 219
(6) Winter Maintenance	<u>1 525 086</u> \$ 4 515 039

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 \$ 1 766 618 was made up as follows:

Paved Streets	\$ 1 377 524
Curb & Gutter Repair	161 650
Driveway Entrances	8 593
Right-of-way Maintenance	<u>218 851</u>

\$ 1 766 618

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

The following streets or portions of streets were resurfaced with Type "D" asphalt concrete in 1994.

Location	Length (metres)
Aberdeen Street - Regent Street to Carleton Street	195
Bird Avenue	286
Bridge Street - Coronation Street to Marysville By-Pass	465
Brookside Drive (selected sections)	280
Canada Street (near Civic #493)	150
Carleton Street - George Street to Aberdeen Street	366
Cedar Avenue - Maple Street to Fulton Avenue	430
Coventry Crescent	471
Crocket Street - Harrison Court to Collett Court	195
Curtis Street	243
Doak Road/Flanagan Road (selected sections)	207
Dobie Street - Carney Street to Medley Street	155
Elizabeth Street	116
* Elmcroft Place	149
Elmwood Drive	193
Essex Street	122
Hanwell Road (selected sections)	206
Harewood Crescent	258
Hilltop Drive	173
McKinley Avenue	154
Northumberland Street - Dundonald Street to Connaught Street	119
Pederson Crescent - York Street to Civic # 489	180
Philip Street	113

Location	Length (metres)
Prospect Street - Civic #35 to Civic # 281	768
Queen Street - Regent Street to St. John Street	220
River Street - (selected sections)	265
Rochester Street	270
School Street	280
Sherwood Court	154
St. Marys Street (selected sections)	201
Teak Drive	189
Union Street - Crerar Court to Cliffe Street	190
Winslow Street	311
Woodbridge Street	842
Woodfield Crescent	320
Woodstock Road - Hanwell Road to Golf Club Road	466
TOTAL	9702

9702 metres = 9.702 kilometres

* Type "B" asphalt was placed

(2) **Sidewalk Maintenance**

The net expenditure of \$ 472 473 for sidewalk repairs was made up as follows:

Personnel Costs	\$ 71 525
Materials	62 038
General Services (use of equipment & special projects & contract services)	<u>338 910</u> \$ 472 473

(3) **Culverts and Ditching**

- the maintenance and installation of culverts and ditches

The net expenditure of \$ 46 971 was made up as follows:

Personnel Costs	\$ 19 925
Materials	11 893
General Services (use of equipment & contract services)	<u>15 153</u> \$ 46 971

(4) **Storm Sewer Maintenance**

- the flushing of mains, cleaning and repair of catch basins and the repair of mains

The net expenditure of \$ 202 672 was made up as follows:

Personnel Costs	\$ 73 581
Materials	55 329
General Services (use of equipment & contract services)	<u>73 762</u> \$ 202 672

(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 1994.

The net expenditure under this heading amounted to **\$ 501 219 *** and was made up as follows:

Personnel Costs	\$ 300 016
General Services (use of equipment & contract services)	172 771
Goods (brooms, litter cans, dust control)	<u>28 432</u> \$ 501 219

* Includes an amount of \$ 21 431 for Spring Cleanup.

(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, 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 327.744 km of roads and streets in 1994 (156.205 km on the north side and 171.539 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 1994, 180.319 km of sidewalk were plowed and sanded. (68.04 km on the north side and 112.279 km on the south side)

Streets:

The total net cost for plowing streets amounted to **\$ 857 269** and was made up as follows:

Personnel Costs	\$ 497 432
General Services (use & maintenance of equipment)	336 505
Goods	372
Fixed Assets (new equipment)	<u>22 960</u> \$ 857 269

The total net cost of sanding and salting streets amounted to **\$ 445 166** and was made up as follows:

Personnel Costs	\$ 135 572
General Services (use & maintenance of equipment)	88 564
Materials (salt and sand)	208 503
Fixed Assets (new equipment)	<u>12 527</u> \$ 445 166

The overall net expenditure of **\$ 1 302 435** for plowing, sanding, and salting City roads and streets was made up as follows:

Personnel Costs	\$ 633 004
General Services (use & maintenance of equipment)	425 069
Fixed Assets (new equipment)	35 487
Materials (salt & sand)	208 503 (1)
Goods	<u>372</u> \$ 1 302 435

Sidewalks:

The total net expenditure for plowing sidewalks amounted to **\$ 166 862** and was made up as follows:

Personnel Costs	\$ 99 486
General Services (use & maintenance of equipment)	67 301
Goods	<u>75</u> \$ 166 862

The total net expenditure for sanding sidewalks amounted to \$ 55 789 and was made up as follows:

Personnel Costs	\$ 27 114
General Services (use & maintenance of equipment)	17 713
Materials (sand)	<u>10 962</u> \$ 55 789

The overall net expenditure for snow plowing and sanding of sidewalks was \$ 222 651 and was made up as follows:

Personnel Costs	\$ 126 600
General Services (use & maintenance of equipment)	85 014
Materials (sand)	10 962 (2)
Goods	<u>75</u> \$ 222 651

TOTAL NET COST OF WINTER MAINTENANCE - ADD (1) & (2) \$ 1 525 086

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

1990	Airport Weather Office	290.4 cm
1991	Airport Weather Office	290.4 cm
1992	Airport Weather Office	205.7 cm
1993	Airport Weather Office	205.1 cm
1994	Airport Weather Office	250.4 cm

(c) Street Lighting

The multiple lighting system for the City of Fredericton as of 1994 12 31 consisted of:

24	-	100 Watt H.P.S.	@	\$ 171.55	per light per year
67	-	150 Watt H.P.S.	@	228.73	per light per year
459	-	100 Watt H.P.S.	@	133.29	per light per year
1	-	180 Watt L.P.S.	@	258.59	per light per year
34	-	400 Watt H.P.S.	@	305.29	per light per year
10	-	125 Watt M.V.	@	142.94	per light per year
2	-	175 Watt M.V.	@	203.01	per light per year
203	-	175 Watt M.V.	@	171.55	per light per year
150	-	175 Watt Ref. M.V.	@	133.29	per light per year
12	-	250 Watt M.V.	@	255.18	per light per year
4	-	250 Watt M.V.	@	223.73	per light per year
752	-	250 Watt M.V.	@	185.46	per light per year
316	-	400 Watt Ref. M.V.	@	259.69	per light per year
1	-	500 Watt Ref. M.V.	@	224.53	per light per year
2	-	400 Watt Flood Lights	@	308.16	per light per year
932	-	150 Watt H.P.S.	@	190.47	per light per year
228	-	200 Watt H.P.S.	@	228.27	per light per year
4	-	116 Watt Flashing Lt.	@	57.10	per light per year
1	-	400 Watt H.P.S.	@	187.04	per light per year
11	-	150 Watt H.P.S.	@	75.00	per light per year

The total street lighting costs for 1994 were as follows:

Salaries & Benefits	\$ 6 083
Municipal Lighting System Contract	604 478
General Services - Maintenance of Equipment & Contract Services	6 939
Government Services (Power to City Owned Lights)	654
New Poles	(642)
New Bulbs	<u>663</u>
	\$ 618 175

(d) Traffic Services

The expenditure under this heading is made up as follows:

- (1) Street Signs
- (2) Paint Department
- (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 **\$ 109 308** made up as follows:

Personnel Costs	\$ 44 743
General Services (use of equipment & contract services)	14 558
Goods (posts, street sign purchases, etc.)	<u>50 007</u> \$ 109 308

(2) **Paint Department**

The net expenditure under this heading was **\$ 120 070** made up as follows:

Personnel Costs	\$ 62 149
General Services (use & maintenance of equipment & contract services)	14 147
Goods (paint & misc. supplies)	<u>43 774</u> \$ 120 070

(3) **Traffic Signals**

The net expenditure under this heading was **\$ 202 936** made up as follows:

Personnel Costs	\$ 60 011
General Services (use of equipment & contract services)	19 853
Government Services (electric power)	70 594
Goods (materials)	37 422
Fixed Assets (new equipment)	<u>15 056</u> \$ 202 936

(4) **Railway Crossings**

The net expenditure under this heading was **\$ 21 349** for maintenance done by railway companies.

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
- (5) Old Burial Ground
- (6) Loyalist Burial Ground

(1) **Garbage and Waste Collection**

In 1994, the net amount paid for the garbage and waste collection operation was **\$ 376 813** made up as follows:

General Services - (Garbage Collection Contract)	\$ 372 012
General Services - (Advertising)	<u>4 801</u>
	\$ 376 813

(2) **Garbage and Waste Disposal**

The net expenditure under this section was **\$ 527 716** made up as follows:

General Services (Solid Waste Commission payments)	\$ 496 190
General Services (land rental)	30 000
Government Services (taxes)	<u>1 526</u>
	\$ 527 716

(3) **Recycling**

The net expenditure under this section was **\$ 174 760** made up as follows:

General Services (Recycling boxes & advertising)	\$ 5 103
General Services (Recycling Collection Contract)	178 516
General Services (Recovery Account)	<u>(8 859)</u>
	\$ 174 760

(4) **Hazardous Waste**

Cleanup of oil spills from accidents, etc.

The net expenditure under this section was **\$ 3103** made up as follows:

Personnel Costs	\$ 2257
General Services (use of equipment & contract services)	471
Goods (materials)	<u>375</u> \$ 3 103

(5) **Old Burial Ground**

The net expenditure under this section was **\$ 5 950** made up as follows:

Personnel Costs	\$ 4998
General Services (use of equipment)	117
Government Services (lighting)	584
Goods (materials)	<u>251</u> \$ 5 950

(6) **Loyalist Burial Ground**

The net expenditure under this section was **\$ 485** made up as follows:

Personnel Costs	\$ 485
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PARKS AND TREES SERVICES

The following items are included under the above heading:

- (1) Wilmot Park
- (2) Odell Park
- (3) Carleton Park
- (4) Old Government House
- (5) Trees
- (6) Greens, Benches & Other Parks

(1) Wilmot Park

The net expenditure for this item was \$ 47 886 made up as follows:

Personnel Costs	\$ 34 524
General Services (use & maintenance of equipment, building repairs)	3 805
Government Services (water & sewer rates, light & power)	2 619
Goods (materials; fuels & lubricants)	<u>6 938</u> \$ 47 886

(2) Odell Park

The net expenditure for this item was \$ 87 203 made up as follows:

Personnel Costs	\$ 68 078
General Services (use & maintenance of equipment, communications; building repairs)	6 472
Government Services (water & sewer rates, lights & power)	1 621
Goods (materials; fuels & lubricants)	<u>11 032</u> \$ 87 203

(3) Carleton Park

The net expenditure for this item was \$ 11 974 made up as follows:

Personnel Costs	\$ 7 156
General Services (use of equipment & land rental)	3 674
Goods (materials)	<u>1 144</u> \$ 11 974

(4) **Old Government House**

The net expenditure for this item was \$ 10 612 made up as follows:

Personnel Costs	\$ 5 230
General Services (use of equipment)	839
Goods (materials & fuels & lubricants)	4 396
Government Services (light & power)	<u>147</u>
	\$ 10 612

(5) **Trees**

The net expenditure for this item was \$ 384 618 made up as follows:

Personnel Costs	\$ 293 828
General Services (use & maintenance of equipment & contract services)	44 574
Goods (fuels & lubricants, materials, new trees, small tools & equipment)	42 030
Fixed Assets (Computer hardware & program)	<u>4 186</u>
	\$ 384 618

TREE REMOVAL

In 1994, 225 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 1994:

Species	Number Removed
White Elm	74
Maple	73
Linden / Basswood	17
Ash	3
Oak	2
Poplar	39
Birch	2
Larch	1
Ironwood	1
Siberian Elm	1
White Pine	3
Spruce	4
Cherry	4
Willow	<u>1</u>
TOTAL	225

In 1994, 39 trees were removed because of Dutch Elm Disease.

Following is a summary of Elm trees removed from 1964 to 1994.

Year	No. Lost (% Lost) To Dutch Elm Disease	No. Removed For Other Reasons	Total No. Removed
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
1987	49 (53.8)	42	91
1988	43 (54.4)	36	79
1989	47 (48.0)	51	98
1990	55 (79.7)	14	69
1991	42 (89.4)	5	47
1992	52 (76.5)	16	68
1993	18 (51.4)	17	35
1994	39 (52.7)	35	74
TOTALS	5851	2873	8724

TREE PLANTING

There were 926 trees planted (793 new plantings and 133 replacements) along City Streets and in parks in 1994. Street trees were planted in new subdivisions as well as on newly curbed streets.

Over 320 shrubs were planted in City parks and City-owned properties in various beautification projects.

In addition, over 2000 seedlings received from the New Brunswick Department of Natural Resources and Energy were planted along the Valley Trail.

(6) Greens, Benches & Other Parks

The net expenditure for this item was **\$ 188 469** made up as follows:

Personnel Costs	\$ 131 178
General Services (use & maintenance of equipment and special projects)	21 551
Goods (fuels & lubricants materials, small tools & equipment)	19 767
Fixed Assets (new equipment)	<u>15 973</u>
	\$ 188 469

UTILITY FUND

The above item is made up of the following headings:

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

(1) **COMMON SERVICES**

In 1994 the net expenditure for this item was \$ 1 236 766 made up as follows:

General Equipment	\$ 660 481
Safety & Benefits	442 475
Administration	<u>133 810</u>
	\$ 1 236 766

(2) **SANITARY SEWER**

In 1994 the net expenditure for this item was \$ 3 142 643 made up as follows:

Operating: Lift Stations

Personnel Costs	\$ 44 043
General Services (use & maintenance of equipment)	39 590
Government Services (light & power)	18 182
Goods (materials)	<u>684</u>
	\$ 102 499

Maintenance:

Personnel Costs	\$ 335 864
General Services (use & maintenance of equipment & contract services)	113 934
Goods (repair parts & tools)	<u>89 803</u>
	\$ 539 601

Sewage Treatment & Disposal:

Personnel Costs	\$ 16 800
General Services -use & maintenance of equipment	10 160
- treatment (F.A.P.C.C.)	2 392 045 *
Government Services: Water & Sewer Rates	832
Lights & Power	26 017
Goods (Miscellaneous Supplies)	<u>670</u> \$ 2 446 524

Debt Charges:

Principal	\$ 48 088
Interest	<u>5 931</u> \$ <u>54 019</u>
TOTAL	\$ 3 142 643

* Includes \$ 1 000 000 for purposes of major capital improvements.

The Fredericton sanitary sewer system consists of approximately 284 kilometres of mains made up as follows:

SIZE	SILVERWOOD GARDEN CREEK	NASHWAAKSIS DOUGLAS	MARYSVILLE	LR. ST. MARY'S BARKER'S PT.	FREDERICTON	TOTAL
100 mm	-	0.158	-	-	-	0.158
100 mm F.M.	0.013	-	-	-	1.103	1.116
150 mm	-	1.433	0.314	-	0.253	2.000
150 mm F.M.	0.031	0.417	0.539	0.712	3.008	4.707
200 mm	16.045	40.432	18.417	10.864	118.552	204.310
200 mm F.M.	0.254	0.463	0.314	-	0.064	1.095
250 mm	1.959	4.656	0.955	0.298	9.430	17.298
250 mm F.M.	1.178	-	-	-	-	1.178
300 mm	1.267	4.063	1.006	1.868	17.858	26.062
300 mm F.M.	0.420	0.489	-	-	0.739	1.648
350 mm	0.287	0.765	-	-	0.713	1.765
350 mm F.M.	-	-	0.528	-	0.254	0.782
400 mm	1.138	2.851	0.500	0.174	2.398	7.061
450 mm	0.018	0.122	-	-	0.210	0.350
450 mm	1.039	0.031	1.350	-	2.879	5.299
500 mm	2.979	-	-	-	-	2.979
525 mm	-	0.529	-	-	-	0.529
600 mm	0.156	0.964	-	-	2.903	4.023
750 mm	-	-	-	-	0.322	0.322
900 mm	-	-	-	-	1.432	1.432
TOTALS	26.784	57.373	23.923	13.916	162.118	284.114

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**

There are, at year's end, 14 separately monitored water systems, comprising 21 wells (11 active), 19 reservoir tanks or cells on 12 reservoir sites, 6 active booster stations and the Water Treatment Plant.

The Water Treatment Plant treats the water from the 7 Wilmot Park wells, which provide 94% of the City's water. The following describes the 14 water systems and their normal sources.

SYSTEM	SOURCE	STORAGE
South Low	7 wells via W.T.P. 1 emergency standby well	18200 kL
North Low	South Low via River Crossing (same pressures) 5 emergency wells	8540 kL
South Intermediate	South Low via Booster	9090 kL
South High	South Interm. via Booster	4550 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
Vanier South Intermediate	South High via Pressure Reducing Valve	0 kL
Hanwell	South High via Pressure Reducing Valve 1 Emergency Well	460 kL
Silverwood	2 Wells Direct	2550 kL
Rainsford	Golf Club Road via Booster 1 Emergency Well	0 kL
Killarney	South Low via Booster 2 Emergency Wells	3750 kL
Marysville	2 Wells Direct 1 Emergency Well	6580 kL
Canterbury	South High via Altitude Valve	1070 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)	\$ 199 993
(2)	Water Ordinary (including meters)	1 365 361
(3)	Water Treatment Plant	874 562
(4)	Debt Charges - Principal	152 270
(5)	Debt Charges - Interest	<u>7 681</u>
		\$ 2 599 867

(1) WATER ADMINISTRATION (BILLING & COLLECTION)

The net expenditure of **\$ 199 993** was made up as follows:

Personnel Costs	\$ 126 261
General Services (Postage, Professional Services, Rental of Equipment, Computer External Services)	54 342
Goods (Computer & Office Supplies)	11 300
Fixed Assets (Computer & New Equipment)	<u>8 090</u>
	\$ 199 993

(2) WATER ORDINARY (INCLUDING METERS)

The net expenditure of **\$ 1 365 361** was made up as follows:

Transmission & Distribution (Operation)

Personnel Costs	\$ 42 798
General Services (use & maintenance of equipment) ..	80 483
Government Services (light & power, provincial taxes)	110 027
Goods (materials)	<u>11 566</u>
	\$ 244 874

Transmission & Distribution (Maintenance)

Personnel Costs	\$ 429 664
General Services (use & maintenance of equipment & hydrants & contract services) 126 381	
Goods (fuels & lubricants, tools, materials, parts)	<u>241 230</u>
	\$ 797 275

Meters

Personnel Costs	\$ 153 010
Meter Parts, miscellaneous supplies, & tools	7 669
Use of Equipment	43 069
Fixed Assets (new meters)	<u>119 464</u>
	\$ 323 212
TOTAL	\$ 1 365 361

On 1994 12 31 there were 12 902 water services on meter and 202 on flat rate, making a total of **13 104**.

180 new meters (new construction and former flat rate) were installed in 1994 and 41 regular register meters changed to remote reading type.

In 1994, 18 discontinued services were excavated and shut off at the main, 196 stopped meters were replaced and 23 frozen meters were replaced. There were also 812 meters replaced due to their age.

At the end of 1994 there were 400 units on the Automated Meter Reading (AMR) System.

Sprinklers were installed in 1994 at the following locations:

- (a) 881 Charlotte Street (UNB/Maggie Jean Chestnut Residence)
- (b) 165 Urquhart Crescent (Atlantic Tractors & Equipment Ltd.)

There are in the City, as of 1994 12 31, 1693 hydrants situated in the following areas:

Fredericton South	776
Fredericton North	166
Nashwaaksis / Douglas	335
Marysville	152
Barker's Point / Lower St. Marys	85
Silverwood / Garden Creek	<u>27</u>
 SUB TOTAL	1541
 LOCATED ON PRIVATE PROPERTY	<u>152</u>
 TOTAL	1693

Hydrants were installed at the following locations in 1994:

Location	Number
Clements Drive	4
Edward Street	2
Jeremy Street	2
Manresa Drive	3
McKnight Street	2
Miro Court	1
Riverside Drive	1
Royal Road	3
Shamrock Terrace	<u>1</u>
 TOTAL	19

The Fredericton distribution system consists of approximately 312 kilometres of water main, made up as follows:

SIZE	MARYSVILLE	NASHWAAKSIS DOUGLAS	LR. ST. MARY'S BARKER'S POINT	SILVERWOOD GARDEN CREEK	FREDERICTON	TOTAL
32 mm	-	0.153	-	-	-	0.153
38 mm	-	0.072	-	-	0.234	0.306
50 mm	-	-	-	0.154	-	0.154
75 mm	-	-	-	-	0.290	0.290
100 mm	0.753	2.232	-	2.508	10.827	16.320
150 mm	12.578	21.142	4.053	4.835	57.591	100.199
200 mm	7.019	24.874	2.266	7.812	44.390	86.361
250 mm	3.071	8.143	5.169	0.966	24.210	41.559
300 mm	1.113	5.899	1.070	7.776	29.572	45.430
350 mm	-	0.840	-	-	5.441	6.281
400 mm	-	2.241	-	-	7.127	9.368
450 mm	-	-	-	-	1.965	1.965
500 mm	-	-	-	-	2.589	2.589
600 mm	-	-	-	-	0.427	0.427
Unknown	0.146	-	-	-	-	0.146
TOTALS	24.680	65.596	12.558	24.051	184.663	311.548

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 \$ 874 562 was made up as follows:

Source of Supply

Personnel Costs	\$ 115 444
Use of Equipment	16 237
Maintenance - Wells	69 819
Communications	3 220
Power - Wells	228 266
Materials - Wells	<u>3 464</u> \$ 436 450

Power & Pumping (Plant)

Personnel Costs	\$ 33 560
Communications	504
Light & Power	3 471
Supplies	<u>2 505</u> \$ 40 040

Water Treatment Plant

Personnel Costs	\$ 98 207
Insurance	11 293
Maintenance	155 927
Power	9 886
Taxes	36 307
Materials	17 303
Goods (Chlorine, Soda Ash, Lime, etc.)	<u>69 149</u> \$ 398 072

TOTAL **\$ 874 562**

The total amount of water pumped into the City's distribution systems from 1994 01 01 to 1994 12 31 for the entire City was 8340 megalitres. The amount of water produced by the Water Treatment Plant in 1994 was 7800 megalitres or 94% of the total City demand. The average daily demand for the City is 23 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
1985	7880	\$ 646 991	\$ 82
1986	7781	732 141	94
1987	8177	712 102	87
1988	8740	743 604	85
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

The total net expenditure for transmission and distribution of water for the City from 1994 01 01 to 1994 12 31 was determined from the following:

Transmission & Distribution:

Operation	\$	244 874
Maintenance	<u>797 275</u>	\$ 1 042 149

Therefore, the net expenditure for transmission and distribution of one megalitre of water from 1994 01 01 to 1994 12 31 was:

$$\frac{\$ 1\,042\,149}{8340} = \$ 125$$

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 MEGLITRE
1985	\$ 99
1986	88
1987	89
1988	93
1989	126
1990	106
1991	117
1992	121
1993	147
1994	125

The total net expenditure for administration costs and debt charges for the City from 1994 01 01 to 1994 12 31 was determined from the following:

Water Administration

(1) Billing & Collection	\$ 199 993
(2) Meters (Installation, Reading, Repairs)	323 212
<u>Debt Charges (Principal & Interest)</u>	<u>159 951</u>

\$ 683 156

Administration costs per megalitre of water produced:

$$\frac{\$ 523\,205}{8340} = \$ 62.73$$

Debt charges per megalitre of water produced:

$$\frac{\$ 159\,951}{8340} = \$ 19.18$$

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
1985	\$ 43	\$ 94
1986	43	75
1987	37	52
1988	39	46
1989	44	46
1990	44	43
1991	45	43
1992	46	38
1993	62	24
1994	63	19

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

TOTAL COSTS PER MEGLITRE

YEAR	PRODUCTION COSTS	TRANSMISSION & DISTRIBUTION COSTS	ADMINISTRATION	DEBT CHARGES	*TOTAL
1985	\$ 82	\$ 99	\$ 43	\$ 94	\$ 318
1986	94	88	43	75	300
1987	87	89	37	52	265
1988	85	93	39	46	263
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

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

S U M M A R Y

WATER AND SEWER REVENUE & EXPENDITURES

1994

ITEM	NET EXPENDITURE	REVENUE
COMMON SERVICES (WATER & SEWER)		
General Equipment	\$ 660 481	\$ 480 339
Safety & Benefits	442 475	
Administration	133 810	
WATER		
Water Administration (Billing & Collection)	199 993	
Water Ordinary (Including Meters)	1 365 361	4 791 431
Water Treatment Facility & Well Production Costs	874 562	
Debt Charges - Principal & Interest	159 951	
SANITARY SEWER		
Operating & Maintenance	642 100	
Sewage Treatment & Disposal	* 2 446 524	3 586 111
Debt Charges	54 019	
TOTALS	\$ 6 979 276	\$ 8 857 881

1994 SURPLUS:	\$ 1 878 605
SURPLUS @ BEGINNING OF 1994:	1 003 879
OVERALL SURPLUS:	<u>\$ 2 882 484</u>

* Includes \$ 1 000 000 for purposes of major capital improvements at the Fredericton Area Pollution Control facility.

NOTE: \$ 1 916 307 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 1994:

WATER:

In 1994, water mains were installed on Willis Street near Saxon Electric; on Brunswick Street from Regent Street to St. John Street; in the Douglas Area on Clements Drive and the relocated section of Diamond Street; on Royal Road between Hawkins Street and Barton Crescent; and on a portion of Shamrock Terrace.

Streets such as King Street between Regent Street and St. John Street; Regent Street between King Street and Brunswick Street; St. John Street between Queen Street and Brunswick Street; and Northumberland Street between Queen Street and King Street had their water mains upgraded or installed under the System Replacement and oversizing account.

New mains were also installed by developers in the Northwood Subdivision (Manresa Drive, Miro Court); Chippins Lincoln Heights Subdivision (Edward Street, Gerrard Court, Trainor Court); Shadowood Estates Subdivision Phase 3 (McKnight Street, Ashley Crescent); and Brookside Homes Ltd. Subdivision (Jeremy Street, Terrance Street).

Following are lengths and sizes of water mains installed in 1994:

LOCATION	LENGTH OF MAINS - metres					
	100 mm D.I.	150 mm D.I.	200 mm D.I. & P.V.C.	250 mm D.I.	300 mm D.I.	350 mm D.I.
* King St. - Regent St. to St. John St.				210		
* Regent St. - King St. to Brunswick St.				86		
* St. John St.-Queen St. to Brunswick St.				209		
* Northumberland St. - Queen St. to King St.				145		
Willis St. - Royal Rd.					72	
Brunswick St.-Regent St. to St. John St.	32			35		
Douglas Area (Clements Dr.;Diamond St.)	24			618		
Royal Rd.- Hawkins St. to Barton Cres.	17	8			620	
Shamrock Terrace	25	70				
** Northwood Subdivision (Manresa, Miro)	25		287		392	
** Lincoln Heights Subdivision (Edward, Gerrard, Trainor)	194	18			6	251
** Shadowood Estates Subdivision Phase 3 (Ashley, McKnight)		7	167	381		
** Brookside Homes Ltd. Subdivision (Jeremy, Terrance)		8	306			
TOTALS	219	201	768	1066	1016	871
					72	209

OVERALL TOTAL - 4422 metres = 4.422 kilometres

* Done under system replacement and oversizing.

** Paid for by the developer through Local Improvement Agreement.

SANITARY SEWER:

In 1994, sanitary sewer mains were installed on Willis Street near Saxon Electric; on Brunswick Street from Regent Street to St. John Street; in the Douglas Area on Clements Drive and the relocated section of Diamond Street; on Royal Road between Hawkins Street and Barton Crescent; and a new Burpee Trunk component between the existing lift station and Floral Avenue.

New mains were also installed by developers in the Northwood Subdivision (Manresa Drive, Miro Court); Chippins Lincoln Heights Subdivision (Edward Street, Gerrard Court, Trainor Court); Shadowood Estates Subdivision Phase 3 (McKnight Street, Ashley Crescent); and Brookside Homes Ltd. Subdivision (Jeremy Street, Terrance Street).

1994 ANNUAL REPORT OF THE CITY ENGINEER

Following are lengths and sizes of sanitary sewer mains installed in 1994:

LOCATION	LENGTH OF MAINS - metres					
	200 mm P.V.C.	250 mm P.V.C. & D.I.	300 mm P.V.C.	375 mm P.V.C. & D.I.	450 mm D.I.	600 mm P.V.C. & Conc.
						300 mm D.I.F.M.
Willis St.- Royal Rd.						
Brunswick St. - Regent St. to St. John Street	35	8			2	215
Douglas Area (Clements Dr.; Diamond St.)				379		
Royal Rd. - Hawkins St. to Barton Cres.						42
Burpee Trunk - Lift Stn. to Floral Ave.			110			529
Northwood Subdivision (Manresa, Miro)	185	394				
Lincoln Heights Subdivision (Edward, Gerrard, Trainor)	428					
Shadowood Estates Subdivision Phase 3 (McKnight, Ashley)	44	455				
Brookside Homes Ltd. Subdivision (Jeremy, Terrance)	277					
TOTALS	969	999	110	379	2	915
						42

OVERALL TOTAL - 3945 metres = 3.945 Kilometres

STORM SEWER:

In 1994, storm sewer mains were installed on Brunswick Street from Regent Street to St. John Street; in the Douglas Area on Clements drive and the relocated section of Diamond Street; Canada Street from Bridge Street to civic number 303; Smythe Street between Shamrock Terrace and Heather Terrace; and a portion of Heather Terrace.

Streets such as King Street between Regent Street and Camperdown Lane and York Street between Needham Street and Argyle Street had their storm sewer mains upgraded or installed under the System Replacement and Upgrading account.

New mains were also installed by developers in the Northwood Subdivision (Manresa Drive, Miro Court); Chippins Lincoln Heights Subdivision (Edward Street, Gerrard Court, Trainor Court); Shadowood Estates Subdivision Phase 3 (McKnight Street, Ashley Crescent); and Brookside Homes Ltd. Subdivision (Jeremy Street, Terrance Street).

A portion of new main was also installed on Doak Road in the area adjacent to Maple Leaf Homes Inc. This was cost shared with Maple Leaf Homes Inc.

1994 ANNUAL REPORT OF THE CITY ENGINEER

Following are lengths and sizes of storm sewer mains installed in 1994:

LOCATION	LENGTH OF MAINS - metres					
	250 mm	300 mm	375 mm	450 mm	600 mm	750 mm
Brunswick St. - Regent St. to St. John St.	6		18	11		
Douglas Area (Clements Dr.; Diamond St.)	39	66		33	106	355
Canada St. (Bridge St. to Civic # 303)		144	116			
Smythe St. (Shamrock Terr. to Heather Terr.)	17			26	14	235
Heather Terrace	11	82				
* King St. - Regent St. to Camperdown Lane	70					
* York St. - Needham St. to Argyle St.	72		204			
Doak Rd. (near Maple Leaf Homes)				5	5	121
** Northwood Subdivision (Manresa, Miro)	80	244				
** Lincoln Heights Subdivision (Edward, Gerard, Trainor)	34	428	237	143		
** Shadowood Estates Subdivision Phase 3 (McKnight, Ashley)	91	80		92	94	43
** Brookside Homes Ltd. Subdivision (Jeremy, Terrence)	52		42	174	43	20
*** Willis St. - Royal Rd.			10			
TOTALS	472	1054	617	484	262	754
						458
						10

OVERALL TOTAL - 4111 metres = 4.111 kilometres

- * Done under System Replacement and Upgrading.
- ** Paid for by developer through Local Improvement Agreement.
- *** Done under Capital Street Reconstruction.

CURB AND GUTTER

Concrete curb and gutter was constructed at the following locations in 1994:
 (Notes indicate budget item under which work was done)

	Location	Length (metres)
(1)	Allen Street - Downing Street to Morrison Street	339
(3)	Brookside Drive / Main Street Intersection	230
(1)	Brunswick Street - St. John Street to Regent Street	450
(6)	Canada Street - north of Bridge Street to Civic #315 ..	399
(2)	Carolin Ventures Subdivision (Murray, Sparrow, Stafford) Chartwell Court	771 450
(4)	Crocket Street - Long Court to Pickard Street	283
(1)	Dewitt Acres	869
(1)	Diamond Street - Realignment Area	374
(2)	D & R Cowperthwaite Subdivision (Mason, Granada, Cowperthwaite)	705
(1)	Floral Avenue (Insulated Area)	227
(4)	Forest Hill Road (by Cemetery)	323
(1)	Lower St. Marys (Alderwood, Hazelwood, Quinn, Ramey, Ross Terrace, Watson)	2986
(5)	Mainstreet Program (King, Queen, St. John, Regent) ..	580
	Manresa Drive - Sunset Drive to Willis Street	323
(1)	McGloin Street - existing to Fisher Avenue plus Fisher intersection	396
(1)	Palmer Street	680
(1)	Prospect Street - Hanwell Road to Civic #426	1154
(3)	Regent Street / Beaverbrook Intersection	464
	Reynolds Street / McKnight Street	1641
	Riverview Subdivision Phase 2 (Aspendale, Barrett, Carter, Jason, Kimble, Stoneybrook, Trites, Wetmore)	3193
(2)	Riverview Subdivision Phase 3 (Forest Hill Road, Barbara Court)	1065
(4)	Union Street Area (Bowlen, St. Marys, Union)	282
(4)	Union Street - Miles Street to Underpass	343
(1)	Willis Street - near Stone Bridge	278
(1)	York Street - Saunders to Argyle	665
(1)	Young Street	<u>963</u>
TOTAL		20 433

- (1) Done under Capital Street Reconstruction.
- (2) Paid for by developer through Local Improvement Agreement.
- (3) Done under Capital Traffic Management.
- (4) Done in conjunction with sidewalk construction.
- (5) Reconstruction of existing under Capital Mainstreet Program.
- (6) Done under Capital Designated Routes.

PAVING:

In 1994, Gorman Paving Inc. 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 - Type "B" at \$ 35.25 plus G.S.T. per tonne in place
- 2) Surface Course - Type "D" at \$ 37.50 plus G.S.T. per tonne in place

(1) **BINDER COURSE - TYPE "B"**

The following streets were paved with Type "B" asphalt concrete in 1994:

	LOCATION	Length (metres)
(1)	Alderwood Drive - end of existing to Hazelwood Drive	344
(1)	Allen Street - Downing Street to Morrison Street	205
	Aspendale Lane	167
(2)	Barbara Court	206
	Barrett Court	71
(1)	Brunswick Street - St. John Street to Regent Street	249
	Carter Court	68
	Chartwell Court	225
(2)	Cowperthwaite Street - existing to the end	65
(1)	Dewitt Acres	420
(1)	Diamond Street - realignment area	140
(1)	Floral Avenue - insulated area	100
(2)	Forest Hill Road - Kimble Drive to the end	372
(2)	Granada Avenue	157
(1)	Hazelwood Drive	136
	Jason Court	59
	Kimble Drive	601
	Manresa Drive - Sunset Drive to Willis Street	207
(2)	Mason Avenue - existing to Granada Avenue	120
(1)	McGloin Street - existing to Fisher Avenue plus Fisher Intersection	200
	McKnight Street	367
(2)	Murray Avenue - existing to the end	126
(1)	Palmer Street	345
(1)	Prospect Street - Hanwell Road to Civic #426	577
(1)	Quinn Court	126
(1)	Ramey Street	99
	Reynolds Street	471
(1)	Ross Terrace	744
(2)	Sparrow Lane	192
(2)	Stafford Drive - MacPherson Street to Sparrow Lane	97
	Stoneybrook Crescent	343
	Trites Court	37
(1)	Watson Drive	143
	Wetmore Road	276
(1)	Willis Street (Grey Signs)	147
(1)	York Street - Saunders to Argyle	302
(1)	Young Street	475
	TOTAL	8979

(1) Done under Capital Street Reconstruction.

(2) Paid for by developer through Local Improvement Agreement. Type "D" asphalt was also placed on these streets.

CONCRETE SIDEWALKS:

New sidewalks were constructed at the following locations in 1994:

LOCATION	Length (metres)
(3) Allen Street - Downing Street to Morrison Street	156
Bridge Street / Canada Street Intersection	91
(3) Brunswick Street - St. John Street to Regent Street	142
(4) Crocket Street - Long Court to Pickard Street	379
(3) Dewitt Acres	588
(3) Diamond Street - Realignment Area	108
(4) Edinburgh Street (Selected Sections)	261
(4) Forest Hill Road (by Cemetery)	329
(2) James Street	237
(4) Kimble Court	156
(2) Kimble Drive (Riverview Phase 3)	322
(3) Lower St. Marys (Alderwood, Hazelwood, Ross Terrace, Watson)	1310
(1) Mainstreet Program (St. John, King, Regent, Queen)	561
(2) Mason Avenue - Existing to Granada Avenue	72
(3) McGloin Street - existing to Fisher Avenue plus Fisher Intersection	135
(3) Palmer Street	323
(4) Parkhurst Drive (Selected Sections)	136
(4) Priestman Street - Abbott Court to York Street	241
(3) Prospect Street - Hanwell Road to Civic #426	542
(4) Prospect Street (near Wacky Wheatleys)	83
(5) Regent/Beaverbrook Intersection	241
(2) Reynolds Street / McKnight Street	780
(2) Riverview Subdivision Phase 2 (Aspendale, Kimble, Stoneybrook, Wetmore)	1369
(2) Stafford Drive - MacPherson Street to Sparrow Lane	83
(4) Union Street Area (Bowlen, St. Mary's, Union)	483
(4) Union Street - Miles Street to Underpass	339
(3) York Street - Saunders Street to Argyle Street	500
(3) Young Street	<u>562</u>
TOTAL	10 529

- (1) Reconstruction of existing sidewalk under Capital Mainstreet Program.
- (2) Paid for by developer through Local Improvement Agreement.
- (3) Done under Capital Street Reconstruction.
- (4) Capital Sidewalk Construction done under O & M Budget.
- (5) Done under Capital Traffic Management.

PASSIVE PARKS

In 1994, the Gibson Trail and the section of the Valley Trail from Rookwood Avenue to Angelview Park was completed. Work was also done on a section of the Valley Trail from Angelview Park to the Bucket Club; on a portion of the North Riverfront Drive path; and on the Botanical Garden facilities.

STREET RECONSTRUCTION

Floor (INSULATED)

In 1994, a number of streets were upgraded with curb and gutter and paving and in some instances sidewalk. These streets included Brunswick Street between St. John Street and Regent Street; Alderwood Drive; Hazelwood Drive, Ross Terrace; Watson Drive; Ramey Street; Quinn Court; Dewitt Acres; Palmer Street; Willis Street (near Stone Bridge), a portion of Diamond Street near Clements Drive; Prospect Street from Hanwell Road to Odell Park ball diamonds; Allen Street from Downing Street to Morrison Street; York Street from Saunders Street to Argyle Street; McGloin Street near Fisher Avenue; and Young Street.

WORKS FACILITIES

In 1994, additional washroom facilities were added to the St. Marys Street and Regent Street Depots and a Traffic Division Storage Building was constructed at the Regent Street Depot.

TRAFFIC MANAGEMENT

In 1994, the northwest, southeast, and southwest corners of the Regent/Beaverbrook intersection and the northeast corner of the Brookside/Main intersection were upgraded under this account.

MAINSTREET PROGRAM

In 1994, the upgrading of the downtown of the City continued. Work was finalized on St. John Street between King Street and Queen Street; on King Street between Regent Street and St. John Street; and in front of the Regency Place development on Queen Street and Regent Street.

NEW STREET CONSTRUCTION:

The following new streets or portions of streets were constructed in 1994:

LOCATION	Length (metres)
Edward Street	247
Gerrard Court	53
Manresa Drive	534
Miro Court	183
Trainor Court	<u>53</u>
 TOTAL	 1070

1070 metres = 1.07 kilometres

PROVINCIAL DESIGNATED AND REGIONAL HIGHWAYS

The City of Fredericton has a total of 51.23 km of provincial designated and regional highways within its boundaries. In 1994, the Provincial Government paid \$ 328.34 (winter) and \$ 82.85 (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 1994:

(1)	Route 8 - Canada Street (Bridge Street North) Storm Sewer and Curb & Gutter	\$ 137 000
(2)	Route 102 - Lincoln Road Resurfacing Selected Sections	<u>101 808</u>
	TOTAL	\$ 238 808

1994 ANNUAL REPORT OF THE CITY ENGINEER

**CAPITAL PROGRAMS
SUMMARY OF EXPENDITURES**

ITEM		BUDGET	EXPENDITURE	REMARKS
UTILITY FUND				
System replacement & oversizing - WATER & SANITARY SEWER		\$ 500 000	\$ 387 404	
Automation of meter reading - WATER		100 000	102 751	
Willis Street - Royal Road (across R.R. tracks) - WATER & SANITARY SEWER		70 000	71 986	
Brunswick Street Trunk - WATER & SANITARY SEWER		250 000	249 677	
Douglas Area - WATER & SANITARY SEWER		250 000	302 246	
Royal Road (tracks to Barton) - WATER & SANITARY SEWER		500 000	484 669	
Upgrade Burpee Trunk - SANITARY SEWER		200 000	312 432	
GENERAL FUND				
Gibson Trail - Phase II (completion) - PASSIVE PARKS		30 000	22 935	
North Riverfront Drive Path Extension - PASSIVE PARKS		20 000	13 980	
Botanical Garden Facilities - PASSIVE PARKS		10 000	57 594	\$ 25 738 received from Fredericton Botanic Garden Assoc. & Government funds.
Valley Trail (Rookwood to Angelview Park & Angelview Park to Bucket Club - PASSIVE PARKS		40 000	103 884	\$ 68 987 Government funded.
System Replacement & Upgrading - STORM SEWER		200 000	22 566	
Storm Water Management Planning - STORM SEWER		50 000	17 741	
Brunswick Street (St. John Street to Regent St) - STORM SEWER		80 000	7 216	
Douglas Area (includes associated roadway) & Diamond Street - STORM SEWER & STREET RECONSTRUCTION		290 000	236 086	
College Brook (includes for property acquisition) - STORM SEWER		100 000	7 371	
Smythe Street - Odell Park - STORM SEWER		320 000	548 636	

1994 ANNUAL REPORT OF THE CITY ENGINEER

**CAPITAL PROGRAMS
SUMMARY OF EXPENDITURES**

ITEM	BUDGET	EXPENDITURE	REMARKS
GENERAL FUND (continued)			
Manresa Drive - Sunset to Willis - CURB & GUTTER & PAVING	\$ 60 000	\$ 34 829	
Wetmore Rd.; Kimble Dr.; Aspendale Lane; Barrett Ct.; Carter Ct.; Jason Ct.; Stoneybrook Cres.; Trites Ct. - CURB & GUTTER & PAVING		366 203	
Brunswick St. - St. John St. to Regent St. - STREET RECONSTRUCTION	120 000	111 982	
Lower St. Marys - STREET RECONSTRUCTION	440 000	367 844	
Dewitt Acres - STREET RECONSTRUCTION	190 000	167 439	
Palmer Street - STREET RECONSTRUCTION	130 000	129 097	
Willis Street (near Stone Bridge) - STREET RECONSTRUCTION	60 000	46 988	
Prospect Street - STREET RECONSTRUCTION	240 000	310 810	
Allen Street - STREET RECONSTRUCTION	70 000	54 152	
Floral Avenue - STREET RECONSTRUCTION	72 150	68 583	
St. Marys St & Regent Depots (washrooms) - WORKS FACILITIES	20 000	12 767	
Traffic Division Storage Building - WORKS FACILITIES	50 000	108 393	
Regent/Beaverbrook Intersection - TRAFFIC MANAGEMENT	470 490	421 528	
Brookside/Main Intersection - TRAFFIC MANAGEMENT	90 000	237 300	
Miscellaneous Land Acquisitions - TRAFFIC MANAGEMENT	50 000	735	
Mainstreet Program - SPECIAL PROJECTS	120 000	425 610	Cost shared with DDFI and AOA
G.I.S. System Upgrade - SPECIAL PROJECTS	80 000	75 527	

1994 ANNUAL REPORT OF THE CITY ENGINEER

CAPITAL PROGRAMS SUMMARY OF EXPENDITURES

CAPITAL PROGRAMS
SUMMARY OF EXPENDITURES

ITEM	BUDGET	EXPENDITURE	REMARKS
NEW SIDEWALK (DONE UNDER O & M BUDGET AND LOCAL IMPROVEMENT)			
Union St./St. Mary's Street Area	\$ 50 000	\$ 71 874	
Crocket Street	100 000	84 077	
Priestman St. (Abbott to York) south side	30 000	20 411	
Union St. (Miles St. to underpass) east side	60 000	71 028	
Kimble Court	30 000	9 399	
Parkhurst Drive	10 000	8 216	
Edinburgh Street	20 000	22 691	
Lincoln Road	70 000	9 029	
James Street	13 000	13 573	
Kimble Drive (Riverview Phase III)	18 000	17 195	
Mason Avenue	4 000	4 008	
Reynolds St./McKnight St.	45 000	47 028	
Riverview Subdivision Phase II (Aspendale; Kimble; Wetmore; Stoneybrook)	90 000	79 986	
Stafford Drive	5 000	4 508	

WATER PUMPING AND QUALITY

WATER SUPPLY

The City of Fredericton is supplied with water from twenty-two (22) municipally owned wells. Eleven (11) of these wells were regularly active, while the remaining eleven (11) were on emergency standby duty at year end. The names of these wells, water analyses, and 1994 pumpages are compiled on the last page 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.

The filter room was doubled in size during 1992, with equipment to expand capacity by 66% on line by April 1993.

DISTRIBUTION SYSTEMS

There are thirteen (13) individually metered water systems in the city. Together they make up the following statistics:

Total kilometres of mains	-	312
Hydrants- City owned	-	1541
Private	-	152
Total	-	1693
Water Services	-	13104
Sprinkler Services	-	198
Total storage, ML	-	58

Detailed system descriptions follow:

South Fredericton Low Level System

This system services the south side of the city below elevation 38 m near Kings College Road and from Monteith Drive to the Fredericton Boat Club on the Lincoln Road. Its water supply is received from eight (8) wells; four (4) in Wilmot Park, the fifth, sixth, and seventh located at Saint Anne's Point, and the eighth, an emergency well, located opposite Angelview Court on Woodstock Road.

The seven (7) active wells pump water through the Water Treatment Plant and into the system. Pressure control and storage is provided by two 9090 kL in ground reservoirs on Smythe Street.

Ten (10) other separately metered systems are directly or indirectly supplied by this system:

South Intermediate System
South High Level System
Rosewood System
Lincoln System
Canterbury System
Golf Club Road System
Hanwell System
North Low System
North High System
Rainsford System

An eleventh area, Vanier South, is separate but not metered. It is supplied through a P.R.V. from the South High Level System.

South Intermediate System

This system serves an area generally bounded by elevation 38 m, elevation 76 m, Odell Park, and the eastern side of the University of New Brunswick. The water is received via the Smythe Street booster station from the low level system. Pressure control and storage are provided by two 4540 kL reservoirs with a top water level of 105.6 m. These are located in Odell Park at Montgomery Street.

South High Level System

The Montgomery Street booster draws water from the intermediate system to supply the area above elevation 76 m. The south high level system stretches from Hanwell Road to Kimble Road, and extends to the City Depot on Regent Street. Pressure control and storage is provided by two (2) 2300 kL reservoirs, one at the top of Smythe Street and a second one at the top of Regent Street. Both have a top water level of 146.1 m.

Hanwell System

A section of Hanwell Road, the upper reaches of Colonial Heights, and Cameron, Foley, Burnham and Eagle Courts, are served by the Hanwell system. Supply is via an altitude valve from the south high system, and a 460 kL reservoir with a top water elevation of 81.9 m is connected to the system above Cameron Court. A well on Cameron Court provides emergency supply.

Canterbury System

The Canterbury system is supplied from the South High System through a meter and altitude valve at Canterbury Drive. This valve maintains the water level within the Canterbury reservoirs at 99.76 m. These reservoirs, with a total capacity of 1070 kL, serve lower Skyline Acres, Dunns Crossing Road, and the area eastward to and including Wetmore Road. This area contains the former Flemming water system, which was connected to it in 1989. Prior to 1989 the former Flemming water system was supplied solely by the Flemming Booster Station. Emergency water supply is available to this system from the Lincoln water system via two electric pumps and a diesel pump at the Flemming booster station.

Golf Club Road System

This system serves the general area of Golf Club Road and Glengarry Place. It works similarly and serves the same elevations as the south intermediate system, but presently has no storage. The system receives water from the south high system through a pressure reducing valve assembly near the Prospect/Hanwell intersection which is capable of providing reasonable fire protection.

Rainsford Park System

This system supplies the Rainsford Lane Park subdivision only, and has no reservoir. Prior to 1983 this system was privately owned. 1991 construction provided a tie between this system and the Golf Club Road system. The connection, which was activated on 1992 01 20, provides domestic flows through a small booster station and lower pressure fire flows through a check valve. Fire hydrants were installed in 1991. The original well and pressure tanks still serve as emergency supply and control.

Rosewood System

The Rosewood booster station pumps water from the low level system for use by the upper elevations of the Rosewood and Monteith subdivisions. As the Rosewood system has no reservoir, a jockey pump system has been installed to maintain pressures.

Lincoln System

This system receives its supply from the low level system, through the Lincoln booster station situated across from the Fredericton Boat Club on Lincoln Road.

The system, which extends almost to the City boundary and includes the Vanier Industrial Park and the Wilsey Road area, is served by the 3750 kL reservoir on Flemming Road. The top water level is 85.45 m.

Silverwood System

Silverwood is supplied by two wells; one at the intersection of Mountain Drive and Fairview Drive; and another above Silverwood outside the City limits. The two celled reservoir on the top of the system holds 2250 kL and has a top water elevation of 134 m. Presently, for better turn-over of storage, only one cell is in use. Pressure control valves halfway down Orchard Drive and Fairview Drive separate the system into two parts, allowing both to develop reasonable static pressures.

North Fredericton Low Level System

In November 1987, the St. John River Crossing water main was activated, and this system began receiving water from the south low system. There are also five (5) wells available on emergency standby duty to serve this system. A sixth well, Greenwood Well #1, was demolished in 1992.

As well, a pressure reducing valve can provide water to the North Low System from the North High System on an emergency basis.

The system serves all areas of north Fredericton below elevation 37 m. Four reservoirs, all with a top water elevation of 57.9 m float on the system. These are:

Highland Avenue Reservoir	-	4500 kL
Longwood Reservoir #1	-	1300 kL
Longwood Reservoir #2	-	1500 kL
Dewitt Reservoir	-	1140 kL

With the commissioning of the Longwood booster station on 1990 12 09, this system now provides water to the north Fredericton high level system.

A check valve separates this system and the Marysville system to provide water to a limited portion of Marysville should its well supply fail.

North Fredericton High Level System

Until 1991 12 09 this system received its supply from two wells situated on the west side of St. Mary's Street, 2.8 km north of Maple Street. On that date, the new Longwood booster station was commissioned, providing water from the north low system. Storage for the north high level system is provided by a 3800 kL reservoir on the south side of Killarney Lake with a top water elevation of 97.3 m. This system serves upper St. Mary's Street and Nashwaaksis above elevation 38 m.

Marysville System

Marysville has two wells on Tower Road and an emergency supply well on McGloin Street. A 6600 kL reservoir with a top water elevation of 79.5 m allows the system to serve the Marysville area between elevations 14 m and 52 m.

Tables

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

1994 PUMPAGE - WILMOT PARK WELLS, ML

MONTH	WELL 1	WELL 2	WELL 3	WELL 4	WELL 5	WELL 6	WELL 7	MONTHLY
January	135	130	96	30	72	88	120	671
February	69	84	120	79	146	94	57	649
March	155	120	65	24	74	88	143	669
April	111	100	65	16	150	66	154	662
May	56	72	91	70	172	122	103	686
June	141	124	144	23	96	65	93	686
July	126	87	71	40	97	117	167	705
August	156	123	149	24	70	26	138	686
September	108	115	99	67	123	88	80	680
October	128	84	91	35	98	104	136	676
November	120	114	0	0	142	145	124	645
December	163	132	0	1	49	128	187	660
TOTALS	1470	1290	991	409	1290	1130	1500	8080

1994 NET SYSTEM DEMANDS, ML

SYSTEM ZONE	QUARTERS, 1994				AVERAGE DAILY DEMAND
	1ST	2ND	3RD	4TH	
SOUTH LOW	785	826	937	929	3477
SOUTH INTERMEDIATE	196	180	176	184	736
SOUTH HIGH	317	304	300	298	1219
CANTERBURY	83	94	95	91	363
LINCOLN	63	67	72	63	265
ROSEWOOD	9	10	10	11	40
GOLF CLUB ROAD	13	15	17	15	60
HANWELL	9	10	11	10	40
RAINSFORD PARK	4	16	4	4	28
SILVERWOOD	15	16	17	15	63
NORTH LOW	392	374	299	223	1288
NORTH HIGH	82	93	94	92	361
MARYSVILLE	91	110	101	95	397
QUARTERLY TOTALS	2060	2120	2130	2030	8340
					22.8

**FREDERICTON WATER TREATMENT PLANT
CHEMICAL DOSAGES AND COSTS, 1994**

CHEMICAL	UNIT COST \$/ft	ANNUAL REQ'D, ^t	ANNUAL COST \$	DOSAGE ¹ mg/L	COST/ML ² \$	COST/DAY
CHLORINE	671.00	26	20 000	3.3	2.51	72.00
SULPHUR DIOXIDE	238.00	4	10 000	0.5	1.30	28.00
LIME	120.54	195	25 000	24.2	3.22	69.00
SODA ASH	303.50	31	10 000	3.8	1.29	28.00
TOTALS			65 000		8.30	178.00

- NOTES: (1) DOSAGE IS BASED ON PLANT INFLUENT: 8100 ML
 (2) COSTS/ML IS BASED ON PLANT EFFLUENT: 7800 ML

WATER QUALITY - 1994

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, and the commissioning of the Longwood Booster Station in late 1990, is now treating approximately 95% 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.

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.

Breakpoint chlorination began in Silverwood during March of 1988, and in the Killarney and Marysville water systems during May 1989. As chlorine residuals made their way through the systems, some taste and odour complaints were received. These have also continued to decrease.

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 that water is bacteriologically safe for human consumption, since coliform bacteria are more hardy than disease-causing bacteria.

Thirteen (13) locations related to supply, 25 distribution system locations, and 9 emergency supply wells are each sampled by water operators, once per month. All samples are tested for total coliform by the membrane filtration technique, by the water operators, and results are monitored by Health and Community Services.

The test results indicated that all water which was delivered was biologically safe. Further, bi-monthly surveys indicate that a stable free chlorine residual was maintained within the distribution system.

WATER QUALITY - 1994

INORGANIC ANALYSIS

Most recent samples for inorganic analysis were taken from wells and the distribution system in March, 1994 and analysed by Environment New Brunswick's laboratory. Results are displayed on the following page. All water delivered to the distribution system meets the Guidelines for Canadian Drinking Water Quality, Health & Welfare Canada.

One column concerning annual pumpage is added for quick reference.

ORGANIC ANALYSIS

The locations listed for inorganic analysis were also sampled for 15 organic contaminants in March of 1994. The same locations, less the emergency standby wells were resampled in October. With the exception of a low level of trihalomethanes, a byproduct of chlorination, no contaminants were detected. A special survey for perchloroethylene detected the contaminant in Wilmot Well #3, at a stable level approximately one one hundredth of the drinking water guideline.

1994 ANNUAL REPORT OF THE CITY ENGINEER

WATER ANALYSES
1994 04 19

	Hardness mg/L CaCO ₃	Alk. mg/L CaCO ₃	Al. mg/L upf.	B mg/L upf.	Ca mg/L upf.	Cd mg/L upf.	Cr mg/L upf.	Cu mg/L upf.	Dissolved solids mg/L	F mg/L upf.	Fe mg/L upf.	Hg mg/L upf.	K mg/L upf.	N mg/L upf.	Ph upf.	pH upf.	Total alkalinity mg/L								
Willard 1	59.1	56.43	1.5	1.1	0.03	0.019	19.52	0.04	7.61	155	1.2	0.008	2.4	0.11	0.000	0.05	0.91	2.51	1.156	7.73	0.03	0.9	7.25	22.7	1470
Willard 2	64.0	45.24	7.1	0.0	0.04	0.057	20.39	0.10	23.98	200	1.0	0.010	1.4	0.11	0.060	0.05	0.66	3.19	1.809	10.52	0.26	0.9	6.64	13.4	1290
Willard 3	131.3	83.60	0.7	0.4	0.04	0.057	43.65	0.04	46.10	363	2.3	0.004	1.0	0.09	0.004	0.05	2.66	5.41	0.035	16.91	0.70	0.8	7.07	16.9	990
Willard 4	101.5	39.41	5.4	0.9	0.03	0.043	33.73	0.05	96.87	504	1.6	0.011	0.9	0.06	0.080	0.05	4.15	4.20	0.103	52.95	2.78	0.9	6.67	31.6	410
Willard 5	53.4	47.91	4.0	0.2	0.03	0.016	17.89	0.03	3.92	130	1.4	0.000	2.1	0.08	0.007	0.05	0.77	2.11	0.604	4.54	0.21	1.4	7.09	23.3	1290
Willard 6	41.1	39.24	4.3	0.02	0.002	0.027	13.55	0.02	3.71	115	2.6	0.009	2.8	0.10	0.026	0.05	0.53	1.76	0.228	6.48	0.36	0.8	6.91	21.6	1130
Willard 7	52.4	46.57	1.0	0.3	0.02	0.019	17.31	0.01	3.98	129	1.1	0.003	2.5	0.17	0.005	0.05	0.45	2.24	0.658	3.84	0.16	0.7	6.59	19.1	1500
WTP	56.9	50.03	1.4	0.6	0.02	0.018	18.85	0.01	5.16	137	2.5	0.061	1.2	0.13	0.000	0.05	0.63	2.38	0.773	5.78	0.13	4.0	7.28	19.3	
WTP [EFF]	76.5	68.62	11.5	0.5	0.02	0.017	26.58	0.0	9.03	180	1.8	0.016	1.4	0.13	0.000	0.05	0.63	2.45	0.000	8.02	0.13	1.0	8.25	18.4	
Shrewsbury Street	11.5	106	22.4	0.2	0.01	0.013	2.74	0.01	15.06	256	1.8	0.049	1.0	0.05	0.039	0.05	0.13	1.12	0.002	56.07	0.12	1.5	7.93	35.1	
Shrewsbury 2	156.8	137	12.4	1.1	0.03	0.164	34.97	0.03	35.02	380	2.0	0.000	0.7	0.07	0.020	0.05	0.60	16.88	0.002	23.30	0.30	1.1	7.89	48.8	10
Shrewsbury 3	110.8	98.95	21.3	0.2	0.02	0.091	25.64	0.03	10.11	224	1.1	0.001	0.9	0.05	0.038	0.05	0.34	11.35	0.000	4.58	0.07	1.4	7.93	55.1	51
Dovey	132.7	122	0.6	0.4	0.03	0.161	46.26	0.08	28.13	355	2.2	0.003	1.6	0.17	0.008	0.05	0.76	4.17	0.062	17.08	0.14	1.1	7.77	28.9	
Tower Rd. 1	135.7	77.64	0.9	0.2	0.03	0.092	47.94	0.01	15.62	319	0.4	0.013	0.	0.19	0.054	0.05	0.47	3.88	0.039	18.39	0.02	0.9	7.88	42.0	
Tower Rd. 2	97.8	70.81	0.0	0.1	0.03	0.099	32.38	0.0	26.34	256	0.3	0.001	0.	0.13	0.014	0.05	0.51	4.11	0.000	14.39	0.06	0.5	7.79	53.7	282
McGinnis St.	97.6	88.39	3.0	0.3	0.01	0.061	33.31	0.01	15.52	254	0.0	0.003	0.	0.19	0.267	0.05	0.64	3.51	0.130	17.11	0.05	2.4	8.12	13.0	
Clinic 32	88.1	90.32	5.9	0.3	0.03	0.127	32.33	0.02	2.13	204	2.1	0.048	0.	0.10	0.021	0.05	0.47	1.79	0.168	8.84	0.01	1.5	7.87	29.2	
Highland	73.5	62.70	12.0	0.1	0.02	0.085	25.57	0.0	7.88	178	1.1	0.003	1.9	0.10	0.019	0.05	0.53	2.35	0.005	7.78	0.06	0.0	7.45	31.7	
Maple 1	127.0	92.05	13.8	0.7	0.03	0.094	44.01	0.04	38.90	352	0.0	0.000	0.	0.17	0.046	0.05	0.73	4.15	0.024	24.81	0.26	1.0	7.62	46.2	
Maple 3	126.7	102	0.8	0.6	0.02	0.079	45.16	0.0	27.31	320	0.4	0.057	1.4	0.12	0.351	0.05	0.63	3.38	0.208	17.02	0.01	4.9	8.14	38.9	
K. C. Well	81.4	75.12	15.6	0.1	0.03	0.072	27.37	0.0	1.54	169	1.5	0.020	0.	0.08	0.058	0.05	0.47	3.16	0.000	4.26	0.09	2.9	7.41	44.9	
L.O. Well	109.3	111	6.4	0.6	0.02	0.079	37.00	0.03	3.00	242	2.0	0.008	0.3	0.12	0.013	0.05	0.55	4.10	0.767	8.20	0.02	1.6	7.67	41.5	
Banks	98.6	69.93	0.5	0.3	0.02	0.098	32.58	0.0	27.12	257	0.3	0.078	1.2	0.13	0.005	0.05	0.49	4.18	0.000	14.61	0.06	0.1	7.68	58.3	
St. Mary's	95.2	75.92	12.8	1.0	0.02	0.024	33.28	0.02	15.93	222	3.2	0.005	0.8	0.13	0.010	0.05	0.83	2.94	0.004	10.33	0.22	0.0	8.21	9.7	
Harwood	91.2	111	5.6	0.0	0.04	0.101	31.34	0.04	30.41	341	1.6	0.000	0.2	0.22	0.008	0.05	0.50	3.15	0.003	34.54	0.25	0.9	7.60	54.4	
Rahab	98.6	76.61	9.2	0.2	0.03	0.024	34.45	0.0	17.78	234	1.7	0.010	3.2	0.13	0.016	0.05	0.91	3.05	0.009	10.43	0.23	0.3	8.16	8.2	
York Water	82.1	71.49	10.4	0.3	0.02	0.021	28.59	0.02	11.41	197	0.0	0.021	1.2	0.13	0.007	0.05	0.71	2.59	0.001	9.50	0.17	0.0	8.22	16.2	

