	A	B	C	D	E
1	Page		Calculating	Formula	
2				You will need to add an opening equals= sign to make these functional formulas	
3	Parameters				
4				There are no formulas on the Parameters page	
5					
6	Original Components				
7		Column A "Expenditure Detail - Description"	Enter the name for the component	Simple entry	When completed these can be sorted by replacement year.
8		Column B "Date in Service"			
9				Simple entry from records	
10		Column C "Date in Service Cost"			
11			Calculate the Date in Service Cost	=$E3*(1+Parameters!$C$2)^($B3-Parameters!$C$5)	Date in Service Cost = Current Cost * (1 + Inflation Rate) ^ (Date in Service - Current Replacement Year) Formula given is first instance- drag down the column.
12		Column D "Replacement Year"			
13			Calculate the Replacement Year	=B3+F3+G3	First entry. Replacement Year = Date in Service + Useful Life + Adjustment. Drag the formula down the column to fill in.
14		Column E "Current Cost"			
15			Calculate the Current Cost from Unit Cost, Quantity and, if it exists, any Qualifier	=IF(ISNUMBER($J3), (K3*M3)*$J3, K3*M3)	Enter as first instance in E3 and drag down. Prefered way to calculate current cost. Current Cost = (Unit Cost * Quantity) * Qualifier or do not use the Qualifier if there is none.
16		Column F "Useful Life"			
17				Enter whole number	If there is nothing fact-based to inform this number, a best guess will have to do.
18		Column G "Adjustment"			
19				Enter a whole number	When extenuating circumstances affect a component, one considers its useful life and makes any adjustment to the actual timing for servicing the component here.
20		Column H "Remaining Life"			
21			Calculate the remaining life	=D3-Parameters!$C$5	Remaining Life = Replacement Year - Current Planning Year from the Parameters spreadsheet. Drag this first instance down the column to fill in.
22		Column I "First Replacement Year Cost"			
23			Calculate the First Replacement Year cost	=$E3*(1+Parameters!$C$2)^(D3-Parameters!$C$5)	First Replacement Year Cost = Current Cost * (1 + Inflation Rate) ^ (Replacement Year - Current Planning Year). Drag down to fill column.
24		Column J "Qualifier"			
25				Enter the number that further qualifies the number of units	Often a % of the larger total
26		Column K "Quantity"			
27				Enter the field measurement of the quantity	Might be the number of square feet, lineal feet, number of units, etc. Used in the Current Cost calculation
28		Column L "Quantity Defined			
29				Enter the type of quantity	Example: square feet, lineal feet, etc. Used in the Current Cost calculation.
30		Column M "Unit Cost"			
31				Enter number from previous cost, estimate or best guess	This is key component for calculating the Current Cost. It is recommended to set up the calculation for this given as Optional below.
32		Total (sum) of Current Cost Column E			

	A	B	C	D	E
33			Do a sum of the column. The example to the right is for rows 2 through 127. Your actual row designations will vary	=SUM(E2:E127)	Example- your array of cells being added up will differ
34		Total (sum) of First Replacement Cost Column I			
35			Do a sum of the column. The example to the right is for rows 2 through 127. Your actual row designations will vary	=SUM(I2:I127)	Example- your array of cells being added up will differ
36					
37	Original Components	Supplemental Columns	The following columns can be set up to double-check the amounts entered. I leave Column N blank to separate these from the primary component attributes and calculations.		
38		Optional Column O: Calculate the Date in Service.			
39			Alternative: Calculate the Date in Service. This is not used in Column B because it gives a circular reference error. and relies on a real-world date entry. Nonetheless, it can be set up as a supplemental column on the Original Components page. Here it is set in Column N	=$D3-$F3-$G3	First entry.This can then be dragged down the supplemental column. The formula is: Date in Service = Replacement Year -Useful Life - Adjsutment
40		Optional Column P: Check entered Date in Service (Column B) to match calculated Date in Service (Optional Column N)			
41			Compare Calculated Date in Service (Column B) to supplemental formula (Column P) to calculate the formula.	=IF($N3=$B3, TRUE())	If we add the formula to a supplemental column, this formula can be entered in the next column to check if the calculated amount equals the number entered in Column B. The first entry is dragged down the column.
42		Optional Column Q:			
43			Calculate the Current Cost using Date in Service Cost, Inflation, Useful Life, Adjustment, and Remaining Life	=C3*(1+Parameters!$C$2)^(F3+G3-H3)	This first instance is dragged down the column to fill in.
44		Optional Column R			
45			Check if Current Cost derived from this formula matches the same derived from Unit Cost and unit details	=IF(Q3=E3, TRUE())	Checks if numbers match. A FALSE result would call for some troubleshooting.
46		Optional Column S			
47			Calculate First Future Cost using alternative method	=C3*(1+Parameters!$C$2)^(F3+G3)	First Future Cost = Current Cost * (1 + Inflation Rate) ^ (Useful Life + Adjustment). First instance- drag down the column to fill in
48		Optional Column T			
49			Check if First Future Cost calculations match	=IF(I3=S3, TRUE())	Checks if numbers match. A FALSE result would call for some troubleshooting. Drag down the column to fill in.
50		Optional Column U			
51			Calculate the Unit Cost	=IF(ISNUMBER($J3),($C3 * (1+Parameters!$C$2)^($F3 + $G3 - $H3) /$J3) / $K3,$C3 * (1+Parameters!$C$2)^($F3 + $G3 - $H3) / $K3)	This uses the Date in Service Cost and Inflation Rate and employs the Useful Life, Adjustment, Remaining Life and Qualifier (if it exists). It might be useful to set up a separate column that runs this formula as a double-check on the Unit Cost entered directly. Drag down the column to fill in
52		Optional Column V			
53			Check if Unit Cost columns match each oteher	=IF($U3=$M3, TRUE())	This is useful to check. Also, there are methods to check any updated cost by changing attributes of a component, useful for understanding the unit cost in future years.

	A	B	C	D	E
54					
55	Categorized Components				
56		Column Headings A through M, Row 1	Either Copy and Paste headings from the Original Components spreadsheet, or type in the exact same headings or use the formula	='Original Components'!B1	Cell A1 different than Original Components A1, but B2 and the rest of the top row is the same, so the formula can be entered in B2 and dragged right
57		Row 2	Set up your own typed-in category heading		
58		Row 3	Enter first item from Original Components page. What you will enter depends on what your first category is and what the first item in that category is. I organize each category alphabetically.	='Original Components'!A24	That formula is an example. We are organizing the Original Components into categories. Choose which component you want on this line and enter the cell and cell number that refers to that component description. You can then drag that across the row and it will fill in the same numbers as are on the Original Components page for tht component.
59		Row 4	Enter 2nd item to fit into the given category. Each item is entered in Column A and then dragged across the row to fill in the attributes of the component.	= 'Original Components'!A74	Another example number. You will choose whatever row number from the Original Components page needed to make that item appear here. The pattern of entry as you choose to categorize is dragged across the row to fill in all the cells where data appears.
60		Total (sum) of Current Cost Column E			
61			Do a sum of the column. The example to the right is for rows 2 through 127. Your actual row designations will vary	=SUM(E2:E127)	
62		Total (sum) of First Replacement Cost Column I			
63			Do a sum of the column. The example to the right is for rows 2 through 127. Your actual row designations will vary	=SUM(I2:I127)	
64		Sum category totals			
65			I left a place to sum up each category. I don't find this necessary or especially useful.	=SUM(E2:E9)	That might be a first example.
66		Sum item totals when category totals are on the page	At the end of Column E, we would need to add each category of individual components separately	=SUM(E2:E9) + SUM(E13:E16) + SUM(E20:E22) etc.	That is an example. Your actual cell entries will differ.
67		Sum Category totals	Select category totals from the column and add them together	=E17 + E23 + E23 etc.	That is an example. Your actual cell entries will differ. The items total and the category titles should be the same, so it is wise to total them with their own formulas to check this.
68					
69	Expenditures				
70		Headings Row 1			
71			Type Description in Column A		
72			Columns B through AE	Enter the first and then the second year of the study. Select both of these, then drag to the right to fill in all the years	
73		Column A2 to bottom of column listings			
74			We are referencing Categorized Components for the rest of this	='Categorized Components'!A2	Check what the last item row (other than totals) is on the Categorized Components page and drag to match that final row number
75		All other component cells			
76			Beginning with cell B3 and extending down all the items and across all the columns we use the same formula.	=IFERROR(IF(MOD(B$1-'Categorized Components'!$D3,'Categorized Components'!$F3)=0,'Categorized Components'!$E3*(1+Parameters!$C$2)^(B$1-Parameters!$C$5), ""), "")	If the formula returns an error, we will leave the cell blank. Otherwise, if the modulus of the column year minus the Categorized Components Replacement Year divided by the Categorized Components Useful Life is 0, calculate the service year cost with Current Cost * (1 + Inflation Rate) ^ (Column Year - Current Planning Year)

	A	B	C	D	E
77		Totals Row	See totals row details above and handle the same way depending on whether you wish to show just component costs or category totals as well.		
78	Current Cost				
79		Headings Row 1			
80			Type Description in Column A		
81			Columns B through AE	Enter the first and then the second year of the study. Select both of these, then drag to the right to fill in all the years	
82		Column A2 to bottom of column listings			
83			We are referencing Categorized Components for the rest of this	='Categorized Components'!A2	Check what the last item row (other than totals) is on the Categorized Components page and drag to match that final row number
84		All other component cells			
85			Beginning with cell B3 and extending down all the items and across all the columns we use the same formula.	='Categorized Components'!$E3*(1+Parameters!$C$2)^(B$1-Parameters!$C$5)	=Current Cost * (1 + Inflation Rate) ^ (Column Head - Current Planning Year)
86		Highlight the items to in their service years			
87			Use conditional formatting to highlight the service year items. I use the Classic style. For the Current Cost spreadsheet example…	=B3:AL129=Expenditures!B3:AL129	I use the Classic style, choose a formula option, and format the cell as grey background with a solid border, but you can choose your own style.
88		Totals Row	See totals row details above and handle the same way depending on whether you wish to show just component costs or category totals as well.		
89	Fully Funded				
90		Headings Row 1			
91			Type Description in Column A		
92			Columns B through AE	Enter the first and then the second year of the study. Select both of these, then drag to the right to fill in all the years	
93		Column A2 to bottom of column listings			
94			We are referencing Categorized Components for the rest of this	='Categorized Components'!A2	Check what the last item row (other than totals) is on the Categorized Components page and drag to match that final row number
95		All other component cells			
96			Beginning with cell B3 and extending down all the items and across all the columns we use the same formula and it's a doozy. We want to see the cost in the years that an item is serviced, and also want to see what contribution should be put into the reserves each year with inflation factored in so that the full amount is available when it is time to service the item.	=IFERROR(('Categorized Components'!$I3*((1+Parameters!$C$2)^(B$1-'Categorized Components'!$D3)))*IF((MOD(B$1-'Categorized Components'!$D3,'Categorized Components'!$F3))=0,1,MOD(B$1-'Categorized Components'!$D3,'Categorized Components'!$F3)/'Categorized Components'!$F3), 0)	If there is an error, we enter 0.The first part of the calculation is: First Future cost * (1 + Inflation Rate) ^ (Column Year - Current Planning Year) but then multiply that "power of" result times an IF() clause that first checks if the modulus (remainder) of (Column Year - Replacement Year divided by Useful Life =0 and if it does we enter 1. IF the modulus is not 0, we calculate the modulus of (Column Year - Replacement Year divided by Useful Life and divide that by the Useful Life.
97		Totals Row			
98			We sum up each column, and this row of figures will be transposed onto the Cash Flow page		
99		Hide zeros			
100				Go to the Excel menu and choose Preference -> View -> at Show in Workbook uncheck Zero Values	
101		Highlight the items to in their service years			

	A	B	C	D	E
102			Use conditional formatting to highlight the service year items. I use the Classic style. For the Current Cost spreadsheet example…	=B3:AL129=Expenditures!B3:AL129	I use the Classic style, choose a formula option, and format the cell as grey background with a solid border, but you can choose your own style.
103					
104	Cash Flow				
105		Column A "Beginning Year			
106			Enter Year previous to the planning year	=Parameters!C6	Enter in cell A2
107			Enter the current planning year	=Parameters!C5	Enter in cell A3
108			Extend years down column	=A3+1	Enter in cell A4 and drag down column
109		Column B "Current Cost"			
110			Copy the Current Cost page row of sums and transpose to a column. It is tricky—read the instructions to the right	{=TRANSPOSE('Current Cost'!B130:AE130)}	To do this, one types =TRANSPOSE(and then go to the row and select the items to be transposed. Complete with a) closing parenthesis and click- important!- Control -> Shift -> Enter. Clicking Enter alone will not work.
111					Link to the Excel explainer for the TRANSPOSE() function
112		Column C "Annual Contribution"			
113			Enter Contribution of year previous to planning year	=Parameters!C10	Enter in cell C2
114			Calculate Annual Contribution using previous year's contribution multiplied by the Contribution % change (Column I)	=C2 + (1 + I3)	Enter in Cell C3 and drag down. It is possible to simply enter amounts one wishes to enter. We'll cover how to record this method as % change when we get to the Contribution % change topic (Column I)
115		Column D "Annual Interest"			
116			Calculate the Annual Interest	=Parameters!$C$3*(1-Parameters!$C$4)*(F2+(1*('Cash Flow'!$C3-'Cash Flow'!$E3)))	Enter in Cell D3 and drag down
117		Column E "Annual Expenditure"			
118			Copy sums from the Expenditures page	{=TRANSPOSE(Expenditures!B130:AE130)}	As explained above…one really needs to get the hang of clicking Control -> Shift -> Enter to make this work. The row number 130 will change depending on the actual placement of your SUM() function.
119		Column F "Project Ending Reserves"			
120			Enter ending reserves from year previous to planning year	=Parameters!C9	Enter in Cell F2
121			Calculate ending reserves	=(F2+C3+D3)-E3	Enter in Cell F3 and drag down. We're adding all the income to the previous account amount and subtracting the expenses
122		Column G "Fully funded			
123			Transpose from Fully Funded page	{=TRANSPOSE('Fully Funded'!B130:AE130)}	Link to the Excel instructions for TRANSPOSE()
124		Column H "Percent Funded"			
125			Calculate the percent funded	=F3/G3	Enter in Cell H3 and drag down. This is the ending reserves divided by the fully funded amount
126		Column I "Contribution % Change"			
127			Enter the desired change to the annual contribution from the previous year.	Enter your chosen amount	One simply enters an amount and this is part of the calculation determining the Annual Contribution. This is not always included on a cash flow page, but it is useful for understanding and planning.
128			Alternatively, calculate the % change using factors on the Cash Flow page	=C2/C3-1	Enter C2 with reference =Parameters!C10. Then enter desired contribution in all other cells as a number. The formula will show the % change year-to-year.