

ARTICLE 1

INVENTORY

PEDESTRIAN SIGNAL

Size (mm)	Display	Quantity Per Intersection
300	Green	2
300	Red	2
300	Amber	2
200	Green	2
200	Red	2
200	Amber	2
Don't Walk		4
Walk		4
NO. OF LAMPS		20
TOTAL PED SIGNALS		242
TOTAL NO. OF LAMPS		4840

TRAFFIC SIGNAL - 2 WAY/2 WAY

Size (mm)	Display	Quantity Per Intersection
300	Green	4
300	Red	4
300	Amber	4
200	Green	4
200	Red	4
200	Amber	4
Don't Walk		8
Walk		8
NO. OF LAMPS		40
TOTAL TRAFFIC SIGNALS		410
TOTAL NO. OF LAMPS		16400

TRAFFIC SIGNAL - 8 PHASE

Size (mm)	Display	Quantity Per Intersection
300	Green	8
300	Red	8
300	Amber	8
200	Green	8
200	Red	8
200	Amber	8
Don't Walk		8
Walk		8
TOTAL NO. OF LAMPS		64
TOTAL 8-PHASE SIGNALS		19
TOTAL NO. OF LAMPS		1216

ESTIMATED TOTAL NUMBER OF LENSES IN THE CITY =

22,456

ARTICLE 2

ESTIMATED ELECTRICITY COSTS WITH INCANDESCENT BULBS

PEDESTRIAN SIGNAL

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	2	150	88	\$133.44
300	Red	2	150	11	\$16.68
300	Amber	2	150	1	\$1.52
200	Green	2	69	88	\$61.38
200	Red	2	69	11	\$7.67
200	Amber	2	69	1	\$0.70
Don't Walk		4	69	90	\$125.55
Walk		4	69	10	\$13.95
TOTAL COST PER PEDESTRIAN SIGNAL					\$360.89
NUMBER OF PEDESTRIAN SIGNALS					242
TOTAL COST FOR ALL PEDESTRIAN SIGNALS					\$87,336.04

TRAFFIC SIGNAL

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	4	150	43	\$130.41
300	Red	4	150	52	\$157.70
300	Amber	4	150	5	\$15.16
200	Green	4	69	43	\$59.99
200	Red	4	69	52	\$72.54
200	Amber	4	69	5	\$6.98
Don't Walk		8	69	80	\$223.21
Walk		8	69	20	\$55.80
TOTAL COST PER TRAFFIC SIGNAL					\$721.79
NUMBER OF TRAFFIC SIGNALS					410
TOTAL COST FOR ALL TRAFFIC SIGNALS					\$295,932.04

TRAFFIC SIGNAL - 8 PHASE

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	8	150	43	\$260.81
300	Red	8	150	52	\$315.40
300	Amber	8	150	5	\$30.33
200	Green	8	69	43	\$119.97
200	Red	8	69	52	\$145.08
200	Amber	8	69	5	\$13.95
Don't Walk		8	69	80	\$223.21
Walk		8	69	20	\$55.80
TOTAL COST PER INTERSECTION					\$1,164.56
NUMBER OF PEDESTRIAN SIGNALS					\$19.00
TOTAL COST FOR ALL PEDESTRIAN SIGNALS					\$22,126.67

TOTAL ESTIMATED ANNUAL ELECTRICITY COST \$405,394.74

ARTICLE 2

ESTIMATED ELECTRICITY COSTS WITH GREEN, RED, & DON'T WALK LEDs

PEDESTRIAN SIGNAL

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	2	11	88	\$9.79
300	Red	2	10	11	\$1.11
300	Amber	2	150	1	\$1.52
200	Green	2	9	88	\$8.01
200	Red	2	7	11	\$0.78
200	Amber	2	69	1	\$0.70
Don't Walk		4	9	90	\$16.38
Walk		4	69	10	\$13.95
TOTAL COST PER PEDESTRIAN SIGNAL					\$52.22
NUMBER OF PEDESTRIAN SIGNALS					242
TOTAL COST FOR ALL PEDESTRIAN SIGNALS					\$12,638.04

TRAFFIC SIGNAL

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	4	11	43	\$9.56
300	Red	4	10	52	\$10.51
300	Amber	4	150	5	\$15.16
200	Green	4	9	43	\$7.82
200	Red	4	7	52	\$7.36
200	Amber	4	69	5	\$6.98
Don't Walk		8	9	80	\$29.11
Walk		8	69	20	\$55.80
TOTAL COST PER TRAFFIC SIGNAL					\$142.32
NUMBER OF TRAFFIC SIGNALS					410
TOTAL COST FOR ALL TRAFFIC SIGNALS					\$58,349.18

TRAFFIC SIGNAL - 8 PHASE

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	8	11	43	\$19.13
300	Red	8	10	52	\$21.03
300	Amber	8	150	5	\$30.33
200	Green	8	9	43	\$15.65
200	Red	8	7	52	\$14.72
200	Amber	8	69	5	\$13.95
Don't Walk		8	9	80	\$29.11
Walk		8	69	20	\$55.80
TOTAL COST PER 8-PHASE SIGNAL					\$199.71
NUMBER OF 8-PHASE SIGNALS					\$19.00
TOTAL COST FOR ALL PEDESTRIAN SIGNALS					\$3,794.57

TOTAL ESTIMATED ANNUAL ELECTRICITY COST \$74,781.79

ARTICLE 2

NO COST SHARING

PEDESTRIAN SIGNAL

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	2	11	88	\$9.79
300	Red	2	150	11	\$16.68
300	Amber	2	150	1	\$1.52
200	Green	2	9	88	\$8.01
200	Red	2	69	11	\$7.67
200	Amber	2	69	1	\$0.70
Don't Walk		4	9	90	\$16.38
Walk		4	69	10	\$13.95
TOTAL COST PER PEDESTRIAN SIGNAL					\$74.69
NUMBER OF PEDESTRIAN SIGNALS					242
TOTAL COST FOR ALL PEDESTRIAN SIGNALS					\$18,073.91

TRAFFIC SIGNAL

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	4	150	43	\$130.41
300	Red	4	10	52	\$10.51
300	Amber	4	150	5	\$15.16
200	Green	4	69	43	\$59.99
200	Red	4	7	52	\$7.36
200	Amber	4	69	5	\$6.98
Don't Walk		8	9	80	\$29.11
Walk		8	69	20	\$55.80
TOTAL COST PER TRAFFIC SIGNAL					\$315.32
NUMBER OF TRAFFIC SIGNALS					410
TOTAL COST FOR ALL TRAFFIC SIGNALS					\$129,281.68

TRAFFIC SIGNAL - 8 PHASE

Size (mm)	Display	Quantity Per Intersection	Power (W)	ON TIME (%)	ANNUAL COST
300	Green	8	150	43	\$260.81
300	Red	8	10	52	\$21.03
300	Amber	8	150	5	\$30.33
200	Green	8	69	43	\$119.97
200	Red	8	7	52	\$14.72
200	Amber	8	69	5	\$13.95
Don't Walk		8	9	80	\$29.11
Walk		8	69	20	\$55.80
TOTAL COST PER 8-PHASE SIGNAL					\$545.73
NUMBER OF 8-PHASE SIGNALS					\$19.00
TOTAL COST FOR ALL PEDESTRIAN SIGNALS					\$10,368.80

TOTAL ESTIMATED ANNUAL ELECTRICITY COST \$157,724.40

ARTICLE 3

COST TO REPLACE ALL SIGNALS

PEDESTRIAN SIGNAL

Size (mm)	Display	Quantity Per Intersection	UNIT COST	SUBTOTAL
300	Green	2	\$280	\$560
300	Red	2	\$130	\$260
300	Amber	2	\$160	\$320
200	Green	2	150	\$300
200	Red	2	\$95	\$190
200	Amber	2	\$130	\$260
Don't Walk		4	\$120	\$480
Walk		4	\$120	\$480
TOTAL COST PER PEDESTRIAN SIGNAL				\$2,850
NUMBER OF PEDESTRIAN SIGNALS				242
TOTAL COST FOR ALL PED. SIGNALS				\$689,700

TRAFFIC SIGNAL

Size (mm)	Display	Quantity Per Intersection	UNIT COST	SUBTOTAL
300	Green	4	\$280	\$1,120
300	Red	4	\$130	\$520
300	Amber	4	\$160	\$640
200	Green	4	150	\$600
200	Red	4	\$95	\$380
200	Amber	4	\$130	\$520
Don't Walk		8	\$120	\$960
Walk		8	\$120	\$960
TOTAL COST PER TRAFFIC SIGNAL				\$5,700
TOTAL NUMBER OF TRAFFIC SIGNALS				410
TOTAL COST FOR ALL TRAFFIC SIGNALS				\$2,337,000

TRAFFIC SIGNAL - 8 PHASE

Size (mm)	Display	Quantity Per Intersection	UNIT COST	SUBTOTAL
300	Green	8	\$280	\$2,240
300	Red	8	\$130	\$1,040
300	Amber	8	\$160	\$1,280
200	Green	8	150	\$1,200
200	Red	8	\$95	\$760
200	Amber	8	\$130	\$1,040
Don't Walk		8	\$120	\$960
Walk		8	\$120	\$960
TOTAL COST PER 8-PHASE SIGNAL				\$9,480
TOTAL NUMBER OF 8-PHASE SIGNALS				19
TOTAL COST FOR ALL 8-PHASE SIGNALS				\$180,120

TOTAL REPLACEMENT COST	\$3,206,820
10% Contingency	\$3,527,502

ARTICLE 3

COST TO REPLACE GREENS, REDS, AND DON'T WALKS ONLY

PEDESTRIAN SIGNAL

Size (mm)	Display	Quantity Per Intersection	UNIT COST	SUBTOTAL
300	Green	2	\$280	\$560
300	Red	2	\$130	\$260
300	Amber	2	NA	-
200	Green	2	\$150	\$300
200	Red	2	\$95	\$190
200	Amber	2	NA	-
Don't Walk		4	\$120	\$480
Walk		4	NA	-
TOTAL COST PER PEDESTRIAN SIGNAL				\$1,790
NUMBER OF PEDESTRIAN SIGNALS				242
TOTAL COST FOR ALL PED. SIGNALS				\$433,180

TRAFFIC SIGNAL

Size (mm)	Display	Quantity Per Intersection	UNIT COST	SUBTOTAL
300	Green	4	\$280	\$1,120
300	Red	4	\$130	\$520
300	Amber	4	NA	-
200	Green	4	150	\$600
200	Red	4	\$95	\$380
200	Amber	4	NA	-
Don't Walk		8	\$120	\$960
Walk		8	NA	-
TOTAL COST PER TRAFFIC SIGNAL				\$3,580
TOTAL NUMBER OF TRAFFIC SIGNALS				410
TOTAL COST FOR ALL TRAFFIC SIGNALS				\$1,467,800

TRAFFIC SIGNAL - 8 PHASE

Size (mm)	Display	Quantity Per Intersection	UNIT COST	SUBTOTAL
300	Green	8	\$280	\$2,240
300	Red	8	\$130	\$1,040
300	Amber	8	NA	-
200	Green	8	150	\$1,200
200	Red	8	\$95	\$760
200	Amber	8	NA	-
Don't Walk		8	\$120	\$960
Walk		8	NA	-
TOTAL COST PER 8-PHASE SIGNAL				\$6,200
TOTAL NUMBER OF 8-PHASE SIGNALS				19
TOTAL COST FOR ALL 8-PHASE SIGNALS				\$117,800

TOTAL REPLACEMENT COST	\$2,018,780
+ 10% Contingency	\$2,220,658

ARTICLE 4

COST BENEFIT ANALYSIS

PEDESTRIAN SIGNAL

Size (mm)	Display	Unit Cost (\$)	Incandescent Bulb Power Consumption (W)	LED Power Consumption (W)	ON TIME (%)	Annual Electricity Cost w/ Bulbs (\$)	Annual Electricity Cost w/ LEDs (\$)	Electricity Cost Savings/Year (\$)	Maintenance Savings/Year (\$)*	Payback Period (Years)
300	Green	\$280	150	11	88	\$66.72	\$4.89	\$61.83	\$4.90	4.2
300	Red	\$130	150	10	11	\$8.34	\$0.56	\$7.78	\$4.90	10.2
300	Amber	\$160	150	19	1	\$0.76	\$0.10	\$0.66	\$4.90	28.8
200	Green	\$150	69	9	88	\$30.69	\$4.00	\$26.69	\$4.90	4.7
200	Red	\$95	69	7	11	\$3.84	\$0.39	\$3.45	\$4.90	11.4
200	Amber	\$130	69	10	1	\$0.35	\$0.05	\$0.30	\$4.90	25.0
	Don't Walk	\$120	69	9	90	\$31.39	\$4.09	\$27.29	\$4.90	3.7
	Walk	\$120	69	6.5	10	\$3.49	\$0.33	\$3.16	\$4.90	14.9

TRAFFIC SIGNAL / 8-Phase Signal

Size (mm)	Display	Unit Cost (\$)	Incandescent Bulb Power Consumption (W)	LED Power Consumption (W)	ON TIME (%)	Annual Electricity Cost w/ Bulbs (\$)	Annual Electricity Cost w/ LEDs (\$)	Electricity Cost Savings/Year (\$)	Maintenance Savings/Year (\$)*	Payback Period (Years)
300	Green	\$280	150	11	43	\$32.60	\$2.39	\$30.21	\$4.90	8.0
300	Red	\$130	150	10	52	\$39.43	\$2.63	\$36.80	\$4.90	3.1
300	Amber	\$160	150	19	5	\$3.79	\$0.48	\$3.31	\$4.90	19.5
200	Green	\$150	69	9	43	\$15.00	\$1.96	\$13.04	\$4.90	8.4
200	Red	\$95	69	7	52	\$18.14	\$1.84	\$16.30	\$4.90	4.5
200	Amber	\$130	69	10	5	\$1.74	\$0.25	\$1.49	\$4.90	20.3
	Don't Walk	\$120	69	9	80	\$27.90	\$3.64	\$24.26	\$4.90	4.1
	Walk	\$120	69	6.5	20	\$6.98	\$0.66	\$6.32	\$4.90	10.7

Electricity Rate = 0.0577 \$/kWh

Annual Electricity Costs = (On Time)x(365 days/year)x(24 hours)x(Electricity Rate)x(Power Consumption)

Payback Period = [Unit Cost]/[(Electricity Cost Savings/Year)+(Maintenance Savings/Year)]

* The Annual Maintenance Saving/Year was determined based on the maintenance savings once LED's are installed, \$110,000, divided by the total number of lenses in the City, 22,456 units, as estimated in Article 1.

ARTICLE 5

A) DO NOTHING

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Rate																								
EXISTING BUDGETS:																								
a) Traffic Signal Electricity Budget	\$323	\$329	\$336	\$342	\$349	\$356	\$363	\$370	\$378	\$385	\$393	\$401	\$409	\$417	\$426	\$434	\$443	\$452	\$461	\$470	\$479	\$489	\$499	
b) Spot & Group Lamping Budget	\$170	\$173	\$177	\$180	\$184	\$188	\$191	\$195	\$199	\$203	\$207	\$211	\$216	\$220	\$224	\$229	\$233	\$238	\$243	\$248	\$253	\$258	\$263	
TOTAL AVAILABLE BUDGET	\$493	\$502	\$512	\$523	\$533	\$544	\$555	\$566	\$577	\$589	\$600	\$612	\$625	\$637	\$650	\$663	\$676	\$690	\$703	\$717	\$732	\$746	\$761	
EXPENDITURES:																								
a) Electricity Costs w/ Incandescent bulbs	-\$323	-\$329	-\$336	-\$342	-\$349	-\$356	-\$363	-\$370	-\$378	-\$385	-\$393	-\$401	-\$409	-\$417	-\$426	-\$434	-\$443	-\$452	-\$461	-\$470	-\$479	-\$489	-\$499	
b) Spot & Group Lamping Budget w/ bulbs	-\$170	-\$173	-\$177	-\$180	-\$184	-\$188	-\$191	-\$195	-\$199	-\$203	-\$207	-\$211	-\$216	-\$220	-\$224	-\$229	-\$233	-\$238	-\$243	-\$248	-\$253	-\$258	-\$263	
c) Estimated Labour Costs to Install LEDs																								
d) Payment to BC Hydro																								
e) 7th Year Replacement LEDs																								
TOTAL EXPENDITURES	-\$493	-\$502	-\$512	-\$523	-\$533	-\$544	-\$555	-\$566	-\$577	-\$589	-\$600	-\$612	-\$625	-\$637	-\$650	-\$663	-\$676	-\$690	-\$703	-\$717	-\$732	-\$746	-\$761	
Net Annual Balance	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
Carry forward from previous year	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	
BALANCE IN RESERVE ACCOUNT	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	

With this Option, the City would continue to use incandescent bulbs. As a result, there would be no benefits in electricity savings or maintenance savings. The budgets for Traffic Signal Electric and Group & Spot Lamping would continue to increase at an estimated 2% for inflation.

ARTICLE 5

B) LED REPLACEMENT PROGRAM - ALL GREEN, RED, & DON'T WALK

(IN 1,000s OF DOLLARS)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Rate	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
EXISTING BUDGETS:																							
a) 2002 Traffic Signal Electricity Budget	\$323	\$329	\$336	\$342	\$349	\$356	\$363	\$370	\$378	\$385	\$393	\$401	\$409	\$417	\$426	\$434	\$443	\$452	\$461	\$470	\$479	\$489	\$499
b) 2002 Spot & Group Lamping Budget	\$170	\$173	\$177	\$180	\$184	\$188	\$191	\$195	\$199	\$203	\$207	\$211	\$216	\$220	\$224	\$229	\$233	\$238	\$243	\$248	\$253	\$258	\$263
TOTAL BUDGET AVAILABLE	\$493	\$502	\$512	\$523	\$533	\$544	\$555	\$566	\$577	\$589	\$600	\$612	\$625	\$637	\$650	\$663	\$676	\$690	\$703	\$717	\$732	\$746	\$761
EXPENDITURES:																							
a) Estimated Electricity Costs with LEDs	-\$199	-\$76	-\$78	-\$79	-\$81	-\$83	-\$84	-\$86	-\$88	-\$89	-\$91	-\$93	-\$95	-\$97	-\$99	-\$101	-\$103	-\$105	-\$107	-\$109	-\$111	-\$113	-\$116
b) Estimated Spot & Group Lamping with LEDs	-\$115	-\$61	-\$62	-\$64	-\$65	-\$66	-\$68	-\$69	-\$70	-\$72	-\$73	-\$75	-\$76	-\$78	-\$79	-\$81	-\$82	-\$84	-\$86	-\$87	-\$89	-\$91	-\$93
c) Estimated Labour Costs to Install LEDs	-\$190	-\$194						-\$218	-\$223						-\$251	-\$256						-\$288	-\$294
d) Payment to BC Hydro																							
e) Replace LEDs after 7 Year Life-Cycle	-\$110	-\$220	-\$220	-\$220	-\$220	-\$110																	
TOTAL EXPENDITURES	-\$614	-\$551	-\$360	-\$363	-\$366	-\$259	-\$152	-\$1384	-\$1,412	-\$161	-\$164	-\$168	-\$171	-\$174	-\$1,357	-\$1,385	-\$185	-\$189	-\$193	-\$196	-\$200	-\$1,346	-\$1,373
Net Annual Balance	-\$122	-\$49	\$152	\$160	\$167	\$285	\$403	-\$818	-\$835	\$428	\$436	\$445	\$454	\$463	-\$708	-\$722	\$491	\$501	\$511	\$521	\$532	-\$599	-\$611
Carry forward from previous year	\$0	-\$122	-\$170	-\$18	\$141	\$309	\$594	\$996	\$178	-\$656	-\$229	\$207	\$652	\$1,106	\$1,568	\$861	\$139	\$630	\$1,131	\$1,642	\$2,163	\$2,695	\$2,095
BALANCE IN RESERVE ACCOUNT	-\$122	-\$170	-\$18	\$141	\$309	\$594	\$996	\$178	-\$656	-\$229	\$207	\$652	\$1,106	\$1,568	\$861	\$139	\$630	\$1,131	\$1,642	\$2,163	\$2,695	\$2,095	\$1,484

SAMPLE CALCULATIONS

YEAR 1 (2002)

Since the replacement program is to span over a 2 year period, the City would not begin to see the full benefits of LEDs until year 2. Therefore:

Estimated Electricity Costs with LEDs in 2002 = (Incandescent Electricity Costs + LED Electricity costs)/2 = (\$322,500 + \$74,781)/2 = \$199,000

Estimated Spot & Group Lamping with LEDs in 2002 = (Incandescent Maintenance Costs + LED Maintenance Costs)/2 = (\$170,000 + \$60,000)/2 = \$115,000

YEAR 2 (2003)

At the end of year 2, all green, red, and don't walk signals should be replaced. Therefore:

Estimated Electricity Costs with LEDs in 2003 = \$74,782 x 2% inflation = \$76,300

Estimated Spot & Group Lamping with LEDs in 2003 = \$60,000 x 2% inflation = \$61,200

YEARS 7 and 8 (2009 and 2010)

After 7 years the City would be responsible for replacing all LEDs without BC Hydro cost sharing. The total program cost for materials was initially estimated at \$2.2 Million in year 1. This option assumes that the material costs for LED technology would reduce by 20% after 7 years and increase by 2% for inflation each year. Therefore:

Replacement of LEDs after 7 years in 2009 = \$2,200,000/2 x 80% x (1.02)⁷ years = \$1,010,843

Replacement of LEDs after 7 years in 2010 = \$1,010,000 + 2% inflation = \$1,031,060

Labour costs in year 7 would increase by 2% to account for inflation over the 7 years.

YEARS 14 and 15 (2016 and 2017)

The replacement cycle continues again in years 14 and 15

ARTICLE 5

C) NO COST-SHARING

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Rate	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
EXISTING BUDGET:																							
a) 2002 Traffic Signal Electricity Budget	\$323	\$329	\$336	\$342	\$349	\$356	\$363	\$370	\$378	\$385	\$393	\$401	\$409	\$417	\$426	\$434	\$443	\$452	\$461	\$470	\$479	\$489	\$499
b) 2002 Spot & Group Lamping Budget	\$170	\$173	\$177	\$180	\$184	\$188	\$191	\$195	\$199	\$203	\$207	\$211	\$216	\$220	\$224	\$229	\$233	\$238	\$243	\$248	\$253	\$258	\$263
TOTAL BUDGET AVAILABLE	\$493	\$502	\$512	\$523	\$533	\$544	\$555	\$566	\$577	\$589	\$600	\$612	\$625	\$637	\$650	\$663	\$676	\$690	\$703	\$717	\$732	\$746	\$761
EXPENDITURES:																							
a) Estimated Electricity Costs with LEDs	\$241	\$163	\$166	\$170	\$173	\$177	\$180	\$184	\$187	\$191	\$195	\$199	\$203	\$207	\$211	\$215	\$220	\$224	\$229	\$233	\$238	\$243	\$247
b) Estimated Spot & Group Lamping w/ LEDs	\$170	\$173	\$177	\$180	\$184	\$188	\$191	\$195	\$199	\$203	\$207	\$211	\$216	\$220	\$224	\$229	\$233	\$238	\$243	\$248	\$253	\$258	\$263
c) Estimated Labour Costs to install LEDs	\$145	\$148																					
d) Payment to BC Hydro																							
e) 7th Year Replacement LEDs	\$650	\$663																					
TOTAL EXPENDITURES	\$1,206	\$1,148	\$343	\$350	\$357	\$364	\$372	\$1,143	\$1,166	\$384	\$402	\$410	\$419	\$427	\$1,179	\$1,203	\$453.02	\$462	\$471	\$481	\$490	\$1,233	\$1,258
Net Annual Balance	\$714	\$645	\$169	\$172	\$176	\$179	\$183	\$577	\$589	\$184	\$198	\$202	\$206	\$210	\$530	\$540	\$223	\$228	\$232	\$237	\$241	\$487	\$497
Carry forward from previous year	\$0	\$714	\$1,359	\$1,190	\$1,017	\$841	\$662	\$479	\$1,056	\$1,645	\$1,451	\$1,253	\$1,050	\$844	\$634	\$1,164	\$1,704	\$1,481	\$1,253	\$1,021	\$785	\$543	\$1,030
BALANCE IN RESERVE ACCOUNT	\$714	\$1,359	\$1,190	\$1,017	\$841	\$662	\$479	\$1,056	\$1,645	\$1,451	\$1,253	\$1,050	\$844	\$634	\$1,164	\$1,704	\$1,481	\$1,253	\$1,021	\$785	\$543	\$1,030	\$1,526

As shown in Article 4, the only signals that would provide a return for investment are the green, and don't walk signals at Pedestrian Signals, and the red and don't walk signals at Traffic and 8-Phase Signals. Therefore, if the City was to initiate a program to install LEDs without assistance from BC Hydro these would be the signals that would be replaced.

The estimated material costs for this option is approximately \$1.3 Million. Labour Cost is 75% of what it would cost to complete the BC Hydro Program which would result in labour costs of approximately \$145,000 per year. For this option, the resulting electricity costs would be approximately \$160,000 in year 2002 dollars.

ARTICLE 5

D) LED REPLACEMENT PROGRAM - ALL SIGNALS

		(IN 1,000s OF DOLLARS)																							
		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	
Rate		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	
EXISTING BUDGETS:																									
a)	2002 Traffic Signal Electricity Budget	\$323	\$329	\$336	\$342	\$349	\$356	\$363	\$370	\$378	\$385	\$393	\$401	\$409	\$417	\$426	\$434	\$443	\$452	\$461	\$470	\$479	\$489	\$499	
b)	2002 Spot & Group Lamping Budget	\$170	\$173	\$177	\$180	\$184	\$188	\$191	\$195	\$199	\$203	\$207	\$211	\$216	\$220	\$224	\$229	\$233	\$238	\$243	\$248	\$253	\$258	\$263	
	TOTAL BUDGET AVAILABLE	\$493	\$502	\$512	\$523	\$533	\$544	\$555	\$566	\$577	\$589	\$600	\$612	\$625	\$637	\$650	\$663	\$676	\$690	\$703	\$717	\$732	\$746	\$761	
EXPENDITURES:																									
a)	Estimated Electricity Costs with LEDs	-\$182	-\$42	-\$43	-\$44	-\$44	-\$45	-\$46	-\$47	-\$48	-\$49	-\$50	-\$51	-\$52	-\$53	-\$54	-\$55	-\$56	-\$57	-\$59	-\$60	-\$61	-\$62	-\$63	
b)	Estimated Spot & Group Lamping with LEDs	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	-\$110	
c)	Estimated Labour Costs to Install LEDs	-\$300	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	-\$306	
d)	Payment to BC Hydro	-\$110	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	-\$220	
e)	Replace LEDs after 7 year life-cycle	-\$650	-\$663																						
	TOTAL EXPENDITURES	-\$1,352	-\$1,274	-\$307	-\$309	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	-\$310	
	Net Balance	-\$860	-\$772	\$206	\$214	\$223	\$342	\$461	\$1,475	\$1,504	\$489	\$499	\$509	\$519	\$529	\$1,364	\$1,391	\$561	\$573	\$584	\$596	\$608	\$1,259	-\$1,284	
	Carry forward from previous year	\$0	-\$860	-\$1,631	-\$1,426	-\$1,212	-\$989	-\$647	-\$187	-\$1,662	-\$3,166	-\$2,677	-\$2,179	-\$1,670	-\$1,151	-\$622	-\$1,986	-\$3,377	-\$2,816	-\$2,243	-\$1,659	-\$1,063	-\$455	-\$1,714	
	BALANCE IN RESERVE ACCOUNT	-\$860	-\$1,631	-\$1,426	-\$1,212	-\$989	-\$647	-\$187	-\$1,662	-\$3,166	-\$2,677	-\$2,179	-\$1,670	-\$1,151	-\$622	-\$1,986	-\$3,377	-\$2,816	-\$2,243	-\$1,659	-\$1,063	-\$455	-\$1,714	-\$2,998	