

**User Manual**

**Financial Model for 'Core'**  
**System Assets and Facilities**

## Using the Financial Model

The AMONTario Financial Model is intended to aid with determining and documenting capital and operating life cycle activity costs for each of the municipality's "core infrastructure" and facilities Asset Classes and then to forecast the required expenditures to finance those life cycle costs over the life of each of the assets. The result is a long range projection of the capital and operating expenditures required to finance each of the Asset Classes over the next 10 years and beyond.

Application of the Financial Model is as follows:

### 1. System Assets

For purposes of this model 'System' assets include any non-facility assets and Asset Classes that are part of the core infrastructure systems or networks.

Use Tabs 1, 2, 3(System), 5(System), and 6 to model the investment and expenditure requirements for each of the System Asset Classes.

### 2. Facilities Assets

The model can be used to forecast investments and expenditures for facilities with and/or without available building condition assessment (BCA) information.

Use Tabs 1, 3(Facilities), 4 (for facilities without BCAs), 5(Facilities) and 6 to model the investment and expenditure requirements for each of the Facilities or Facilities Asset Classes.

### 3. Bridges and Major Culverts

Expenditure planning for Bridges and Major Culverts is similar to that of Facilities; condition assessments are carried out to forecast the capital requirements to maintain state-of-good-repair and estimate the current replacement values. Like the Facility Condition Index (FCI) for buildings, this information is necessary to calculate the Bridge Condition Index (BCI).

Although both "System" and "Facilities" Tabs can be applied to Bridges and Major Culverts, it may be more practical to use Tabs 1, 3(Facilities), 5(Facilities) and 6 to model the investment and expenditure requirements for the Bridges and Major Culverts Asset Classes.

### 4. Tab 7 – 10-year Reserve Financing

Tab 7 is a standalone reserve financing model to determine Tax or Utility Rate reserve and revenue requirements. Copy and paste the various Asset Class expenditure forecasts from Tab 6 onto Tab 7.

## The Sherman-Dergis Formula for Calculating Capital Reinvestments in Facilities (Tab 4)

The Sherman-Dergis Formula was developed at the University of Michigan in 1981. The formula is used to estimate at a high level, the capital reinvestment requirements over time to maintain a facility in a state-of-good-repair. Note that the formula is less effective when applied to designated “Heritage” facilities.

The formula to determine the annual capital reinvestments required for renewal of a building is based on construction replacement costs and calculated as follows:

$$\text{Annual Appropriation} = 2/3 \text{ Building Value} \times \text{Building Age}/n$$

The value ‘n’ is calculated based on building life expectancy. For example, if Life Expectancy is 50 years, therefore  $n=1,275$ , which is derived by progressively compounding by addition,  $1+2+3+4+5\dots49+50$ .

The formula assumes that building renewal on average, should cost no more than two-thirds of the building’s current replacement value and that older buildings require more building renewal (capital funding) than newer buildings.

# TAB 1 – Calculate Operations and Maintenance Costs by Asset Class

Step 1c

Cost Categories	Pavement Step 1a				
	Daily Road Patrols Step 1b				Operations_System
	Description	Cost Centre (if available)	\$/Hour	Annual Hours	Total Costs
Labour	Supervisor Step 2a		36	1250	\$ 45,000
					\$ -
			Step 2b	Step 2c	\$ Step 2d -
					\$ -
					\$ -
<b>Subtotal Labour</b>					\$ * 45,000

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

### Steps 1a to 1c

- Enter the Asset Class name, Service Division name (Service Division is the collection of related Asset Classes) or Facility name.
- Enter the name of the life cycle activity.
- From the drop-down menu select "Operations\_System" or "Maintenance\_System" for System Asset O&M costs or "Operations\_Facilities" or "Maintenance\_Facilities" for Buildings, Bridges and Major Culverts O&M costs.

### Steps 2a to 2d

Steps 2a to 2d are to be completed as much as possible and practical for the following Cost Categories:

- Labour
- Parts & Materials
- Consumables
- Equipment

- Enter the descriptions of resources to carry out the life cycle activities.
- For each description entered under Step 2a, enter the typical unit costs or hourly costs for the resources.
- For each description and the units entered under Steps 2a and 2b, enter the annual resource requirements to carry out the life cycle activity, whether it be total annual hours or annual amount used.
- Once Steps 2a to 2c are completed, the total costs for each description and the subtotal for the cost categories will automatically be calculated.

**NOTE:**

\* Where details for each cost categories are not available (Steps 2a to 2c), the total estimated annual costs can be entered directly into the subtotal cells to calculate the overall annual cost for the activities.

**Adding Additional Rows under Cost Categories:** To add additional rows to the Cost Categories, copy the middle row from the cost category and insert below that middle row. By selecting the middle row, the additional rows added will automatically be included in all the formulas.

# TAB 1 continued...

## Calculate Operations and Maintenance Costs by Asset Class

<b>Activity Subtotal</b>		\$ <b>Step 3a</b> 68,625
<b>Asset Class as a Percentage of the Service Division (A major grouping of related Asset Classes)</b>	<b>Note:</b> The units used to calculate the Asset Class as a percentage of the overall Service Division must be consistent with the asset units of measure in the asset register or data base; e.g., km, metres. m <sup>2</sup> m <sup>3</sup> , hectares per each etc.	<b>Step 3b</b> 26%
<b>Activity Total</b>		\$ <b>Step 3c</b> 17,774

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

### Steps 3a to 3c

- a. Once the input into all the cost categories are completed, an “Activity Subtotal” will automatically be calculated.
- b. If the activities and costs are spread across several Asset Classes in a Service Division, then enter the Asset Class as a percentage of the Service Division. The Asset Class as a percentage of the Service Division can be apportioned by number of assets or value of assets in the Asset Class.

If the activities and costs are specific to a single Asset Class, then enter 100% or leave it blank. This will result in the life cycle activity costs being applied entirely to the Asset Class.

- c. After completing Step 3b, the life cycle “Activity Total” will automatically be calculated.

### SELECT & COPY

### PASTE

BE	BF	BG	BH	BI	BJ
Name of Asset Category					
Name of Life Cycle Activity				Operations_System	
Description	Cost Centre (if available)	\$/Hour	Annual Hours	Total Costs	
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
Description	Cost Centre (if available)	\$/Unit (if available)	Amount Used	Total Costs	
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
Description	Cost Centre (if available)	\$/Unit (if available)	Amount Used	Total Costs	
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-
				\$	-

**Adding Additional Life Cycle Activities:** To add additional life cycle activities copy from Column BE to BI (Description Column to the Total Costs Column) and paste it in Column BJ. Repeat, as necessary.

## TAB 2 – Calculate Capital Costs by Asset Class (System Assets Only)

Pulverize and Pave <b>Step 1a</b>		Pulverize and Pave	
Applicable Works (includes all labour, materials & equipment)	Unit of Measure	\$/Unit	
Rehabilitation/Refurbishment Unit Costs <b>Step 1b</b>	km <b>Step 1d</b>	\$	153,000
Optional Additional Allowances (Name) <b>Step 1c</b>			
Optional Additional Allowances (Name)			
Optional Additional Allowances (Name)			
Optional Additional Allowances (Name)			
<b>Sub Total Construction Costs</b>		\$	<b>153,000</b>
Overhead & Contingency Costs (as applicable)	Allowances (% of Line 8)	\$/Unit	
Pre-Design/Study <b>Step 1g</b>	5	\$	7,650
Design	5	\$	7,650
Contract Administration	5	\$	7,650
Survey	5	\$	7,650
Contingency/Provisional Allowance	10	\$	15,300
Other		\$	-
<b>Sub Total Overhead &amp; Contingency Costs</b>		\$	<b>45,900</b>
<b>Total Unit Costs</b>		\$	<b>198,900</b>

Legend:
Prepopulated or calculated fields
Data entry fields

### Steps 1a to 1i

- Enter the name of the life cycle activity for the Asset Class under consideration.
- From the drop-down menu, select the type of activity:
  - Rehabilitation/Refurbishment
  - Reconstruction/Replacement/Reinstallation
  - New Construction/Creation/Upgrade
- “Optional Additional Allowances” are provided to give flexibility for adding extra allowances typically required for the activity. These allowances should be normal costs that not covered in the base unit costs. Enter the description of those allowances.
- Enter the unit of measure (per metre, km, m<sup>2</sup>, m<sup>3</sup>, hectare, each, lump sum per unit, etc.). **Note: The unit of measure selected must match the units of measure used in your data base for the Asset Class.**
- Enter per unit costs for the type of activity selected and per unit costs for the additional allowances that were included.
- Once the unit costs are entered, the “Sub Total Construction Costs” will automatically be calculated.
- Enter the percentages for the different overhead and contingency costs normally applicable for the activity. The percentages are a factor of the “Sub Total Construction Costs”.
- Once the percentages for overhead and contingencies are entered, the “Sub Totals for the Overhead and Contingency Costs” will automatically be calculated
- The “Total Unit Cost” for the life cycle activity will automatically be calculated.

# TAB 2 – Calculate Capital Costs by Asset Class (System Assets Only)

**Adding Additional Rows under Cost Categories:** To add additional rows to the “Applicable Works” section or to the “Overhead & Contingency” section, copy the middle row from the section where you would like to add and insert below that middle row. By selecting the middle row, the additional rows added will automatically be included in all the formulas.

SELECT & COPY

PASTE

Pulverize and Pave		
Applicable Works (includes all labour, materials & equipment)	Unit of Measure	\$/Unit
Rehabilitation/Refurbishment Unit Costs		\$ 153,000
Optional Additional Allowances (Name)		
Optional Additional Allowances (Name)	km	
Optional Additional Allowances (Name)		
Optional Additional Allowances (Name)		
<b>Sub Total Construction Costs</b>		<b>\$ 153,000</b>
Overhead & Contingency Costs (as applicable)	Allowances (% of Line 8)	\$/Unit
Pre-Design/Study	5	\$ 7,650
Design	5	\$ 7,650
Contract Administration	5	\$ 7,650
Survey	5	\$ 7,650
Contingency/Provisional Allowance	10	\$ 15,300
Other		\$ -
<b>Sub Total Overhead &amp; Contingency Costs</b>		<b>\$ 45,900</b>
<b>Total Unit Costs</b>		<b>\$ 198,900</b>

**Adding Additional Life Cycle Activities:** To add additional life cycle activities, copy from Column V to X (Applicable Works Column to the \$/Unit Column) and paste it in Column Y.

SELECT & COPY

PASTE

V	W	X	Y
Name of Construction/Installation Activities			
Applicable Works (includes all labour, materials & equipment)	Unit of Measure	\$/Unit	
New Construction/Creation/Upgrade Unit Costs			
Optional Additional Allowances (Name)			
Optional Additional Allowances (Name)			
Optional Additional Allowances (Name)			
Optional Additional Allowances (Name)			
<b>Sub Total Construction Costs</b>		<b>\$ -</b>	
Overhead & Contingency Costs (as applicable)	Allowances (% of Line 8)	\$/Unit	
Pre-Design/Study		\$ -	
Design		\$ -	
Contract Administration		\$ -	
Survey		\$ -	
Contingency/Provisional Allowance		\$ -	
Other		\$ -	
<b>Sub Total Overhead &amp; Contingency Costs</b>		<b>\$ -</b>	
<b>Total Unit Costs</b>		<b>\$ -</b>	

# TAB 3 – Summary and Total Cost of Ownership for System Assets

HCB Urban Roads		Step 1a
<b>Technical and Financial Inputs</b>		
Reserve Source	Tax	Step 1b
Estimated Useful Service Life <sup>1</sup>	30	Step 1c
Average Asset Class Age	9	Step 1d
Unit of Measure for the Asset Class (m, km, m2, m3, per each, etc.)	km	Step 1e
Total Asset Class Quantity	150	Step 1f

Legend:
Prepopulated or calculated fields
Data entry fields

## Steps 1a to 1f: Technical and Financial Inputs

- a. Enter the name of the Asset Class.
- b. From the drop-down menu select the reserve source the Asset Class is funding from:
  - Tax
  - Utility Rate
- c. Enter the “Estimated Useful Service Life”; i.e., the estimated timespan that the assets are typically viable to provide services and manage risk to acceptable levels (not necessarily total life span).
- d. “Average Asset Class Age” will be automatically be calculated once the asset inventory is downloaded in Tab 5: Lifecycle (System) Modelling (See Tab 5 instructions).
- e. Enter the unit of measure for the Asset Class. **Note: The unit of measure selected should match the units of measure used in your data base for the Asset Class.**
- f. Total asset class quantity will automatically be calculated once the asset inventory is downloaded into the Tab 5: Lifecycle (System) Modelling (See Tab 5 instructions).



# TAB 3 – Summary and Total Cost of Ownership for System Assets

Capital Works Summary									
Rehabilitation or Refurbishment				Reconstruction or Replacement/Reinstallation			New Construction/Creation or Upgrade <sup>2</sup>		
Significant asset renewal work toward achieving original design conditions and/or extending asset life (includes Major Maintenance)				Like-for-like asset replacements or installations to fully achieve original design conditions.			Addition of new assets or an asset upgrade/expansion to improve performance beyond the original design conditions.		
Rehabilitation or Refurbishment Activities	Unit Cost	Year	Year	Year	Reconstruction or Replacement Activities	Unit Cost	Year	New Construction/Creation or Upgrade	Unit Cost
Crack Sealing	\$ 4,400	3	26		Reconstruct / Cold in Place	\$ 652,050	30	Enter Activity	\$ -
Microsurfacing	\$ 46,200	6			Enter Activity	\$ -		Enter Activity	\$ -
Single Lift Resurface	\$ 138,000	12			Enter Activity	\$ -		Enter Activity	\$ -
Pulverize and Pave	\$ 198,900	20							
Enter Activity	\$ -								
Enter Activity	\$ -								

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

**Note:** Ensure that there is a full Replacement or Reconstruction unit cost estimate included for the end of useful service life in the “Capital Works Summary”. This will ensure that the replacement of the assets are included in the life cycle modelling costs and financial projections.

## Steps 2a and 2b

The following steps are to be completed for the following capital works activities:

- Rehabilitation or Refurbishment
- Reconstruction or Replacement/Reinstallation
- New Construction/Creation or Upgrade

- Copy the name of the capital life cycle activity from Row 1 of Tab 2 and paste it under one of the three applicable capital activities listed above. The name of the capital activity should match exactly from Tab 2 otherwise the unit costs for the activity will not populate automatically in the “Capital Works Summary” tables.
- Based on the typical asset life cycle strategies, enter the interval years when the capital life cycle activities normally occur. The life cycle strategies will be used to do the life cycle projections in Tab 5 (Lifecycle (System) Modelling)

### Step 3a

Operating Cost Summary	
Total Annual Operating Costs per Unit	\$ 2,893
Total Annual Maintenance Costs per Unit	\$ 343
Total Annual Operating Costs	\$ 434,018
Total Annual Maintenance Costs	\$ 51,468
<b>Total 10-year Operating Costs<sup>3</sup></b>	<b>\$ 4,340,185</b>
<b>Total 10-year Maintenance Costs<sup>3</sup></b>	<b>\$ 514,675</b>

### Step 3b

Total Costs of Ownership	
Operating Costs per Unit	\$ 86,804
Maintenance Costs per Unit	\$ 10,294
Capital Costs per Unit (Excluding New Construction/Creation/Upgrade)	\$ 1,043,950
<b>Total Cost Of Ownership Per Unit</b>	<b>\$ 1,141,047</b>

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

## Step 3a and 3b

- The “Operating Cost Summary” will be calculated after the completion of Tab 1 (Operating and Maintenance Unit Costs) and after the “Asset Class Quantity” is calculated from the download of the asset inventory in Tab 5 (Lifecycle (System) Modelling). **Note: The 10-year Operating, and Maintenance Costs are in uninflated values.**
- The “Total Cost of Ownership” will be calculated after the completion of “Technical and Financial Inputs” table and the “Capital Works Summary” tables on Tab 3 Input & Summary (System).

# TAB 3 – Summary and Total Cost of Ownership Facilities or Bridges or Major Culverts

Operations Yard <span style="color: blue;">Step 1a</span>	
<b>Technical and Financial Inputs</b>	
Reserve Source	Tax <span style="color: blue;">Step 1b</span>
Estimated Useful Service Life <sup>1</sup>	40 <span style="color: blue;">Step 1c</span>
Average Asset Class Age	5 <span style="color: blue;">Step 1d</span>
Unit of Measure ( m <sup>2</sup> , ft <sup>2</sup> )	Ft <sup>2</sup> <span style="color: blue;">Step 1e</span>
Total Gross Floor/Deck Area	24500 <span style="color: blue;">Step 1f</span>
Total Replacement Costs	\$ 70,000,000 <span style="color: blue;">Step 1g</span>

Legend:
Prepopulated or calculated fields
Data entry fields

## Steps 1a to 1g: Technical and Financial Inputs

- a. Enter the name of the Asset Class.
- b. From the drop-down menu select the reserve source the Asset Class is funded from:
  - Tax
  - Utility Rate
- c. Enter the “Estimated Useful Service Life”; i.e., the estimated timespan that the assets are typically viable to provide services and manage risk to acceptable levels (not necessarily total life span).
- d. “Average Asset Class Age” will be automatically be calculated once the asset inventory is downloaded in Tab 5: Lifecycle (Facilities) Modelling (See Tab 5 instructions).
- e. Enter the unit of measure for the Asset Class. **Note: The unit of measure selected should match the units of measure used in your data base.**
- f. Total gross area will be automatically be calculated once the asset inventory is downloaded into the Tab 5: Lifecycle (Facilities) Modelling (See Tab 5 instructions).
- g. Total Replacement Costs will be automatically be calculated once the asset inventory is downloaded into the Tab 5: Lifecycle (Facilities) Modelling (See Tab 5 instructions).

# TAB 3 – Summary and Total Cost of Ownership Facilities or Bridges or Major Culverts

## Step 2a

Operating Cost Summary	
Total Annual Operating Costs per Unit	\$ 2
Total Annual Maintenance Costs per Unit	\$ 0
Total Annual Operating Costs	\$ 42,800
Total Annual Maintenance Costs	\$ 12,000
<b>Total 10-year Operating Costs<sup>3</sup></b>	<b>\$ 428,000</b>
<b>Total 10-year Maintenance Costs<sup>3</sup></b>	<b>\$ 120,000</b>

## Step 2b

Total Costs of Ownership	
Operating Costs per Unit	\$ 70
Maintenance Costs per Unit	\$ 20
Capital Costs per Unit <sup>2</sup>	\$ 4,762
<b>Total Costs Per Unit</b>	<b>\$ 4,851</b>

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

### Step 2a and 2b

- The “Operating Cost Summary” will be calculated after the completion of Tab 1 (Operating and Maintenance Unit Costs) and after the “Total Gross Floor/Deck Area” is calculated from the download of the asset inventory in Tab 5 (Lifecycle (Facilities) Modelling). **Note: The 10-year Operating, and Maintenance Costs are in uninflated values.**
- The “Total Cost of Ownership” will be calculated after completion of “Technical and Financial Inputs” table on Tab 3(Facilities).

# TAB 4 – Facilities Investment Model

## Individual Facilities with no Building Condition Assessment (BCAs)

Existing Facility (No BCA)		
Building Name	Operations Yard 4	Step 1a
Current Replacement Value	\$ 25,000,000	Step 1b
Construction Yr.	2019	Step 1c
Useful Service Life	40	Step 1d
n Value	820	
Current Age	2	
Starting Budget Year	2021	Step 1e
BCA Year		
2019	\$ 20,325	1
2020	\$ 40,650	2
2021	\$ 60,976	3
Step 1g 2022	Step 1h \$ 81,301	4 Step 1i
2023	\$ 101,626	5
2024	\$ 121,951	6
2025	\$ 142,276	7
2026	\$ 162,602	8
2027	\$ 182,927	9
2028	\$ 203,252	10
2029	\$ 223,577	11

Building Name	Operations Yard 4	
Budget Years:	Facility with no BCA Investment Needs (\$,000's)	
Deferred Maintenance	\$60,976	Step 1j
Year 1 (Including Deferred Maintenance less Previous Investments)	\$101,951	Step 1k
2021	\$60,976	Step 1l
2022	\$81,301	
2023	\$101,626	
2024	\$121,951	
2025	\$142,276	
2026	\$162,602	
2027	\$182,927	
2028	\$203,252	
2029	\$223,577	
2030	\$243,902	
10 Year Reinvestment Total	\$1,524,390	Step 1m
10 Year Total Incl. Deferred Maintenance	\$1,585,366	
Less Previous Investments	Step 1f \$20,000	
Net 10 Year Investment Needs	\$1,565,366	
Estimated Current (Year 1) FCI	0.4%	
Estimated 10 Year FCI	6.3%	

Legend:
Prepopulated or calculated fields
Data entry fields

### Steps 1a to 1m

Under “Existing Facility” enter the following information for the facility:

- Name of the facility
- Current Replacement Value
- Construction Year
- Useful Service Life
- Starting Budget Year (the upcoming budget year)
- Previous Investments; the capital investments that have been made into the facility for state-of-good-repair since the date of construction. **Note: These investments should only include costs to address state-of-good repair requirements and not such items as building expansions or reconfigurations.**

The following information will be populated:

- Calendar years since the initial construction year of the facility
- Investment requirements for each of the years since the initial construction year
- Number of years since the initial construction year
- Deferred Maintenance which is the sum of total investment requirements from the initial construction year up to, but not including the “Starting Budget Year”
- The total investments required for the “Starting Budget Year” including deferred maintenance less previous investments already made into the facility (Step 1f)
- Reinvestment requirements for each of the 10 years from the “Starting Budget Year”
- The total 10-year reinvestment requirements, total 10-year reinvestment requirements including deferred maintenance and net 10-year reinvestment requirements which includes deferred maintenance, less previous state-of-good-repair investments. Also, an estimated Facility Condition Index (FCI) for the “Starting Budget Year” and for the 10-year period is calculated.

# TAB 4 – Facilities Investment Model

## Asset Class of Facilities with no Building Condition Assessments (BCAs)

Asset Class Facilities (No BCA)		
Asset Class Name	Paramedic Reporting Stations	Step 1a
Current Replacement Value	\$ 40,500,000	Step 1b
Average Useful Service Life	80	Step 1c
n Value	3240	
Average Age	20	Step 1d
Starting Budget Year	2021	Step 1e
2001	\$ 8,333	1
2002	\$ 16,667	2
2003	\$ 25,000	3
2004	\$ 33,333	4
2005	\$ 41,667	5
Step 1g 2006	\$ Step 1h 50,000	Step 1i 6
2007	\$ 58,333	7
2008	\$ 66,667	8
2009	\$ 75,000	9
2010	\$ 83,333	10
2011	\$ 91,667	11
2012	\$ 100,000	12
2013	\$ 108,333	13

Legend:
Prepopulated or calculated fields
Data entry fields

Building Name	Paramedic Reporting Stations
Budget Years:	Investment Needs
Deferred Maintenance	\$1,750,000
Year 1 (Including Deferred Maintenance less Previous Investments)	\$925,000
2021	\$175,000
2022	\$183,333
2023	\$191,667
2024	\$200,000
2025	\$208,333
2026	\$216,667
2027	\$225,000
2028	\$233,333
2029	\$241,667
2030	\$250,000
10 Year Reinvestment Total	\$2,125,000
10 Year Total Incl. Deferred Maintenance	\$3,875,000
Less Previous Investments	Step 1f \$1,000,000
Net 10 Year Investment Needs	\$2,875,000
Net Investments Needs up to ESL	\$26,000,000
Estimated Current (Year 1) FCI	2.3%
Estimated 10 Year FCI	7.1%

Step 1j  
Step 1k  
Step 1l  
Step 1m

### Steps 1a to 1m

Under “Asset Class Facilities” enter the following information for the Asset Class of facilities:

- Name of the facilities Asset Class
- Current Replacement Value for the entire portfolio of facilities in the Asset Class
- Average Useful Service Life for the facilities in the Asset Class
- Average Age of the facilities in the Asset Class
- Starting Budget Year (the upcoming budget year)
- Previous Investments; the capital investments that have been made into each of the facilities in the Asset Class for state-of-good-repair since the date of construction. **Note: These investments should only include costs to address state-of-good repair requirements and not such items as building expansions or reconfigurations.**

The following information will be populated:

- The calendar investment years starting from a year based on the average age of the portfolio entered in Step 1d
- Investment requirements for each of the years since the starting investment year
- A count of the years since the starting investment year
- Deferred Maintenance which is the sum of total investment requirements from the starting investment year up to, but not including the “Starting Budget Year”
- The total investment requirement for the “Starting Budget Year” including deferred maintenance less previous investments made into the facility portfolio (Step 1f)
- Reinvestment requirements for each of the 10 years from the “Starting Budget Year”
- The total 10-year reinvestment requirements, total 10-year reinvestment requirements including deferred maintenance and net 10-year reinvestment requirements which includes deferred maintenance, less previous state-of-good-repair investments. Also, an estimated portfolio Facility Condition Index (FCI) for the “Starting Budget Year” and for the 10-year period is calculated.<sup>13</sup>

# TAB 5 – Capital Life Cycle Modelling System Assets

Capital Works Summary										
Rehabilitation or Refurbishment					Reconstruction or Replacement/Reinstallation					
Significant asset renewal work toward achieving original design conditions and/or extending asset life (includes Major Maintenance).					Like-for-like asset replacements or installations to fully achieve original design conditions.					
Rehabilitation or Refurbishment Activities		Unit Cost	Year	Year	Year	Year	Reconstruction or Replacement Activities		Unit Cost	Year
Crack Sealing		\$ 4,400	3	26			Reconstruct / Cold in Place	\$ 652,050	30	
Microsurfacing		\$ 46,200	6				Enter Activity	\$ -		
Single Lift Resurface		\$ 138,000	12				Enter Activity	\$ -		
Pulverize and Pave		\$ 198,900	20							
Enter Activity		\$ -								
Enter Activity		\$ -								

**Legend:**

Prepopulated or calculated fields
Data entry fields

Tab 3: Step 2b

Step 1d

HCB Urban Roads		Step 1a							
A	B	C	D			Step 1c			
asset_id	asset_name	in_service_date (year-month-date) xxxx-xx-xx	Quantity	Age	estimated_s ervice_life	2021	2022	2023	
HCB_UR_1	HCB Urban Road_1	2020-05-01	15	0	30	\$ -	\$ -	\$ 66,000	
HCB_UR_2	HCB Urban Road_2	2014-05-02	32	6	30	\$ -	\$ -	\$ -	
HCB_UR_3	HCB Urban Road_3	2009-05-03	18	11	30	\$ 2,484,000	\$ -	\$ -	
HCB_UR_4	HCB Urban Road_4	2006-04-01	60	14	30	\$ -	\$ -	\$ -	
HCB_UR_5	HCB Urban Road_5	2017-05-05	25	3	30	\$ -	\$ -	\$ 1,155,000	
HCB_UR_5	HCB Urban Road_5	2047-05-05	25	-27	30	\$ -	\$ -	\$ -	

Step 1b

## Steps 1a to 1e

- The name of the Asset Class is prepopulated from Tab 3(System), Step 1a
- Download following asset data from the asset register:
  - Column A – The asset identification numbers
  - Column B – The asset names
  - Column C – The installation or in-service dates in the format year-month-day
  - Column D – The asset quantities in units of measure that are consistent with the capital and operating unit costs used in Tabs 2 and 3.
- Enter the Starting Budget Year (the upcoming budget year)
- Lifecycle projections up to the assets' estimated useful life are automatically calculated based on the typical asset life cycle strategies entered in Tab 3: Step 2a
- At the end of the lifecycle modelling table, the following information will be calculated:
  - The 10-year state of good repair needs (from the starting budget year)
  - The capital life cycle costs of the asset up to and including its replacement
  - The year when the asset is estimated to be replaced (based on useful life and age of the asset)

### Step 1e

10 Year SoGR Needs	SoGR Lifecycle Cost	Asset Retirement Year
\$ 759,000	\$ 5,878,500	2050
\$ 4,416,000	\$ 10,921,600	2044
\$ 6,064,200	\$ 6,143,400	2039
\$ 11,934,000	\$ 12,198,000	2036
\$ 4,605,000	\$ 9,687,500	2047
\$ -	\$ 9,797,500	2077
<b>\$ 27,778,200</b>	<b>\$ 54,626,500</b>	

# TAB 5 – Capital Life Cycle Modelling Facilities with Building Condition Assessments (BCAs), Bridges and Major Culverts with OSIM Inspection Reports

Step 1e

A Step 1a	B	C	D	E	F	G	Step 1b				
Operations Yards											
asset_name	Current Replacement Value	Gross Floor/Deck Area	asset_id	in_service_date (year-month-date) xxxx-xx-xx	Deferred Maintenance	Previous Investments	Current FCI/BCI <sup>1, 2</sup>	Age	estimated_s ervice_life	Step 1b 2021	2022
<b>Facilities with BCAs and Bridges/Major Culverts with OSIM Inspections</b>											
Operations Yard 1	\$ 20,000,000	3000	Ops_1	2020-01-01			0.2%	0	40	\$ 32,520.33	\$ 48,780.49
Operations Yard 2	\$ 15,000,000	2500	Ops_2	2005-01-01			0.1%	15	40	\$ 12,195.12	\$ 24,390.24
Operations Yard 3	\$ 10,000,000	15000	Ops_3	2015-01-01			0.6%	5	40	\$ 56,910.57	\$ 65,040.65
Sub Total	\$ 45,000,000	20500					0.2%	7.0		\$ 101,626.02	\$ 138,211.38

Step 1c

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

Step 1f

10 Year SoGR Needs	Facility Retirement Year
\$ 1,056,910.57	2060
\$ 670,731.71	2045
\$ 934,959.35	2055
\$ -	
\$ 2,662,601.63	

## Steps 1a to 1f

- The name of the Asset Class is prepopulated from Tab 3(Facilities), Step 1a
- Enter the Starting Budget Year (the upcoming budget year)
- Download following asset data from the asset register or manually enter:
  - Column A – The asset names
  - Column B – The Current Replacement Values (CRVs)
  - Column C – The Gross Floor/Deck Areas (GFA)
  - Column D – The asset identification number(s)
  - Column E – The in-service dates in the format year-month-day
  - Column F – Any deferred maintenance costs (Past due “NOW Needs” costs that have been identified in years before the “Starting Budget Year”.)
  - Column G – Any investments or approved funding that has been made against the “Deferred Maintenance” amounts (usually only Facilities).
- The Current Facility Condition Index (FCI) or Bridge Condition Index (BCI) and overall FCI/BCI is calculated for the Asset Class. **Note: The FCI/BCI is calculated based on the data inputs and can be overwritten based on what is reported in the condition assessment reports.**
- Download or manually enter the annual BCA or OSIM inspection recommendations for each of the 10 years for each of the facilities, bridges or major culverts
- At the end of the lifecycle modelling table, the following information will be calculated:
  - The 10-year state-of-good-repair needs including the net deferred maintenance costs
  - The year when the asset is estimated to be replaced (based on useful service life and age)

# TAB 5 – Capital Life Cycle Modelling Facilities Without BCAs

## Step 1f

Operations Yards	Step 1a									Step 1b	
asset_name	Current Replacement Value	Gross Floor/Deck Area	asset_id	in_service_date (year-month-date) xxxx-xx-xx	Deferred Maintenance	Previous Investments	Current FCJ/BCI <sup>1,2</sup>	Age	estimated_s service_life	2021	2022
<b>Facilities without BCAs</b>											
Operations Yard 4	\$ 25,000,000	4000	Ops_4	2019-01-01	\$ 60,976	\$ 20,000	0.4%	1	40	\$ 60,975.61	\$ 81,300.81
	\$ -				\$ -	\$ -				\$ -	\$ -
	\$ -				\$ -	\$ -				\$ -	\$ -
	\$ -				\$ -	\$ -				\$ -	\$ -
Sub Total	\$ 25,000,000	4000			\$ 60,976	\$ 20,000	0.4%	1.0		\$ 60,976	\$ 81,301
<b>Totals</b>	<b>\$ 70,000,000</b>	<b>24500</b>			<b>\$ 60,976</b>	<b>\$ 20,000</b>	<b>0.3%</b>	<b>6.0</b>		<b>\$ 162,602</b>	<b>\$ 357,724</b>

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

### Steps 1a to 1g

- The name of the Facilities Asset Class is prepopulated from Tab 3(Facilities), Step 1a
- Enter the Starting Budget Year (the upcoming budget year)
- Enter the names of the Facilities and/or Facilities Asset Classes from Tab 4.
- Enter Gross Floor Area (GFA)
- Enter Facility ID number
- The following asset data will be populated from Tab 4:
  - The Current Replacement Values (CRVs)
  - The in-service date in the format year-month-day
  - Deferred Maintenance Costs
  - Previous Investments made on Deferred Maintenance
  - Current Facility Condition Index
  - Age
  - Estimated (Useful) Service Life
  - Required Annual Capital Investments for 10 years beginning with the “Starting Budget Year”
- At the end of the lifecycle modelling table, the following information will be calculated:
  - The 10-year state-of-good-repair needs including the net deferred maintenance costs
  - The year when the asset is estimated to be replaced (based on useful service life and age)

### Step 1g

10 Year SoGR Needs	Facility Retirement Year
\$ 1,565,365.85	2059
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ -	
\$ 1,565,366	



# TAB 6 – 10-year Financing by Asset Class

Reinvestment Forecasting	Year 1		
	Operating Investments	Capital Investments	Total
<b>System Assets</b>	<b>Step 1b</b>	<b>Step 1c</b>	<b>Step 1d</b>
HCB Urban Roads <b>Step 1a</b>	\$ 485,486	\$ 2,484,000	\$ 2,969,486
			\$ -
			\$ -
			\$ -
<b>Facilities/Bridges/Major Culverts</b>			
Operations Yards <b>Step 1a</b>	\$ 54,800	\$ 162,602	\$ 217,402
			\$ -
			\$ -
			\$ -
			\$ -
<b>Total Recommended Investments</b>	<b>\$ 540,286</b>	<b>\$ 2,646,602</b>	<b>\$ 3,186,888</b>
Proposed Investments <b>Step 2a</b>	\$ 500,000	\$ 150,000	\$ 650,000
<b>Difference Step 2b</b>	<b>\$ 40,286</b>	<b>\$ 2,496,602</b>	<b>\$ 2,536,888</b>

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

## Steps 1a to 1d

- The “System” Asset Class names and the “Facilities/Bridges/Major Culverts” Asset Class names will be prepopulated from the linked Tab 5(System) and Tab 5(Facilities) spreadsheets respectively.

The following information will be automatically calculated for all 10 years: **All the Investments are in Uninflated \$’s**

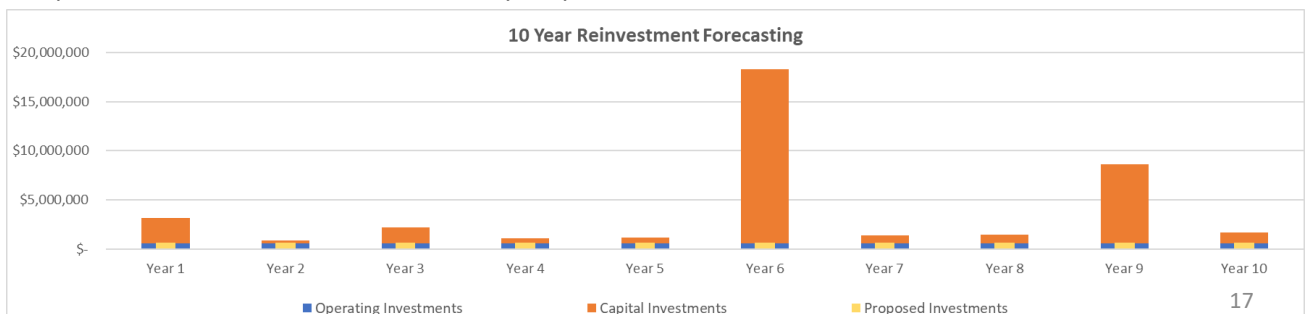
- Operating Investments from the Tabs 3 “Operating Cost Summary”
- Capital Investments from the Capital Life Cycle Modelling on Tabs 5
- Total Investments – Summation of annual Operating & Capital expenditures

## Steps 2a & 2b – Comparison of Proposed Investments vs Total Recommended Investments

- Enter the proposed annual Operating and Capital investments for the Asset Classes included on the table per one of the following:
  - The amounts that are approved in the annual Budget & Forecast
  - Annual estimates based on historical investments
  - Annual estimates that are deemed to be affordable
- The difference between the “Total Recommended Investments” and the “Proposed Investments” is calculated for the Asset Classes included.

## Step 3

A graphic comparison is produced showing the recommended Operating and Capital Investments and the “Proposed Investments” over the next 10-year period.



# TAB 7 – 10-year Reserve Financing for All Asset Classes

**Note:** The objective of this process is to create a standalone reserve financing model to determine reserve and revenue needs using a consolidation of multiple Tab 6 Asset Class expenditure forecasts.

Tax		Step 1a
Summary		
Starting Reserve Balance	\$ 10,000,000	Step 1b
Annual Revenues	\$ 5,000,000	Step 1c
Average Annual Construction Price Index (%)	2.5%	Step 1e
Average Annual Return on Investments (%)	4.0%	Step 1d
Discount Rate (%)	3.0%	Step 1f
<b>Ending Reserve Balance</b>	<b>\$ 21,891,792</b>	Step 1g

Legend:
Prepopulated or calculated fields
Data entry fields

## Steps 1a to 1g

- a. Select the reserve source for the Asset Classes
- b. Enter the starting reserve balance.
- c. Enter the estimated annual revenue.
- d. Enter the average annual construction price index
- e. Enter average annual return on investments which includes:
  - Earned revenue from interest on the current reserve balance, plus;
  - Earned revenue from interest on the net balance (annual revenue less annual investments). It is assumed that the net balance will earn interest for half the year. Municipalities can change this assumption according to their financial planning.
- f. Enter the discount rate which is the Interest Rate used to discount future cashflows back to present value. This rate is currently not used in the calculation but if the Municipality's investment forecasts are inflated then this rate can be used to bring those values to present dollar values.
- g. Ending reserve balance will be calculated once the total operating and capital investments have been entered through the following steps.

# TAB 7 – 10-year Reserve Financing for All Asset Classes

Tab 6

Reinvestment Forecasting	Year 1		
	Operating Investments	Capital Investments	Total
<b>Asset Classes</b>			
<b>System Assets</b>			
HCB Urban Roads	\$ 485,486	\$ 2,484,000	\$ 2,969,486
			\$ -
			\$ -
			\$ -
<b>Facilities/Bridges/Major Culverts</b>			
Operations Yards	\$ 54,800	\$ 162,602	\$ 217,402
			\$ -
			\$ -
			\$ -
<b>Total Recommended Investments</b>	<b>\$ 540,286</b>	<b>\$ 2,646,602</b>	<b>\$ 3,186,888</b>
Proposed Investments	\$ 500,000	\$ 150,000	\$ 650,000
<b>Difference</b>	<b>\$ 40,286</b>	<b>\$ 2,496,602</b>	<b>\$ 2,536,888</b>

<b>Legend:</b>
Prepopulated or calculated fields
Data entry fields

**Step 2a**

- Copy the rows of asset classes that are populated in Tab 6 Reinvestment Forecasting table and
- Paste those rows in Tab 7 Reinvestment Forecasting table

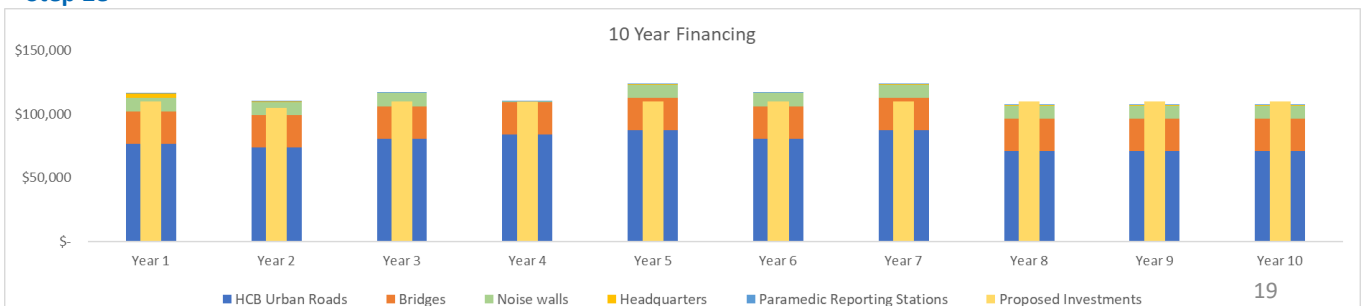
Tab 7

Reinvestment Forecasting	Year 1		
	Operating Investments	Capital Investments	Total
<b>Asset Classes</b>			
HCB Urban Roads	\$ 485,486	\$ 2,484,000	\$ 2,969,486
Bridges	\$ 70,000	\$ 500,000	\$ 570,000
Noise walls	\$ 10,000	\$ 300,000	\$ 310,000
Headquarters	\$ 420,000	\$ 1,400,000	\$ 1,820,000
Paramedic Reporting Stations	\$ 277,500	\$ 925,000	\$ 1,202,500
<b>Total Recommended Investments</b>	<b>\$ 1,262,986</b>	<b>\$ 5,609,000</b>	<b>\$ 6,871,986</b>
Proposed Investments	\$ 500,000	\$ 400,000	\$ 900,000
<b>Difference</b>	<b>\$ 762,986</b>	<b>\$ 5,209,000</b>	<b>\$ 5,971,986</b>

**Step 2a to 2e**

- Copy and paste from all the Tab 6 spreadsheets, the Asset Classes to be included on the “standalone” Tab 7 spreadsheet.
- “Total Recommended Investments” will be automatically be calculated.
- Enter proposed annual Operating and Capital investments for the Asset Classes included on the table per one of the following:
  - The amounts that are approved in the annual Budget & Forecast
  - Annual estimates based on historical investments
  - Annual estimates that are deemed to be affordable
- The difference between the “Total Recommended Investments” and the “Proposed Investments” is calculated for the Asset Classes included.
- A graphic comparison is produced showing the recommended Operating and Capital Investments and the “Proposed Investments” over the next 10-year period.

**Step 2e**



# TAB 7 – 10-year Reserve Financing for All Asset Classes

Reserve Forecasting	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Opening Reserve Balance <b>Step 3a</b>	\$ 10,000,000.00	\$ 8,528,014.02	\$ 12,618,022.89	\$ 15,604,112.11	\$ 19,932,964.89	\$ 24,412,871.79	\$ 11,935,100.69	\$ 16,050,893.02	\$ 20,309,217.04	\$ 17,615,099.75
Annual Revenue <b>Step 3b</b>	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00	\$ 5,000,000.00
Total Recommended Annual Investment <b>Step 3c</b>	\$ 6,871,985.98	\$ 1,324,619.31	\$ 2,567,285.98	\$ 1,367,952.64	\$ 1,389,619.31	\$ 18,454,285.98	\$ 1,432,952.64	\$ 1,454,619.31	\$ 8,506,485.98	\$ 1,497,952.64
Ending Reserve Balance <b>Step 3d</b>	\$ 8,528,014.02	\$ 12,618,022.89	\$ 15,604,112.11	\$ 19,932,964.89	\$ 24,412,871.79	\$ 11,935,100.69	\$ 16,050,893.02	\$ 20,309,217.04	\$ 17,615,099.75	\$ 21,891,792.04

## Step 3

The Reserve Forecasting Table will be calculated as follows:

- a. Year 1 Opening Reserve Balance entered in Step 1b and then increased annually by Net Balance (Annual Revenue less Annual Investment)
- b. Annual Revenue entered in Step 1c
- c. Total Recommended Annual Investments from Step 2d
- d. Ending Reserve Balance which is the addition of Step 3a and 3b less Step 3c
  - (Opening Reserve Balance + Annual Revenue – Annual Investment)

**Note:** These assumptions can be changed according to the Municipalities strategy

Assumptions made in the Reserve Forecasting table:

- If annual revenue is greater than investment, it is assumed the net balance will earn interest for half year
- Total investments are based on the budget year dollars (If not then Annual CPI needs to be applied to bring the investments to budget year dollars)