ANNUAL REPORT
OF THE ENGINEERING AND PUBLIC WORKS DEPARTMENT

1928

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I N D E X.

REPORT OF THE CITY ENGINEER 1928

TO HIS WORSHIP THE MAYOR AND THE ALDERMEN

OF THE CITY OF FREDERICTON:-

The following is a statement of the work done in the different Departments under the direct supervision of the City Engineer during that period of time from the first of December, 1927, to the first of December, 1928.

ROADS AND STREETS

REPORT OF WORK DONE IN THIS DEPARTMENT, WITH A NET EXPENDITURE OF $26,058.70.

This expenditure is made up of $17,122.45 paid out through Pay Rolls and $8,936.25 paid for material and other charges such as Workmen's Compensation, Rental and Upkeep of Machinery and Plant, etc.

The above amount of $17,122.45, or Pay Roll expenditure, is made up as follows:-

Snow Ploughing Sidewalks	$184.63
Snow Control,- as shovelling roads, ploughing roads, snow roller, hoops or drags on snow, hauling snow from streets, snow fences, or any other means of snow control	441.36
Streets,-as flushing surface sewers, cutting grass and weeds, spreading oil or calcium chloride, all patching, scarifying, repair and maintenance other than where tar or asphalt is used, cleaning catch-basins and keeping gutters clear of ice or dirt and in good working order, filling holes in gutters and any other heading as widening and recurbing corner of Brunswick Street and Regent Street	4,840.09
Cinders from Maritime Electric,-cost of hauling when placed in storage piles	171.13
Sanding Walks,-hauling sand for winter storage pile, drying sand and putting sand on slippery sidewalks	416.19
Yard,-putting away summer plant, taking out winter plant, and men working at repair work in Yard or at Carleton Street Plant	1,024.33
Storing Gravel,-Men tallying gravel hauled by contract, City teams hauling and piling river dug gravel	196.67
Street Sprinkling,-Watering Carts	1,120.53
Crushing Stone	829.34
Forward	$9,224.67

Brought Forward.....	$9,224.27
Repairs and Patrol to Saint John road,- Lansdowne Street to eastern City line.....	1,566.65
Repairs and Maintenance of Doak and Wilsey Roads.....	749.87
Repairs and Maintenance of Woodstock Road,- Odell Avenue to western City line.....	410.99
Repairs and Maintenance of New Maryland road,- C. P. R. Crossing to southern City line.....	294.64
Repairs to Outlying Roads,- Hanwell Road. Crossroads from College Hill to Brick Hill. Brick Hill Road. Poorhouse Hill Road. College Hill Road. Forest Hill Road, and Roads in what is known as English Settlement.....	1,157.25
Street Cleaning,- All cleaning and removal of dirt on actual travelled streets, that is between curbs....	1,478.40
Tarvia Repairs,-Mixing patching material, Patching and repairing sidewalks with tar or asphalt, Patching tarvia or asphalt pavements, Putting on wearing coat of light tar or asphalt on paved streets, Applying light tar to gravelled roads.....	962.02
City Road Patrol,-Patrolling City streets with light road machine or drag.....	489.30
Spreading Gravel,-Repairing and grading roads to receive gravel surface, hauling, spreading and raking gravel on streets in the City proper. (By streets in City proper is meant those streets or roads not above mentioned).....	187.14
King Street Paving,-Block on King Street between York Street and Carleton Street.....	601.92
	$17,122.45

Below are comments on the above items:-

Snow Ploughing Sidewalks and Snow Control were both light for this year on account of favorable weather conditions and light snowfall. Both items are probably considerably lower than our future average expenditure along these lines. In the event of heavy and continuous snowfalls, the City would find it difficult and expensive to keep our sidewalks and roads open when it is considered that we have only horse drawn equipment and also when it is considered that the demand for open roads is increasing with our increasing automobile traffic.

Under Yard expenditure is included the wages of a "handy man", who did rough blacksmith work, sharpening tools, etc., and also kept track of stock and tools in Yard.

The gravel used this year in the City, some 3,000 yards in all, was dug from the Saint John river near the mouth of the Nashwaak and piled in storage piles in the City. The total cost to the City for gravel was $2,223.93 plus the payroll cost of $196.67, equalling $2,420.60.

The summer of 1928 was an easy season on street sprinkling costs, as dry spells were shorter than the average. On June 5th we finished spreading 6,000 gallons of road oil. Most of this was used on the extreme eastern and western portions of the City as these districts are less shaded and harder to reach with the watering carts. 1,000 gallons of road oil was stored in drums and used as second application on portions where the already treated streets were beginning to get dusty again. When this oil began to wear out, we had many complaints from citizens, located along these treated streets, of oily dust which settled on floors and furniture and which was very difficult to remove. The only calcium chloride used in the City this year was about half a ton which was supplied by some private citizens and spread by the City. Even with the use of the road oil and a favorable season our labor charges for street sprinkling were $1,120.53. To these labor charges must be added the upkeep of three watering carts which, as the carts are all getting old, is heavy when compared to their initial cost. I believe a much more efficient service at a lower cost could be given to the City by a motor driven street sprinkler.

The City Crusher was operated from October 9th to November 10th crushing some 1,637 tons at a labor cost per ton of .45¢. The crushed stone is now in stock and is sufficient for our requirements of 1929.

The Crusher was repaired early in September by our own men. At that time we crushed a few days to supply stone to the Provincial Government for their work on the Fredericton-Devon Highway Bridge. The City at this time sold the Provincial Government some 64 cubic yards of stone for the sum of $238.26.

A road patrol, consisting of a man and team with a split log drag which was later changed to a No. 5 Sawyer-Massey road patrol machine, was kept constantly at work on the Saint John road for 181 days. For 62 days of this time the teamster had one extra man working with him. This patrol crew spent about one day a week on the Doak and Wilsey Roads. The Doak and Wilsey Roads had considerable repair and new construction in the shape of corrugated iron culverts, and widening, regrading, and gravelling. The Doak Road, beginning at Doak Station and working south for 1.7 miles, was widened, regraded and partially gravelled. Four pole culverts in bad shape were replaced by corrugated iron pipe, two of these culverts requiring a 30 inch pipe and two a 24 inch pipe. 700 feet of heavy side ditch was dug in order to drain a swamp through which the road runs. The Wilsey Road, beginning at Doak Station and running east for one mile, was skirted out, widened, regraded and partially gravelled. Two 24 inch corrugated pipe culverts were put in and 600 feet of offtake ditch dug in order to drain low lying portions of this road. The total expense to the City for this above mentioned work on the Doak and Wilsey roads was made up as follows:-

Pay Roll	$749.67
Corrugated iron culvert pipe	401.56
Rental and repair of road machine	64.00
473 cubic yards of gravel	47.30
Dynamite and small tools	50.00
Total	$1,312.73

To the above amount must be added $481.35, granted by the Provincial Government and spent in wages, making the total expenditure on the Doak and Wilsey Roads $1,794.08.

The Doak road is not a through road, therefore the further back the road runs the less traffic it has and a lower standard of construction is allowable. The Wilsey road, on the other hand, is a through road and if it were in good condition would have a considerable amount of through traffic from outside the City limits to and from the City. About a mile of this road between the City limits and where work was stopped this season is in very bad shape and is almost impassable for car traffic. This piece of road could be put in fairly good shape for about $500.00. However, the bridge over the Baker Brook, situated at the City line on the Wilsey Road, is in very bad shape and would probably fail within a few weeks should the road be put in good shape for motor traffic. Therefore, if this piece of road is to be improved and opened up it will be necessary first to have a new bridge built at the Baker Brook. In my opinion the Provincial Government should be asked to construct this bridge in the event of the City putting the rest of the road in good shape.

The Woodstock Road, from Odell Avenue to the western City line, was scarified and reshaped three times during the season. It was also given two light coats of gravel. After the first application of gravel it was given a coat of road oil. This road is one of the most difficult roads of the City to keep in good shape. During the summer season it carries over fifteen hundred cars a day. The speed of this car traffic probably averages over thirty miles per hour. Under this volume of traffic, and with the City's light horse drawn road maintainer, it is impossible to keep this road in first class condition at a reasonable cost.

The New Maryland road was dragged about once every two weeks during this season from the first crossroad south to the City line. Most of the expense shown against this item was incurred by work done on Maryland Hill which was twice road machined and had the ditches and culverts cleaned out and put in shape at the same time.

Under repairs to outlying roads,-The Hanwell road was skirted for its entire length within the City. It was also widened out and roadmachined into shape and all but 600 feet at the City limits gravelled.

The first cross road between Brick Hill and Maryland Hill was skirted clear of bushes and roadmachined. This road was gravelled between Poorhouse Hill and Maryland Hill. One pole culvert just west of the top of Poorhouse Hill was replaced by a 24 inch corrugated iron pipe.

The second crossroad running from Maryland Hill road to the Brick Hill road was skirted and regraded from Maryland Hill half way to Brick Hill. We had some rather heavy grading on this piece with the rooter plough and large road machine. This work was necessary as the road had become hollowed out and after every rain carried a heavy stream of water which washed out the Maryland Hill road. We put in one culvert on this piece of used 15 inch terra cotta pipe.

The first crossroad from Maryland Hill to College Hill was partly roadmachined and had three culverts of used 15 inch terra cotta pipe installed.

The Poorhouse Hill road was roadmachined twice during the summer. An old stone wall culvert with wooden top, situated about half way up Poorhouse Hill, was replaced by a 4' x 4' reinforced concrete box culvert. This culvert was made 30 feet wide from inside of headwall to inside of headwall.

The roads in what is known as English Settlement were roadmachined and given a coat of cinders. One culvert of used 15 inch terra cotta pipe was put in.

College Hill road was roadmachined and gravelled from the C. P. R. track to the upper entrance to the College buildings.

Forest Hill road was roadmachined and gravelled from the C. P. R. tracks back one mile. Two worn out wooden culverts were replaced by 24 inch corrugated iron pipe.

Our costs in the Street Cleaning Department are quite heavy on account of the great number of leaves it is necessary to clean up each year. In order to keep the front part of the City clean, we last season had two men with push carts and brooms constantly employed in cleaning work. These two men were able to keep in good shape all Queen Street, also Regent, Carleton, York, and Westmorland back as far as Brunswick Street and the City Hall and Court House Square. The increase in motor traffic and the decrease in horse traffic I believe tends to make street cleaning easier. This season we had manufactured in Fredericton one dozen large cans to hold waste paper. These cans were placed at strategic points near street intersections in the business district. I believe they were a good deal of assistance and will no doubt increase in service as our citizens become more educated to their use.

Tarvia Repairs.

The following streets were given a wearing coat of Tarvia B:-

Queen Street, from Westmorland to Waterloo Row.

Waterloo Row, from Queen Street to Lansdowne Street.

Brunswick Street, from Smythe to Church Street. (This application on Brunswick Street was omitted in some places where the wearing surface seemed good. In all about 3/4 of the surface of Brunswick Street was treated).

Charlotte Street, from Westmorland to Carleton Street and from Regent to Church Street.

Westmorland Street, from Queen to Charlotte.

York Street, from King to Saunders.

These above streets received about 1/10 gallon of Tarvia B. per square yard. This same work will, I believe, have to be gone over again next year as I think our car traffic uses up about one such application a year.

The piece of gravel road on Brunswick Street, from Church St. to the C. N. R. Crossing, was given two coats of Tarvia B. Tarvia B. was applied in coats of 1/10 gallon per square yard in a strip about 20 feet wide. The second coat was applied about two weeks after the first. This light tar application gave very good results. We formerly had a lot of complaint from this block on account of the dust and the potholed condition of the surface.

The light tar gave us a smooth wearing surface free of dust. Next summer will tell how this class of road stands up under spring conditions, but even if it goes to pieces in the spring it seems to me to have been a good investment. From the end of the paving at the east end of Charlotte Street, south of University Avenue, was treated in this same manner. This piece of road was formerly a water bound McAdam and here the light tar also gave good results.

Our paved streets required less patching in 1928 than in 1927. This I believe was on account of the streets being better protected by the wearing coats of light tar applied in 1927 and also to better methods of patching used. Practically all our patches this year were made by the "hot patch" method. The sidewalk on the south side of Queen Street was patched with tarvia and asphalt K. P., as were some of the worst blocks in other parts of the City. The amount of tar and asphalt used by the City during 1928 was as follows:-

Purchased 1928

	Gal.	Price F.O.B. Montreal.	Gal.in stock Dec. 1927.	Gal.in stock Dec. 1928.	Gal. used 1928.
Tarvia X.	7084	$1152.13	1056	180	7960
Tarvia B.	2970	638.55	1450	450	3970
Tarvia K.P.	720	197.10	88	258	550
Asphalt K.P.			300	172	128
	10774	$1987.78	2894	1060	12608

The total expenditure on labor for tarvia repair, namely $962.02, was divided as follows:-

Patching Streets	$400.55
Tarring Streets	415.57
Patching Sidewalks	145.90
	$962.02

A tarvia pavement was laid on one block of King Street, from York to Carleton Street, in all 1966 square yards. This block was formerly a water bound McAdam. The McAdam was scarified and removed for a depth of 3 inches to make room for a 3 inch tarvia wearing course. Upon removal of this 3 inch layer, enough of the old McAdam was left to act as a base for the wearing course. This wearing course was of the penetration tarvia type. The tar was applied in two coats. The first of 1½ gallons per square yard and a seal coat slightly over ¼ gallon per square yard, making in all 2.05 gallons per square yard.

Before this pavement was laid, all water services in the block were relaid with 5/8 inch 9 lbs. lead. The cost of relaying water services does not appear in the costs as charged against the pavement. The pavement costs are as follows:-

4839 gallons of tarvia X @ .20¢	$967.80
220 cubic yards crushed stone @ $3.00	660.00
20 yards sand @ $1.00	20.00
5 tons coal @ $10.00	50.00
Oil, fittings, repairs to Plant, etc.	50.00
Labor	560.15
	$2,307.95

As the total cost of 1966 square yards of pavement was $2,307.95, the cost of pavement per square yard was $1.17.

WORK DONE UNDER HEADING OF PUBLIC WORKS, TOTAL COST OF $3,156.87:-

This cost is made up of $2,470.39 in wages and $686.48 for material.

Under the material heading,-the switch ties in the City of Fredericton Railway Siding were renewed at a cost of $129.00. A proportion of the repairs and running expenses of truck were charged as $134.72, and ground rent to the amount of $70.00 was paid for the Carleton Street Plant. The rest of the material charge was made up of materials purchased and used under the following labor charges:-

The $2,470.39 labor charges were made up as follows:-

Trees,- Cutting, trimming, etc.....$974.30

Dump,- Wages of dump tender and any extra help..... 676.50

River Roads,-Staking out or working on ice roads from Fredericton across Saint John river..... 22.56

Surface Sewer Repair,- Repairs to surface sewers not directly on street lines..... 170.24

Back Drain,- All work on back drain..... 97.93

Unforseen,- Any unforseen work not covered by any other appropriation, such as handling storm damages, or any survey work not directly covered by other appropriation, etc..528.86

$2,470.39

Some thirty trees were cut during the season. The stumps of these trees were cut out below the ground level. The trees on both sides of Brunswick, George and Charlotte Streets were trimmed out as nearly as possible above the telephone and electric light wires and dead or decayed matter taken out. Besides the above mentioned places this trimming work was done in a few other locations as requested from time to time by citizens. I believe this work had good results as it not only improved the trees themselves, but also improved our street light service and removed a considerable danger from falling dead branches.

The New Brunswick Telephone Company co-operated with the City in this work. They gave us one of their men with climbing equipment. This man worked with the City Crews from time to time when they were at tree trimming work. Altogether he worked with the City for 10½ days, which assistance, as the Telephone Company were paying him at the rate of $4.00 per day, cost the Telephone Company $42.00 in actual cash.

Under the direction of Colonel Loggie, the appearance of the Old Burying Ground was much improved. The City team hauled loam from the Flats for some filling work. The cost of this team work was $50.29 and was charged through pay roll to Public Works.

CONCRETE SIDEWALKS, AT A TOTAL EXPENDITURE OF $5,453.43,- MADE UP OF $2,546.48 FOR WAGES AND $2,906.95 MATERIAL.

The following is a list of the concrete walks laid during the season of 1928;-

Street		Location
Argyle Street.	(South Side)	York and Westmorland.
York Street.	(West Side)	Argyle and Victoria.
Brunswick Street.	(North Side)	Smythe and Northumberland.
King Street.	(North Side)	Smythe and Odell Avenue.
Brunswick St.	(South Side)	Church and St. John St.
Charlotte St.	(South Side)	St. John and Regent St.
Queen St.	(South Side)	Church & Parliament Bldg.
Queen St.	(South Side)	University Avenue & Church St.
Brunswick St.	(North Side)	Church and St. John St.
George St.	(South Side)	Westmorland & Northumberland.
George St.	(South Side)	Northumberland and Smythe.
Saunders St.	(North Side)	Smythe and Northumberland.
Waterloo Row	(South Side)	Shore-University Avenue.
Lansdowne St.	(North Side)	Mr. Ivan McKnight.
Campbell St.	(South Side)	Imperial Oil Co.
Regent St.	(East Side)	Imperial Oil Co.

In all 7641 lineal feet of walk was laid this season.

275 lin. ft. of this was by a special arrangement charged to the property owner. 6808 lin. ft. were charged one-half to the property owner and one-half to the City, and 558 lin. feet all charged to the City, this last being parts of walk built on corners or in front of City property.

This walk was all 5 feet wide except one piece on Queen Street, from Church Street to the Parliament Buildings, which piece was made 6 feet wide for a distance of 244 feet.

Altogether concrete walk laid makes a total of 4,272 square yards and the cost is $1.28 per square yard.

CITY WHARF, TOTAL EXPENDITURE $2,047.29, made up of $696.51 paid out in Pay Rolls and $1,350.78 paid out for material and other charges.

Last spring the ice in the river broke down a piece of the front wall of the shed on the Wharf. This was repaired at a cost of $71.79 which is included in the above charge of $1,350.78.

The old high water Wharf at the end of Regent Street has for the last few years become very much out of repair. This season a new high water Wharf was built on the location of the old one. This Wharf was made 73 feet long and was built 6 inches higher than the old Wharf. Piles 40 feet long were driven along the face of the old Wharf. These piles were driven from 14 to 18 feet in the river bottom and were placed about 1½ feet apart. The wornout face of the old wharf was then removed back for a distance of about 10 feet. A new facing was built up of 8" x 8" jack pine inside the row of piles. This facing was bolted through the piles to 3 rows of 8" x 8" jack pine on the outside of the piles. The facing was also tied to the Wharf with 8" x 8" jack pine stickers running back into the old Wharf and also by 7/8" iron tie rods running back to a dead man sunk in the old Wharf. The whole was rock filled and given a surface of crushed stone and gravel.

The total cost of this Wharf was $1,975.50 made up as follows:-

$696.51	Pay Roll.
275.00	Purchase of Piling.
221.30	Towing and driving piling.
556.30	Cost of 6" x 8" jack pine lumber.
24.00	Rental of Scow.
202.39	General expenses and Material, such as iron, etc.
$1,975.50	

WORK DONE UNDER STREET LIGHT AT A COST OF $7,323.41.

This cost is divided up as follows:-

Current, December 1, 1927, to December 1, 1928, 171244 K. W. H. =.....	$4,634.81
Maintenance of line and street lights at a contract price of $20.00 a mile per year.....	555.00
578 lamps purchased for replacements and for new installations.....	871.26
Material purchased for new installations and renewals of lamp fixtures (This includes only material such as lamp brackets, heads, sockets, shades, etc., that is, material pertaining only to actual light fixtures).....	601.46
Material used in line maintenance.....	591.49
Miscellaneous.....	69.39
	$7,323.41

The following total shows how the current charge was made up:-

Month	K.W.H.	Demand	No. of burning Hours	Cost
Dec. 1927.	15200	40	430	$408.24
Jan. 1928.	21100	40	395	527.09
Feb. "	15780	39	353	406.86
Maroh "	13500	40	333	362.81
April "	10500	40	277	302.25
May "	12720	43	235	353.51
June "	9484	40	208	283.33
July "	10500	43.8	224	313.48
Aug. "	10980	42.6	256	321.49
Sept. "	15120	45.23	315	408.96
Oct. "	17700	48	380	467.16
Nov. "	18660	45	403	479.63
	171244		3809	$4,634.81

The average cost per K.W.H. for the year was 2.7¢.

The average cost of light per hour = $1.22.

The average cost of light per hour for energy along = .92¢.

LAMPS

	600 c.p.	400 c.p.	250 c.p.	100 c.p.	Total
Lamps purchased during year	24	18	336	200	578
Lamps in stock Dec. 1, 1928	13	12	12	30	67
Lamps used during year.....	11	6	324	170	511

We have now installed in our Street Light Circuits 345 lamps made up as follows:

600 c. p.	250 c. p.	100 c. p.
8	235	102

Therefore the number of lamp burning hours for the year = 345 x 3809 = 1314105.

The average life of one of our lamps should be about 1200 burning hours. That is, not counting deliberate or accidental breakage. As a general rule after burning 1200 hours the illumination cast by a lamp will be about 80% of that cast by a new lamp. However, the watts consumed will be about the same. Our replacements for the year should be $\frac{1314105}{1200}$ = 1095.

Our actual replacement was 511 which would seem low when compared to the probable replacement required, namely 1095 as shown in the preceding paragraph. However, it must be remembered that it is our practice only to replace lamps which have actually burnt out or have been broken. This method of replacement, i. e. when lamp has been broken or burnt out, seems to be the only practicable method for the City and I believe is the one used in most cities.

Material purchased for new installations and renewals of lamp fixtures,- We had on hand at December 1, 1926, the following:-

Lamp brackets.....	34.
Reflectors.....	17
Heads.....	15
Sockets.....	25
Large fixtures with globe...	1

The total value of the above is $267.00, making an actual cost for the year for this item of $601.46 minus $267.00 = $334.46.

This charge is quite heavy for the year when compared with the last few years. However it was necessary as many of our lamp fixtures have been in place without renewals or repairs for a long time and had to be replaced. In all probability considerable work of this same nature will have to be done next year.

With regard to the cost of $591.49 for material used in line maintenance,- This amount was paid to the Maritime Electric over and above their contract price of $20.00 a mile per year and is made up entirely of cost of material supplied by the Maritime Electric in maintaining our street light lines. In this cost is included the purchase of 30 telephone poles. This cost was necessary as our lines in many places had become very much out of repair. The Maritime Electric were themselves doing considerable repair work on their own lines and as our lines were, in most places, on the same poles as the Maritime Electric, it was advisable to have our lines repaired at the same time.

The miscellaneous cost of $69.39 is made up of small items, such as blueprints, etc., and a proportion of the cost of City Engineer's car allowance.

BATHING BEACH WITH A TOTAL EXPENDITURE OF $293.52, made up of $276.85 paid out in wages and $16.67 miscellaneous charges.

The Bathing Beach was maintained at the western end of the City from June 22, 1928, to September 13, 1928. This Beach was in charge of Charles Williams, who acted as Caretaker and Life Guard and to whom was paid the amount of $276.85 as salary, which with the miscellaneous charge of $16.67 makes up the total expenditure under this item.

TOURIST CAMPING GROUND WITH A TOTAL EXPENDITURE OF $59.65.

The Tourist Camping Ground was maintained at the western end of the City on land owned by the Federal Government who permit the City to use it for this purpose. This is the same location as was used last year. The Camping Ground is supplied by the City with water, sewerage and light, also a cooking shanty and fuel. The Caretaker receives no salary from the City, but is relieved from taxation, which amounts to about $25.00 a year.

The above expenditure of $59.65 was made up by an item of $33.45 on the City Payroll and other miscellaneous charges such as wood, repairs to plumbing, etc. The amount $33.45 as charged to the payroll was work done by City employees in digging a cesspool, the old cesspool having filled up and become useless.

The Register at the Camping Grounds shows as having registered:

78 parties for the month of June.
193 parties for the month of July.
188 parties for the month of August.
109 parties for the month of September, and
7 parties for the month of October.

Totalling 575 parties for the year.

1487 persons registered.

The number of parties registered last year is 71 less than the year before. This does not mean that our Tourist trade is decreasing but rather shows a marked increase, as last season there was a new Tourist Camping Ground, privately owned and operated near this locality, which took a great majority of the Tourist business.

SEWERAGE DOMESTIC WITH A TOTAL EXPENDITURE OF $3,589.70, made up of $1,940.72, City Pay Roll, and $1,648.98 for material.

The above total is made up as follows:-

House connections and private sewer installations.....	$785.88
University Avenue sewerage extension.....	790.42
Regent Street sewerage extension.....	1,244.60
Sewer Maintenance.....	768.80
	$3,589.70

Under House Connections and private sewer installations,- this cost of $785.88 has all been returned to the City, as, under the

City By-Laws, work of this nature must be paid for in advance by those desiring to have house connections installed. This item, besides eight house connections, included the installation of two private sewer connections to our City surface sewers. One of these connections was from J. Clark & Sons, Ltd., on York Street, and the other from the roof of the Royal Bank Building, on the corner of Carleton and Queen Streets. As these sewer connections were to be used to drain a car washing stand and gravel roof respectively, they were led into the surface sewers rather than our domestic sewer system. The costs of these connections were, of course, paid for by the owners of the properties and not by the City.

University Avenue sewer extension,-This sewer extension was made necessary by the request of the University of New Brunswick to be joined up with our City sewerage system. The 8" sewer on University Avenue was extended a distance of some 680 feet south along University Avenue to the junction of University Avenue and road running up to the University Buildings. In making this installation, it was necessary to use some 8" cast iron pipe as a siphon beneath the brook (City Backdrain) which crosses University Avenue. As the yearly sewerage rates paid by the University of New Brunswick will, according to agreement, be governed by the cost of this installation, I will here give an itemized account of the cost:-

Labor cost	$242.90
635 feet 8" terra cotta pipe @ .40¢	254.00
8 - 8" terra cotta Y's @ $1.60	12.80
4 special 8" cast iron castings	10.00
12 feet of 8" cast iron pipe	15.60
4 manhole frames and covers @ $20.58	82.32
2500 hard brick @ $16.00, plus 3% sales tax	41.20
30 bags cement @ .70¢	21.00
One yard crushed stone	3.00
3 yards gravel @ $1.50	4.50
	$667.32
Overhead (Small tools, charges of C. N. R. and C. P. R. for supervision and assistance in crossing tracks, engineering work, Workmen's Compensation Board, etc.)...15%	$103.10
Total cost of installation	$790.42

Cost per foot - $1.17

The Engineer's estimate submitted before work was started on this installation was $941.97.

Regent Street Sewer Extension,-The 8" domestic sewer on Regent Street was extended south from a point on Regent Street near the C. N. R. Railway Crossing some 700 feet to a point on Maryland Hill opposite the residence of Ashley A. Colter. This extension crossed under the C. N. R. and C. P. R. tracks and also under the City backdrain. The sewer was here low enough to go beneath the backdrain without making it necessary to use a siphon.

The itemized cost of this sewer are :-

Labor	$ 649.56
653 feet terra cotta pipe @ .40¢.....	261.20
12 - 8" Y's @ $1.60	19.20
12 feet of 8" cast iron pipe	15.60
2000 hard bricks @ $16.00 plus 3% sales tax	32.96
3 manhole frames and covers @ $20.58	61.74
10 yards of gravel @ $ 1.50	15.00
2 yards of crushed stone @ $ 3.00	6.00
30 bags of cement @ .70¢	21.00
	$1,082.26
Overhead (Small tools,etc.) 15%	162.34
	$ 1,244.60

The Engineer's estimate submitted before work was started on this installation was $ 1,200.00

It will be noticed that the labor cost on this installation is much greater than the labor cost on the University Avenue extension for practically the same number of lineal feet. However, the work in laying the Regent Street extension was much more difficult, the ground being wet and full of boulders. Again, in digging the trench for this installation,we had to cut through some heavy corduroy which we found about four feet below the surface of the ground. This corduroy was met with for a distance of slightly over 200 feet.

Sewer maintenance :- This charge of $ 768.80 is for maintenance work on our existing domestic sewer system. This Maintenance consists of flushing all the mains in the City twice or three times a year; (This year they were flushed three times); taking obstructions from house connections; thawing out frozen sewers and in general any work on sewerage domestic pertaining to the existing sewerage system.

Water:- With a total cost of $ 26,122.73

This cost is divided into two charges of ;-

Water Ordinary	$ 7,877.68
and	
Water Pumping Station	18, 245.05
	$ 26, 122.73

Water ordinary takes in all work done outside the pumping station and pumping station grounds.the total of $ 7,877.68 for this item is divided into:

City Pay Rolls	$ 4.520.93
and	
Material and other charges	3.356.75
	$ 7,877.68

Nine new water services were installed for new customers and a number of broken or worn out services were fixed or renewed. In this class of work the customer pays for all labor and material outside the street limit while the City stands all expense inside the street limit.

During the summer all water services which were not lead were relaid from the main to the curbcock on King Street from Westmorland to Carleton Street and on the north side of King Street from Carleton to Regent Street,- in all forty -two services. This relaying was necessary between York and Carleton Streets as a new pavement was laid there this season. The other block and a half was relaid as it was thought probable that these two blocks would be paved in 1929. In laying these services a year ahead, it permits the back fill in the trench to become more compact. The special relaying of these 42 services cost $ 998.90 - $ 430.90 being labor charges and $ 568.00 being material charges, making the average cost of one service $ 23.79.

All water mains in the City were flushed in the fall. Besides this general flushing, it is necessary from time to time to flush dead ends such as Woodstock Road.

The fire hydrants in the City, some 136 in all, are at the beginning of cold weather inspected and repacted. During the cold season these hydrants are inspected at least once every two weeks.

The 8" main on Regent Street was extended south some 630 feet. This extension started about 150 feet south of the Valley Track and stopped 450 feet south of the C. P. R. tracks, or in front of the residence of Ashley A. Colter.

An itemized cost of the work is as follows :-

630 feet of 8" Class C. Cast Iron Pipe	$ 900.00	
Gate Valves	180.00	
Hydrant	100.00	
Lead and Okum	80.00	
Labor	591.15	
	$	1,851.15
Overhead		
Small tools, Instrument Work, Lumber, C. P. R. Supervision, ... 10 %		185.11
	$	2,036.26

Total Cost of Installing @ $3.23 a foot

Note : The 10 % overhead is on account of the large cost of material when compared to the cost of labor.

The labor cost on this work was higher than ordinary cost of laying mains in the City on account of the nature of the ground through which the main was laid. The trench ran through a clay and gravel soil, studded with small boulders. This work was also hindered by ground water which was encountered for the entire length of the trench.

The estimated cost of this piece of work was $ 2,000.00

We have in Fredericton some 998 water accounts on Meter and some 498 on what is known as Flat Rate or without Meter.

The meters are read four times a year, although the accounts

are only billed twice a year. About twenty of the above meter accounts, where there is a large or varied consumption, are read once a month.

The monthly and quarterly readings are necessary not only from the City's standpoint of inspection and protection, but in order to protect the customer. There might be unknown leaks in the system, causing an unnecessary waste of water for which the customer would have to pay. We frequently find such leaks in rented houses where the tenant is not careful of water which the landlord has to pay for. Upon such leaks being discovered by the Meter Reader, they are reported to both the tenant and landlord.

Number of services, not before under meter, metered this year...24.
Number of old meters replaced by new.....30
Number of these old meters which can be repaired and put back into service.....23
Number completely worn out which must be scrapped..... 7

Meters now in stock:-

New meters.....	5/8" Trident.....	8
Repaired meters now fit for service,-	5/8" Trident.....	8
Used meters which can be repaired and put in service.....	(Trident.....	23
	(National.....	6

This season fifty 5/8" Trident meters were purchased at a cost of $675.00. The serial numbers of these new meters run from 3,701,506 to 3,701,555.

WATER PUMPING STATION includes all labor and material used in Pumping Station and Pumping Station grounds.

The total expense of $18,245.05 is divided as follows:-

$6,304.19 City Pay Rolls
11,940.86 Material and other expenses

This material and other expense charge is divided as follows:-

Item #1.	Light and Electric Power supplied by Maritime Electric.....		$5,416.74
" #2.	Transformer charges.....		126.60
" #3.	Lime, 6335 lbs.....		203.85
" #4.	Alum, 85,025 lbs.....		1,309.41
" #5.	Coal, 307.19 tons.....		1,612.74
" #6.	Fuel Oil, 5158 gal.....		600.10
" #7.	Engine Oil (Renown) 69 gal.....		41.61
" #8.	Motor oil (Polarine) 89 gal.....		57.86
" #9.	Gasoline, 135 gal.....		30.38
" #10	Maintenance and repairs of building and machinery.....		269.48
" #11	New installations.....		498.49
" #12	Supplies (Packing, Rags, etc).....		101.04
" #13	Stationery (Forms, Charts, etc).....		104.75
" #14	Workmen's Compensation Board.....		547.19
" #15	Dr. Hagerman's salary.....		900.00
" #16	Hoisting Chemicals.....		78.00
" #17	Miscellaneous (Telephone, Petty Cash, etc).....		42.62
	Total.....		$11,940.86

Item #1 covers all charges paid to Maritime Electric Company for light and power. The power at Pumping Station was supplied by Maritime Electric from the 1st of February, 1928, to the 1st of December, 1928. However, the bill for November is not included in the cost as the Maritime Electric bill was not submitted in time to be put through at the December Meeting of the Council and therefore is not included in the yearly cost of 1928. Considering the fact that the Maritime Electric Company have been carrying on a program of construction in their Plant, in my opinion the power as supplied by them to the City Pumping Station has been satisfactory for the time covered by the report. In this period of eight months they have dropped out motor service pumps ten times. These accidents have generally been due to drop in frequency when changing over from one machine to another at the Maritime Electric plant. Most of these failures were from five to ten minutes duration. Three of the ten failures were so short that it was not necessary to start our auxiliary. During the other seven failures we carried our load with our Sterling gasoline engine. I think, however, that these small failures should be entirely done away with in the future.

Item #2 is a yearly charge of 10% of the initial cost and cost of installation of the transformers at the Pumping Station. These transformers are owned by the Maritime Electric and the City pays this rental as per the contract between the two parties. As the service has been in force for ten months, the City is here paying ten twelfths of the ordinary yearly charge.

Item #5. It is interesting to note that on May 10th, 1928, for the first time in many years there was no fire under the boilers and no steam power available.

Item #10 covers repairs to machinery, repairs and painting of buildings, and maintenance of grounds. This cost is, of course, for materials only as any work done is shown under City Pay Roll charge of $6,304.19.

Item #11 is made up of $178.92 for outside labor and material in completing switchboard installation; $27.81 material for installation of auxiliary light in oil engine room; $52.85 for purchase of ½ H.P. motor for charging batteries, running emery stone, etc., and $258.88 for the purchase of an 11½" impeller and shaft for one of our service pumps. This new impeller and shaft were installed July 13th, 1928, and enabled us to cut our water pressure at Pumping Station from 70 lbs. to 60 lbs. This drop in pressure saves the City some $10.00 a month in demand charges and at least $50.00 a month in energy and chemical charges. It will be seen from this statement that the installation has already paid for itself.

Item #14 has the amount of $513.71 over and above the ordinary yearly cost for Workman's Compensation. This $513.71 is an assessment made by the Board against previous years' Pay Rolls on which no Workmen's Compensation had been paid.

Item #15. Dr. Hagerman's salary was not shown against Pumping Station in my Yearly Report for 1927, but should have been so shown. However this omission of last year makes the cost for Pumping Station in this report some $900.00 out of proportion when compared with last year's report.

Comparison of Water Pumped and Yearly Cost:-

	Imp.Gal. Water Pumped.	Total Yearly Cost of Pumping Station.	Cost per 1000 Gal. of Water.
1926	206,076,526		
1927	198,165,000	$18,040.65	9.10¢
1928	192,890,000	18,245.05	9.46¢

I am here affixing the Yearly Report of Dr. Hagerman, the City Analyst, and John Malloy, Chief Engineer at the Pumping Station:-

REPORT ON FREDERICTON FILTRATION PLANT - 1928

John D. MacKay, Esq.,
City Engineer, Fredericton, N. B.

Dear Sir:-

Following is my report on the operation of the Water Filtration Works for the year 1928.

1. Total Bacteria by plate counts on Agar.

Twenty-nine series of tests were carried out during the year. These tests as usual include samples of the Raw Water, the Effluent at the filter and a Tap Sample.

Average Bacteria per cubic centimeter for Year

Year	Raw Water	Effluent	Tap	Per Cent Removal
1925	1492	7.2	24.8	99.6
1926	1916	6.4	24.8	99.6
1927	1767	7.3	14.5	99.6
1928	1186	5.8	9.6	99.5

The results for 1928 show a somewhat smaller average of bacteria in the different classes of water than usual but the general results are very similar to those obtained for several years past.

2. Dosage of Chemicals

Alum, when used, from 2.6 to 4.0 grains per gallon
Hypo, (used constantly) 0.5 to 1.6 parts per million of available chlorine

Continuing the practice of previous years the plant was operated for a period of 116 days during the year using the Hypo treatment alone. This method is used at times when the water is clear and does not act well with the alum coagulent and continues to give very satisfactory results.

3. Supervision and Chemical Tests

Daily tests of chemical solutions continue to be made and regular charts of the rate of flow of all solutions are kept continuously. These, in connection with daily inspections, continue to produce uniformity of operation on which the successful operation of the plant depends.

4. General Observations

The year 1928 offered varying conditions and difficulties similar to those encountered in past years and the results indicate that these have been met with a considerable degree of success. The bacterial count of the filtered water has been kept very low and I should consider the general results satisfactory.

I have to thank you and others associated with me in this work for hearty cooperation throughout the year.

Fredericton, N. B.,
January 1929.

H. H. Hagerman.

Mr. J. D. MacKay,
City Engineer,
Fredericton, N. B.

Dear Sir:-

I herewith submit my report on the operation of the City of Fredericton Pumping Plant from December 1, 1927, to November 30, 1928.

The following table shows the sources from which power was derived during this time:-

Month	Total Hours	Hours Power Supplied By: Maritime	Oil	Steam	Gas
Dec. 1927	744		744		
Jan. 1928	744		408	336	
Feb. "	696	615	4	75¾	1¼
March "	744	742¾			1¼
April "	720	719¾			¼
May "	744	743½			½
June "	720	720			
July "	744	743¼			¾
August "	744	744			
Sept. "	720	695½	24		½
Oct. "	744	744			
Nov. "	720	720			

From December 1, 1927, to January 10, 1928, power was supplied by the Oil Engine Plant. From January 10th to February 23rd inclusive, power was supplied by the Steam Plant, the Oil Engine Plant being shut down fourteen days to allow for the necessary connection being made on the Oil Engine Switchboard to permit the Maritime Company to supply power to operate the Pumping Plant. In this period there was installed a new slate panel supplied by oil switches and automatic circuit breakers, also one recording volt meter and one recording frequency meter. The Maritime Electric installed an independent power line from their Plant on Shore Street to the Pumping Plant. This power was transformed by two transformers, installed by the Maritime Electric Company in our Oil Engine Room, from 2300 volt, two phase, sixty cycle, to 2300 volt, three phase, sixty cycle. Power was turned on through this new installation on the 1st day of February, 1928, and gave good service for the balance of the year ending November 30, 1928. When the above mentioned switchboard installation was put in, provision was made so that the light and power to the Victoria Hospital would come over the Pumping Station power lines and in case of a failure or interruption in Maritime power, light and power can be supplied by our Oil Engine.

During the summer the pump well was thoroughly cleaned of all mud and silt and washed out. Also the wells and crib pier on the river end of the intake pipe were thoroughly cleaned. The valves in the pump well were examined and found to be in good condition. Next year it will be necessary to put a new covering on the intake pier in the river.

The Pumping Plant was kept in a good state of repair. The interior was kept clean and tidy. Considerable overhauling and painting was done which greatly improved the appearance and general cleanliness of the Plant. The grounds surrounding the

Plant were in good condition this season, - the grass being kept cut and fences and walks kept in good repair.

The chart and recording system inaugurated in the Plant keeps a daily record of power supplied, water pumped, pressure carried, fuel and oil consumed, etc., and in fact gives a daily record of the Plant. This system is similar to those employed in all up to date Water Pumping Plants, and by this means a continual record is kept from day to day.

In July No. 3 boiler was removed from the Plant and scrapped. There was no salvage value to this boiler on account of its age and construction; the boiler being of lap jointed construction and one piece bottom half. This construction is not now permitted and the boiler inspectors will not allow a sufficient working pressure on a boiler of this age and construction. The replacement of this boiler is not necessary, for the Steam Plant can be operated when necessary by the two boilers now in place.

The grate area in the elder of these two boilers was reduced, as under ordinary circumstances the boiler is only used for heating purposes. This reduction in the grate area saves about 800 lbs. of coal a day when boiler is being used for heating purposes only.

Respectfully submitted,

(Sgd) John J. Malloy,

Chief Engineer.

Dr. Hagerman's Report shows that the safety of the Water Consumer has been a chief consideration during the year and has been well looked after. As Dr. Hagerman states this safety can only be insured by constant supervision along with the co-operation of the employees at the Pumping Station.

All of which is respectfully submitted.

City Engineer.

January 31, 1929.