# Estimation of annual operating and maintenance costs

A. Energy Costs					
1. Tunnel lighting	3000000 kWh/yr @	0.1	\$/kWh= \$	300000	/yr
2. Ventilation fans	400000 kWh/yr @	0.1	\$/kWh= \$	40000	/yr
3. Sump pumps	20000 kWh/yr @	0.1	\$/kWh= \$	2000	/yr

#### **B. Electrical Maintenance Costs**

1. Labour (Assume 1 electricians for 5 days per week throughout year)

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Electrician 1 2080 hrs/yr @ 65 $/hr= $ 135200 /yr
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2. Materials/replacement of equipment (assume electrical equipment replaced once every 40 years)

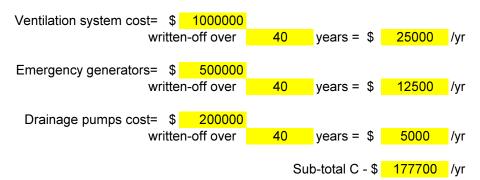
Sub-total A - \$ 342000 /yr

#### C. Mechanical Maintenance Costs

1. Labour (Assume 1 mechanic/maintenance technician for 5 days per week throughout year)

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Mechanic 2080 hrs/yr @ 65 $/hr= $ 135200 /yr
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2. Materials/replacement of equipment (assume mechanical equipment replaced every 40 years)



contd.

### Estimation of annual operating costs

#### **D. Structure Maintenance Costs**

1. Inspection (assume 3 man inspection crew for 10 weeks once every 4 years)

Senior engineer	100	hrs/yr @	130	\$/hr=	\$ 13000	/yr
Engineer 1	100	hrs/yr @	100	\$/hr=	\$ 10000	/yr
Engineer 2	100	hrs/yr @	100	\$/hr=	\$ 10000	/yr

2. Tunnel Cleaning (Assume 4 man crew for 13 weeks once a year)

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Labourers 2080 hrs/yr @ 60 $/hr= $ 124800 /yr
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3. Sump clean-up (Assume 2 man crew for 2 days twice a year)

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Labourers 64 hrs/yr @ 50 $/hr= $ 3200 /yr
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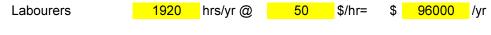
4. Structure maintenance (Assume 4 man crew for 13 weeks once a year)

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Labourers 2080 hrs/yr @ 50 $/hr= $ 104000 /yr
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5. Permanent Way Inspection (Assume 2 men inspect track 3 times per week)

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Labourers 312 hrs/yr @ 50 $/hr= $ 15600 /yr
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6. Permanent way maintenance (Assume 4 man crew for 12 weeks once a year)



Sub-total D - \$ 215600 /yr

Total estimated maintenance cost=\$ 895,500 /yr

# Newfoundland Fixed Link Rail System - Estimation of Annual Operating Cost

Item Annual Cost

# Assumptions:

Facility operates 12 hours/day, 7 days/week 50 percent of this time the facility is fully staffed with toll collectors, the remainder of the time only 1 toll booth is operating on each side.

National Staff   National Staff   National Staff   Tunnel Manager   1.40   Year   100,000   14		on each side.				
Tunnel Operator	Α	Salaried Staff	Mult.	Unit	Rate	
Apprentice Operator   1.40   Year   60,000   84,000   Site Maintenance Mgr   1.40   Year   50,000   70,000		Tunnel Manager	1,40	Year	100,000	140,000
Site Maintenance Mgr		Tunnel Operator	1.40	Year	100,000	140,000
B		Apprentice Operator	1.40	Year	60,000	84,000
Toll collectors - (2 FT, 4 PT, 1 PT Spare)   7,000   h   50   350,000     Site Labor		Site Maintenance Mgr	1.40	Year	50,000	70,000
Site Labor	В			Unit		
Electricians		Toll collectors - (2 FT, 4 PT, 1 PT Spare)	7,000	h	50	350,000
Mechanics		Site Labor	•	h		
Train drivers         8,000         h         85         680,000           Loading foreman         4,000         h         55         220,000           Laborers         20,000         h         40         800,000           C         Subcontracted Work         Subcontracted Work         Subcontracted Work         Subcontracted Work         Subcontracted Work         Subcontracted Work           Locomotive maintenance         1         LS         120,000         120,000         25,000         25,000         25,000         25,000         25,000         25,000         26,000         13,000         26,000		Electricians	6,000	h	65	390,000
Loading foreman		Mechanics	6,000	h		
Laborers         20,000         h         40         800,000           C         Subcontracted Work         Locomotive maintenance         1         LS         120,000         120,000           Rolling stock maintenance         1         LS         25,000         25,000           Facility cleaning         52         w         250         13,000           Landscaping         52         w         500         26,000           Building maintenance         1         LS         10,000         10,000           D         Power         Quant         Unit         Rate           Equipment Depreciation (straight-line)         Life         Unit         Cap. Cost           Locomotives (20 years)         20         Year         13,750,000         687,500           Rolling stock (20 years)         20         Year         10,128,421         506,421           Buildings         30         Year         10,128,421         506,421           Buildings         30         Year         1,250,000         41,667           Roads         30         Year         1,250,000         41,667           Trackwork         25         Year         3,130,000         125,200 <t< td=""><td></td><td></td><td>8,000</td><td>h</td><td>85</td><td>680,000</td></t<>			8,000	h	85	680,000
C   Subcontracted Work   Locomotive maintenance   1   LS   120,000   120,000   Rolling stock maintenance   1   LS   25,000   25,000   Facility cleaning   52   w   250   13,000   Landscaping   52   w   500   26,000   Building maintenance   1   LS   10,000   10,000   Equal   Unit   Equal   Equ		Loading foreman	•	h	55	
Locomotive maintenance		Laborers	20,000	h	40	800,000
Rolling stock maintenance	С	Subcontracted Work				
Facility cleaning		Locomotive maintenance	1		-	1
Landscaping Building maintenance         52 1 LS         w 10,000         500 10,000         26,000 10,000           D         Power         Quant Rolling to ck (20 years)         Whit Rate         Rate           E         Equipment Depreciation (straight-line)         Life         Unit Unit         Cap. Cost           Locomotives (20 years)         20         Year         13,750,000         687,500           Rolling stock (20 years)         20         Year         10,128,421         506,421           Buildings         30         Year         2,912,000         97,067           Roads         30         Year         1,250,000         41,667           Trackwork         25         Year         3,130,000         125,200           OCS system         15         Year         9,298,814         619,921           Signal system         15         Year         6,592,000         439,467           Train loading system         12         Year         500,000         41,667           Heavy vehicles         12         Year         560,000         46,667		Rolling stock maintenance	1	LS	25,000	25,000
Building maintenance   1 LS   10,000   10,000     D   Power   Quant   Unit   Rate     S,922   MW-h   60   535,324     E   Equipment Depreciation (straight-line)   Life   Unit   Cap. Cost     Locomotives (20 years)   20   Year   13,750,000   687,500     Rolling stock (20 years)   20   Year   10,128,421   506,421     Buildings   30   Year   2,912,000   97,067     Roads   30   Year   1,250,000   41,667     Trackwork   25   Year   3,130,000   125,200     OCS system   15   Year   9,298,814   619,921     Signal system   15   Year   6,592,000   439,467     Train loading system   12   Year   500,000   41,667     Heavy vehicles   12   Year   560,000   46,667		Facility cleaning	52	W	250	
D   Power   Quant   Unit   Rate		Landscaping	52	W	500	26,000
E   Equipment Depreciation (straight-line)   Life   Unit   Cap. Cost		Building maintenance	11_	LS	10,000	10,000
E Equipment Depreciation (straight-line)  Life Unit Cap. Cost  Locomotives (20 years)  Rolling stock (20 years)  Buildings  30 Year 1,250,000 97,067  Roads  Trackwork  OCS system  15 Year 9,298,814 619,921  Signal system  Train loading system  12 Year 500,000 46,667  Heavy vehicles	D	Power	Quant	Unit	Rate	
Locomotives (20 years)       20 Year 13,750,000       687,500         Rolling stock (20 years)       20 Year 10,128,421       506,421         Buildings       30 Year 2,912,000       97,067         Roads       30 Year 1,250,000       41,667         Trackwork       25 Year 3,130,000       125,200         OCS system       15 Year 9,298,814       619,921         Signal system       15 Year 6,592,000       439,467         Train loading system       12 Year 500,000       41,667         Heavy vehicles       12 Year 560,000       46,667				MW-h	60	535,324
Rolling stock (20 years)       20 Year 10,128,421       506,421         Buildings       30 Year 2,912,000       97,067         Roads       30 Year 1,250,000       41,667         Trackwork       25 Year 3,130,000       125,200         OCS system       15 Year 9,298,814       619,921         Signal system       15 Year 6,592,000       439,467         Train loading system       12 Year 500,000       41,667         Heavy vehicles       12 Year 560,000       46,667	E	Equipment Depreciation (straight-line)	Life	Unit	Cap. Cost	
Buildings       30 Year 2,912,000       97,067         Roads       30 Year 1,250,000       41,667         Trackwork       25 Year 3,130,000       125,200         OCS system       15 Year 9,298,814       619,921         Signal system       15 Year 6,592,000       439,467         Train loading system       12 Year 500,000       41,667         Heavy vehicles       12 Year 560,000       46,667		Locomotives (20 years)	20	Year	13,750,000	
Roads       30       Year       1,250,000       41,667         Trackwork       25       Year       3,130,000       125,200         OCS system       15       Year       9,298,814       619,921         Signal system       15       Year       6,592,000       439,467         Train loading system       12       Year       500,000       41,667         Heavy vehicles       12       Year       560,000       46,667		Rolling stock (20 years)	20	Year	10,128,421	506,421
Trackwork       25       Year       3,130,000       125,200         OCS system       15       Year       9,298,814       619,921         Signal system       15       Year       6,592,000       439,467         Train loading system       12       Year       500,000       41,667         Heavy vehicles       12       Year       560,000       46,667		Buildings	30	Year	2,912,000	97,067
OCS system       15       Year       9,298,814       619,921         Signal system       15       Year       6,592,000       439,467         Train loading system       12       Year       500,000       41,667         Heavy vehicles       12       Year       560,000       46,667		Roads	30	Year	1,250,000	41,667
Signal system       15       Year       6,592,000       439,467         Train loading system       12       Year       500,000       41,667         Heavy vehicles       12       Year       560,000       46,667		Trackwork			3,130,000	125,200
Train loading system       12 Year       500,000       41,667         Heavy vehicles       12 Year       560,000       46,667		OCS system		Year	9,298,814	619,921
Heavy vehicles 12 Year 560,000 46,667		Signal system				439,467
		Train loading system	12	Year	500,000	41,667
Light trucks 7 Year 220,000 31,429		Heavy vehicles	12	Year	560,000	46,667
		Light trucks	7	Year	220,000	31,429

TOTAL ANNUAL OPERATING COST OF SHUTTLE TRAIN

\$ 6,740,327

Time	Train A	Train B	Train C	Track Use	PCUs to N	PCUs to L				
0:00:00	Loading at L	Idle	Idle	unused	0	0				
0:15:00	Departs for N	Idle	Loading at N	Train A	126		21	railcars with	6	ECU per c
0:30:00	Unloading at N	Loading at L	Departs for L	Train C		126				
0:45:00	Loading at N	Departs for N	Unloading at L	Train B	126					
1:00:00	Departs for L	Unloading at N	Loading at L	Train A		126				
1:15:00	Unloading at L	Loading at N	Departs for N	Train C	126					
	Loading at L	Departs for L	Unloading at N	Train B		126				
1:45:00	Departs for N	Unloading at L	Loading at N	Train A	126					
2:00:00	Unloading at N	Loading at L	Departs for L	Train C		126				
2:15:00	Loading at N	Departs for N	Unloading at L	Train B	126					
2:30:00	Departs for L	Unloading at N	Loading at L	Train A	/	126				
2:45:00	Unloading at L	Loading at N	Departs for N	Train C	126					
3:00:00		Departs for L	Unloading at N	Train B		126				
3:15:00		Unloading at L								
				/						
				/						
			252 PCU/hr -							
			Each Direction							

ar =	126