# Housing Development Center

# Replacement Reserve Model, 2011

# Spreadsheet Instructions

# Overview/Intro

The Housing Development Center originally developed this replacement reserve model in 2002 to assist project owners in assessing the adequacy of reserves over a 30-year time period and as a tool to model different financing scenarios.

The most current version of the model, instructions, and updates are available on the Housing Development Center’s website at [www.housingdevelopmentcenter.org](http://www.housingdevelopmentcenter.org).

# Purpose and Use

This Excel workbook is a useful tool for estimating the long term replacement reserve requirements for your affordable housing project. It is designed to help you determine the schedule and costs for to replace a range of exterior and interior Items and to make site improvements over a designated number of years.

To use this tool you will need to inspect, inventory (establish quantities), and enter data about the current condition of each building component or system, as well as data on replacement costs and estimated lifespans for each building component or system. You can then use the spreadsheets to compile your inspection and inventory data, analyze the replacement reserve balances over time and model the impact of varied annual reserve contributions (and refinancing) to best plan for the future needs of the project.

# Disclaimer

Information and estimates created by this product are based on data you collect and enter. You are responsible for the accuracy of the data collection and entry. The creators of this product make no representations as to the accuracy of the estimates generated by this product and assume no liability for the use of those estimates.

# Requirements

In order to run these spreadsheets you will need Excel 2010 or earlier versions of Excel that are able to convert Excel 2010 documents. While you should be familiar with Excel, expert skills are not required.

# Starting Out

## Template Workbook

The Replacement Reserve Workbook is made up of four spreadsheets, one per tab:

* Project Information
* Date Collection
* Capital Needs Inventory (includes two charts)
* Reserve Analysis

The following instructions will lead you through each spreadsheet (tab) and identify the information which needs to be inputted into specific cells, rows or columns. We recommend that you read through all of the instructions before beginning to input information. The order of inputting data is important, and if you begin with the first tab, rather than per these instructions, you may become unnecessarily confused.

## Sample Workbook

The sample workbook provided on the CD (“Housing Development Center Replacement Reserve Model Sample 2011”) has been completed to give you an idea of how the model should look when complete. The sample is based on a 50 unit, 15-year-old townhouse development serving families.

# Introducing The Tabs (Spreadsheets)

The four spreadsheets (tabs) in the workbook are designed to accomplish the following:

***Tab 1: Project Information*.** Tab 1 provides a summary of the project, including basic project information, linking it to other spreadsheets.

***Tab 2: Data Collection.*** Tab 2 is used to inventory and input your project’s building components and their condition. We refer to building components as replacement reserve Items (Items). Based on your inputted data, this spreadsheet calculates the “Average Percent of Life Expired” (Column “BC”) and “Current Average Age” (Column “BD”), based on the “Average Useful Life Expectancy” (Column “BB”) inputted for each Item on the third tab.

***Tab 3: Capital Needs Inventory.*** This tab is used estimate the annual reserve balances over the life of your replacement reserve analysis period. This tab translates the condition and remaining useful life information from Tab 2 into cost information, which is then spread across a specified number of years for each Item. The expected costs per year for each Item are then totaled to give expected reserve needs per year. Initial and annual reserve deposit information is also inputted on Tab 3. Cost and deposit information is then spread for the entire replacement reserve analysis period, with annual reserve balances shown in Rows 60 – 65, beginning in Column S (unless you add years).

***Tab 4: Reserve Analysis.*** This tab provides a chart of the projected reserve balances for the project over a 30 year period. This spreadsheet also allows for financial modeling including:

* Adjusting deposits to replacement reserves both initially and in subsequent years,
* Inputting additional, periodic deposits in specified years, such as from refinancing events, to allow you to plan for capital needs based on a combination of initial and annual deposits plus periodic refinancing.

# General Notes on the Spreadsheets:

***Cost Information.*** Enter all cost information data entries as current dollars.

***Do not to change the names of the spreadsheets.*** Formulas within the workbook refer to spreadsheets by name; if the names are changed, formulas will not work.

***Shaded cells are for data entry.*** Unshaded cells contain formulas and should not be changed.

***Inserting or deleting rows should be done with extreme caution.***  It is better to hide rows rather than delete them. If rows are inserted, formulas for the entire row should be copied and inserted. More detailed instructions are below.

# Completing the spreadsheets

## *Tab 1: Project Information*.

## Use one spreadsheet per project and complete shaded cells. You may override (customize) annual reserve contributions, interest rates, and other information in shaded cells. Unshaded cells have formulas, but are not locked – take care not to unintentionally override formulas.

## Tab 2: *Data Collection Spreadsheet*

1. **Set Up Data Collection Spreadsheet.**Before starting your site inspection, enter unit numbers (row 4) and building numbers (row 42) before heading out to your site inspection. There are hidden columns on the spreadsheet which can be unhidden to enter data for up to 50 units. If you have more than 50 units, simply insert additional columns between existing columns C & D. This will help ensure that formulas remain consistent. For common areas, simply rename a unit as common area.
2. **Complete Site Inspections.** Enter condition of each Item on the Data Collection Spreadsheet in rows 5-32 (interiors), and 42 – 61 (exteriors and site), entering a rating for each Item in the individual apartment unit. Additional rows with title “Other” are available for project specific Items not on the template.

To make the spreadsheet calculate correctly, you must score the ratings for the useful life of the each Item from 0 to 5, corresponding to the amount of life expired for the Item:

0 = 0% expired (new)

1 = 20% expired

2 = 40% expired

3 = 60% expired

4 = 80% expired

5 = 100% expired (needs immediate replacement)

***Hint:*** *While the expired useful life of an Item is the basis for the replacement reserve calculations, most users will be more inclined to rate Items by their condition (good, bad, and ugly). Prior to your inspection, it would be helpful to determine how conditions translate into useful life. For example, if kitchen cabinets are missing pulls, show damage consistently around the edges of doors and show significant wear and tear, this would translate to an expired life of 80% or a rating of 4.*

1. **Calculation of Remaining Useful Life.** Once you've entered this information, the spreadsheet will calculate the average percent of life expired for all of the like Items (see column. You will have the opportunity to accept or modify this calculation by manually entering (or modifying) this data into the Capital Needs Inventory Spreadsheet (discussed below).

***Hint.*** *Note that the "Useful Years of Item" in column BB is linked to the “Useful Life” entered in the Capital Needs Inventory Spreadsheet, Column J. If you chose to modify the Useful Life of an Item, edit these on the Capital Needs Inventory Spreadsheet.*

## *Tab. 3: Capital Needs Inventory Spreadsheet*

This sheet generates cost information based on the condition of Items from the Data Collection Tab. It consists of two linked charts:

* The **Data Entry Chart** to the left of the spreadsheet (Through Column Q)
* The **Annual Calculation Chart** to the right of the spreadsheet (Beginning Column S)

**DATA ENTRY CHART: Enter quantity, useful life, and cost data related to replacement Items:**

**Optional Calculation Columns**: Columns D-H will calculate the replacement cost of an Item on a per-dwelling-unit basis. Complete these columns for all Items where there is not EXACTLY one Item per dwelling unit (e.g. it is not necessary for refrigerators). For applicable Items:

1. **Enter Quantity (Column D).**  Enter the total number of each Item for the entire project.
2. **Enter Type-of-Measurement (Column E).** Enter the best description of how the Item is measured such as “each”, “lump sum”, “lineal ft.”, or “sq. ft.”
3. **Enter Cost per Type-of-Measurement (Column F).** Enter the replacement cost per Item “type-of-measurement” as you defined in 2. above, expressed in current dollars. Sources for this information include construction contractors, architects, property management firms, and cost estimating databases such as RS Means.
4. **Spreadsheet Calculates Total Replacement Costs per Item (Column G).** This is simply quantity x cost per Type-of-Measure.
5. **Spreadsheet Calculates Replacement Cost per Dwelling Unit (Column H).** This is the cost of an Item per dwelling unit. Clearly, the per-dwelling-unit cost may differ from the Item (type-of-measure) cost if a unit does not have exactly one Item per unit. See exercises below for more information.

**Example #1:** Calculate the cost per dwelling unit to sealcoat a 10,000 SF parking lot at a cost of $0.60/SF at a 50 unit project.

1. Enter “10,000” in the “Quantity” Column D.

2. Enter “SF” for Square Feet in the “Type of Measurement” Column E.

3. Enter “$0.60” in the “Cost per Type of Measurement” Column F.

**Result:** The spreadsheet will calculate the “Total Replacement Cost” of $6,000 (total cost to sealcoat the parking lot) and “Replacement Cost per Dwelling Unit” cost for sealcoating of $120 per unit.

4. Enter “120” in Column I as the “Replacement Cost per Dwelling Unit”

1. **Enter Replacement Cost per Dwelling Unit (Column I).** For Items being calculated using the “Optional Calculation Columns”, hand enter the calculated cost-per-unit from Column H. Remember, if you know that there is only one Item per dwelling unit then you can skip the Optional Calculation Columns and hard enter the Replacement Cost per Dwelling Unit directly in Column I.

**Example #2:** Enter the Replacement Cost per Dwelling Unit for refrigerators.

1. Each unit has 1 refrigerator
2. Replacement refrigerators cost $450 per refrigerator including delivery
3. Enter “450” in Column I

1. **Enter Useful Life (Column J).** Enter useful life expectancy for each Item. HDC has inserted a comment which gives a range of useful life for each Item (e.g. 15-20 years). The cells contain a useful life that is in the middle of typical range. You may modify the provided useful life expectancy based on the quality of the Item and/or your experience.

***Hint****: Note that the average useful life of individual Items used in the spreadsheet is based on information from Oregon Housing and Community Services. It can be found in their Consolidated Funding Cycle application materials on the OHCS website,* [*www.oregon.gov/OHCS*](http://www.oregon.gov/OHCS)*. Another source of useful life data is USDA Rural Development’s MFH Loan Origination Handbook HB 1-3560. Chapter 4 discusses project costs and information specific to useful life can be found at Section 4.21. The website for that handbook is* [*www.rurdev.usda.gov/handbooks*](http://www.rurdev.usda.gov/handbooks)*.*

1. **Replacement Years Spread (Column K).** This is the number of years over which an Item will be replaced. The default for this column is “1” which means that all of the Item would be replaced in a single year (e.g. a roof on a building). If you plan to replace an Item over a period of years, enter the number of years in “Replace Years Spread” column. Example: The ranges will be replaced over a 5 year period, change the appropriate cell to “5.”
2. **Current Average Age (Column L).** This cell is linked to the calculation from the Data Collection Tab, which will create a weighted average age. However, you may override the formula to input the current average age based on a known installation date of a component or to modify your inspection findings based upon experience.

**DATA ENTRY CALCULATIONS.** Based on the data you have entered in Step 1-9 of this spreadsheet, the spreadsheet will calculate the “Current Age” of each Item in (Column L) the “Percent of Life Expired” (Column M) the Remaining Value of the Item (Column N) the “Years of Remaining Life” (Column O) and the “Annual Deposit per Unit” needed per year to support the ongoing replacement of that Item based on the entered life expectancy and spread for replacement.

**Example of Data Entry CHART ENTRY:**

**Exercise 1:** Calculate the cost to replace the bath cabinets at a cost of $250 per cabinet set for a 50 unit project with a mix of 20 units with one bathroom and 30 units with one full bathroom and a half bathroom. The cabinets have been in place ten years are projected to be replaced over a five year period.

1. Enter “80” in the “Quantity” Column D. This totals 20 bathrooms with 1 cabinet set and 30 bathrooms with 2 cabinet sets.
2. Enter “Each” in the “Unit of Measure” Column E.
3. Enter “$300” in the “Unit Cost” Column F.
4. The spreadsheet will calculate the “Total Replace Cost” (for all cabinet sets) Column G ($24,000) and the average per unit cost of $480 in the “Replace Cost per Unit” Column H,
5. Enter “10” in the “Current Age” Column J.
6. Enter “5” in the “Replace Years Spread”, Column M”

**Result:** An initial deposit of $400 and annual deposits of $40 into the replacement reserve will cover the costs for replacement of the cabinets in years 3-4, 12-16 and 24-28.

**Annual Calculation CHART.** Beginning in Column S (to the right of the Capital Needs Inventory on this same spreadsheet), the spreadsheet uses the figures entered in the Data Entry Chart to generate annual expenses for replacements for a 30 year period. At the top of this Annual Calculations Chart in Rows 6 and 7 you will find the year number and an annual per unit deposit to the project’s replacement reserve account. The annual per-unit deposit is linked to the Reserve Analysis Tab, where you enter your beginning deposit amount and the annual accelerator. Only change these Items on the Reserve Analysis Tab.

The center portion of the Annual Calculation Chart spreads the annual replacement costs for the individual replacement Items. The bottom portion of the Annual Calculation Chart shows the results of calculations for the following in both per unit and total project amounts:

**Capital Deposit from Refinancing.** This is a formula linked from the Reserve Analysis sheet which shows periodic deposits to the reserves, e.g. capital raised as part of a refinancing event by year of that event.

**Annual Reserve Expenses (current dollars).** This row shows the total expected capital improvement costs (expected draws from reserves) for each year in current year dollars.

**Annual Reserve Expenses (future dollars).**  This row shows the total expected capital improvement costs (expected draws from reserves) for each year in future year dollars based upon a given inflation percentage.

**Res. Acct. Balance (current dollars).**  This row reflects the annual reserve balance, in current dollars, after periodic and annual deposits and withdrawals.

**Res. Acct. Balance (future dollars).** This row reflects the account reserve balance, in future dollars, after periodic and annual deposits and withdrawals.

## *Tab. 4: Reserve Analysis Spreadsheet*

On this spreadsheet you will enter the initial replacement reserve balance, the amount of the annual reserve deposit, the interest rate for reserve savings, and an inflation rate for replacement costs. The spreadsheet allows you to factor in a change in the deposit amount as well as periodic capital infusion, e.g. capital generated through a refinance. Note that the amounts you enter in this section are all per unit. The spreadsheet will calculate the annual reserve balances, both in current and future dollars.

**INPUT BASIC FINANCIAL INFORMATION.** Start by filling in the shaded cells at the bottom of the spreadsheet. These are very important because much of the data in the other cells throughout the spreadsheets is calculated using these figures. Your data entry for primary information is:

1. **Enter the initial amount PER UNIT of the replacement reserve balance** in the cell identified as "starting balance" (E51). The total project reserve amount is calculated and shown to the right.
2. **Enter the annual amount PER UNIT of the deposit to the replacement reserve** starting in year one in the cell identified as “annual reserve deposit." (Cell E59)
3. **Enter the interest rate earned on replacement reserve account** into the cell identified as “Savings interest rate.” (Cell E60) Of course, this figure will fluctuate so it is best to use a conservative rate such as 1%.
4. **Enter the amount estimated for inflation on construction costs** into the cell identified as “Expense inflation rate.” (Cell E61) The costs of the replacement Items will inflate over the next 30 years so it is important to include this factor. Although inflation rates will fluctuate, a conservative amount to use would be 3% per year.

**MODIFY YOUR MODEL.** Additional analysis can be accomplished using this spreadsheet by modifying the financing information to evaluate the impact that changes to initial, annual and periodic deposits have on the reserve balance over time. To make use of this tool simply:

1. **Enter the year and the amount of a change to the annual deposit amount** to the replacement reserve into the shaded areas in the cells identified as “Annual reserve deposit change.”
2. **Enter the year(s) and amount(s) of periodic deposits (e.g. refinancing)** in the cells identified as “1st Refinance” “2nd Refinance” and “3rd Refinance” as appropriate.

The spreadsheet will reflect the information inputted, showing the overall reserve balance over the 30 year period in a graph format. Additionally calculations showing the ending balance at year 30, the minimum, maximum and average balances are shown below the chart.

For example, here are the figures generated by specific inputs for a 50 unit project:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Exercise 3. | Project Yr | Per Unit | Project Total | Inflated Total (3%) |
| Starting balance | 1 | $ 1,000 | $ 50,000 |  |
| Annual Deposit | 1 | $350 | $ 17,500 |  |
| Deposit Change | 10 | $ 400 | $ 20,000 | $522 PU; $26,100 total |
| Refinance | 15 | $ 2,000 | $ 100,000 | $3,025 PU; $151,259 total |

To do the modeling effectively, you will need to know when your project’s financial milestones will take place (e.g. Year 15 in a LIHTC project or possibly Year 20 when the primary debt may be paid off). You will also need to be aware of any prepayment penalties that may be triggered by refinancing early during a loan term. You may need to get this financial information from the loan documents or compliance chart if available. Note that while we refer to these periodic deposits as refinancing, other sources of funds may also generate additional capital. The graph is an effective visual representation of the reserve balances and recapitalization impacts.

The goal of replacement reserve planning is to be able to develop a clear and planned approach to annual and longer term capital improvements. As the affordable housing industry matures, we are learning that many projects will need periodic recapitalization, in addition to annual reserve deposits, in order to cover the project’s long term capital needs. Typically, the reserve model will show that recapitalization is needed between years 15-20. This is due to the projects not having adequate initial deposits to replacement reserves and/or not be able to afford higher annual reserve deposits.

Note that even if a project could support higher initial deposits or annual deposits, those funds would be sitting in a reserve account losing purchasing power each year, since cost inflation typical exceeds earnings on reserves. Planning periodic refinances, stretched to be efficient, may prove to be the best, most cost effective approach to managing the long term capital needs of our portfolios. This is why we believe incorporating these periodic deposits into the replacement reserve model is a critical component.

***Hint:*** *The dollar amount labels in the left column of the graph will adjust to reflect the maximum balance. Keep your eye on the dollar amounts labels on the left side of the chart, not just on the graph line. By keeping an eye on the minimum, maximum and average "balance" numbers below the chart will also help determine if your project’s replacement reserve account is staying within acceptable bounds.*

# Printing Instructions

**Project Info Sheet**

This sheet will print on 1 page of standard 8 ½” x 11” letter paper.

**Data Collection Sheet**

This sheet will print on 2 pages of standard 8 ½” x 11” letter paper. The first page will have interior Items for up to 10 units and the 2nd page will have exterior Items for up to 10 buildings. You can print additional pages if you have more than 10 units or 10 buildings to be inspected.

**Capital Needs Inventory Sheet**

This sheet will print on 1 page of standard 8 ½” x 11” letter paper showing the Data Entry Chart (Columns A-P).

To print the Calculation of Annual Costs Chart to show the year by year tracking of deposits and withdrawals of the reserves to 3 pages of letter size paper with 10 years per page, then the following is recommended:

1. Hide Columns A-Q
2. Select print area for specified years 1-10 by highlighting cells R1-AB77 and use the select print area command
3. Print the page
4. Hide Columns S-AB
5. Select print area for specified years 11-20 by highlighting cells R1-AM77 and use the select print area command
6. Print the page
7. Hide Columns AC-AL
8. Select print area for specified years 21-30 by highlighting cells R1-AV77 and use the select print area command
9. Print the page
10. Unhide all columns

**Reserve Analysis Sheet**

This sheet will print on 1 page of standard 8 ½” x 11” letter paper. No modifications to printing should be needed.