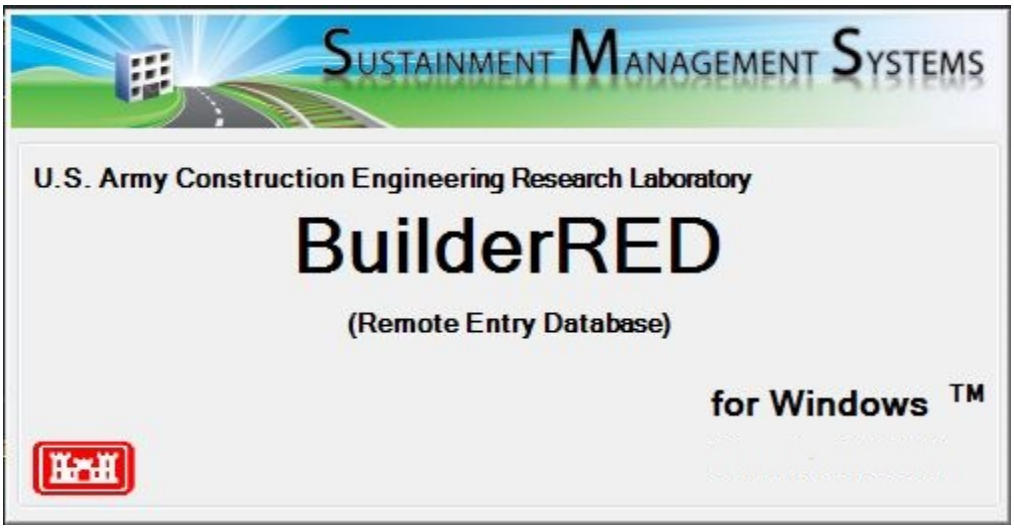
BuilderRED User Guide

Version 3.3.7

May 10, 2016

Welcome to BuilderRED



BuilderRED is Remote Entry Database software for collecting and storing facility (building) inventory and inspection information electronically. Using BuilderRED for collecting and storing this information instead of pen and paper techniques provides the following advantages:

- Inventory can be collected for loading into BUILDER.
- Data loading from paper to computer is eliminated, reducing error and saving time.
- Previous condition survey data and sample locations are available on-screen.
- Recorded condition survey data is easily uploaded into the BUILDER database.
- Distress definitions are available on screen.
- Drop-down lists of the Component-Sections pertaining to the inspected Facility are provided.
- The condition survey checklists are provided on screen.
- Component-Section quantities are displayed on-screen.
- A tally is provided that shows the number of samples and amount sampled.
- Inventory can be verified and updated during the condition survey.

Because of its numerous advantages over pen and paper techniques, it is strongly recommended that BuilderRED be used to save time and increase the accuracy of the data collected.

Table of Contents

Introduction:

USING THIS PDF

Note: This document contains the same information as the Online Help. However it is structured differently: Lists of reference material have been moved to the Appendixes so as not to interfere with the flow of overview information and procedures.

Navigation Tip:

When you activate a link to jump to a new location in this document, you can return to your original location by holding down the ALT key and pressing the left arrow key. This functions like the **Back** button on the Web, and can be used to back up through multiple navigational steps.

Chapter One:

CRITICAL VERSION INFORMATION

Impact of Upgrading to BUILDER 3.3.7 and BuilderRED 3.3.7

With the upgrade of BUILDER to Version 3.3.7, the underlying software formatting of **BRED**[1] (BuilderRED) files created by BUILDER Versions 3.3.7 and up will change. You will not be able to use pre-3.3.7 versions of BuilderRED to work on BRED files created by BUILDER Version 3.3.7. Therefore, you should carefully consider (1) the timing of upgrading to BUILDER and BuilderRED Version 3.3.7, and (2) whether your organization wishes to establish any procedures to minimize confusion about compatibilities. See "An Approach To Consider" on page 18 below for an example of such a procedure.

If there will be a need to work with both pre-upgrade and post-upgrade BRED files, contact your BUILDER support representative before installing BuilderRED Version 3.3.7.

> **Note:** BUILDER Version 3.3.7 will continue to accept import of BRED files created with previous versions of BUILDER. Older BRED files you have outstanding can always be imported back into BUILDER.

In this explanatory section, "older" BRED files means BRED files created with BUILDER Versions 3.3.0 through 3.3.6.

[1] BUILDER Remote Entry Database (BuilderRED)

Upgrade BUILDER First

Best practice is to upgrade BUILDER to Version 3.3.7 before you upgrade BuilderRED to Version 3.3.7. The BuilderRED upgrade may either be done immediately after the BUILDER upgrade or may be delayed.

Before Your BuilderRED Upgrade

Before upgrading to BuilderRED 3.3.7, you will be able to work only on BRED files created with BUILDER versions prior to 3.3.7.

If you have not yet upgraded to BuilderRED Version 3.3.7 and have time for some advance planning, see "An Approach To Consider" on the next page below.

After Your BuilderRED Upgrade

Once you have upgraded to BuilderRED 3.3.7, you will be able to work on BRED files created with BUILDER version 3.3.7. You will *not* be able to work on older BRED files.

After the upgrade you will still be able to import older BRED files back into BUILDER. Then you can re-export them from BUILDER 3.3.7 and work on them.

Details

What Works

1. After your system has been upgraded to BUILDER 3.3.7, you will continue to be able to import outstanding BRED files back into BUILDER, whether they have been created with BUILDER 3.3.7 or an older version of BUILDER.
2. After you upgrade to BuilderRED 3.3.7, you will continue to be able to import outstanding BRED files back into BUILDER, whether they have been created with BUILDER 3.3.7 or an older version of BUILDER.
3. If you delay upgrading to BuilderRED 3.3.7, you will be able to work directly on your outstanding BRED files with BuilderRED. *However, you will not be able to work on BRED files created with BUILDER Version 3.3.7.*

What Doesn't Work

1. **Working on Old with the New Won't Work.** After upgrading to BuilderRED Version 3.3.7, you will not be able to continue work on older outstanding BRED files in BuilderRED 3.3.7. What to do: First, import the older file back into BUILDER (Version 3.3.7; or possibly an older BUILDER version if you are working ahead of the Version 3.3.7 release date). Then, from BUILDER 3.3.7, re-export the information to BuilderRED, creating a fresh BRED file.
2. **Working on New with the Old Won't Work, Either.** If after upgrading to BUILDER Version 3.3.7, you delay upgrading your version of BuilderRED to Version 3.3.7, you will not

be able to use your pre-3.3.7 BuilderRED version to work on BRED files generated by BUILDER Version 3.3.7 or later.

An Approach To Consider

If you are comfortable delaying creation of new BRED files for a period of time, you can delay installation of BuilderRED 3.3.7 for that period, using it as a transition time for Inspectors and inventory takers to complete their in-progress work on older BRED files using the older version of BuilderRED, and to import them into BUILDER. Any older BRED files not completed during the transition period can be imported into BUILDER and then re-exported from BUILDER Version 3.3.7 to be worked on in the new 3.3.7 version of BuilderRED.

What's New In BuilderRED 3.3.7

Legacy BRED Export Files

WARNING: Legacy **BRED**[1] export files will not work in BuilderRED 3.3.7. The solution is to import these files back into BUILDER, then re-export. See "Impact of Upgrading to BUILDER 3.3.7 and BuilderRED 3.3.7" on page 16 for more details.

Major Display Changes

Be aware of this change in Mode display introduced in BuilderRED 3.3:

- **Mode Button Displays Currently Active Mode**. In BuilderRED 3.2 and previous, when the leftmost (Mode toggle) button on the toolbar indicated **Inspections**, it meant that you could activate the button to change *to* Inspections Mode. However, starting with version 3.3, it means the opposite, that you are *in* Inspections Mode.

New Terminology

- **"Activate"**. Because BuilderRED may be used either at a computer with a keyboard, or out in the field using a touch screen, the term "activate" will often be used in the documentation to replace "click", "tap", "tap or click", or "click or tap".

New Functionality Assessment Set

- **High Performance Sustainable Building** is a new functionality set in BuilderRED, alongside the (1) Functionality and (2) Cultural Resources functionality sets.

[1]BUILDER Remote Entry Database (BuilderRED)

Chapter Two:

GETTING STARTED

System Requirements

To properly operate BuilderRED, you will need the following:

- Windows-based tablet (NOT the RT version) or laptop
- Floppy drive, zip drive, flash drive, or a mapped network card to transfer data
- Windows NT, 2000, XP, or Windows 7, 8, or 8.1 operating system
- Microsoft Silverlight 5
- 32 Megabytes (MB) of RAM
- 32 MB of hard disk space

Note: For ease of inspection, it is recommended that BuilderRED is run on a Windows based tablet or laptop. However, BuilderRED can also be run on desktop computers.

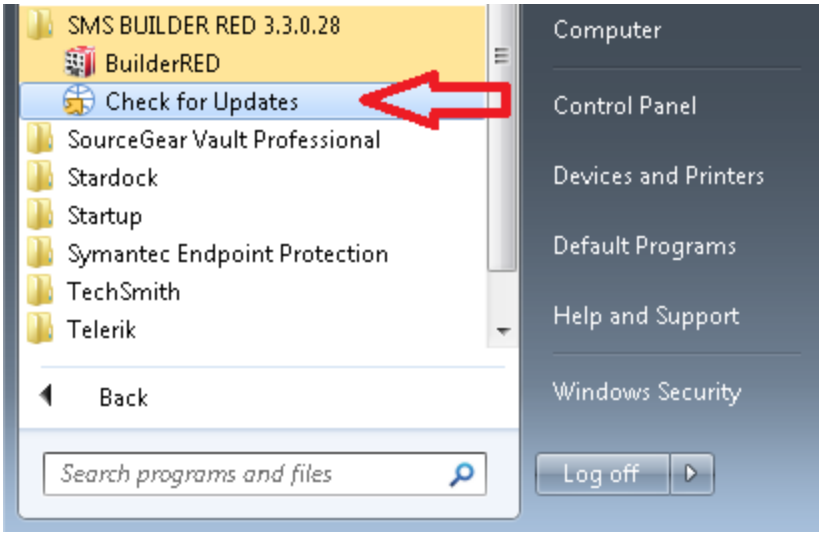
How To Install BuilderRED

Before installing BulderRED 3.3.7, be sure to first read "Impact of Upgrading to BUILDER 3.3.7 and BuilderRED 3.3.7" on page 16. Below are two options for accomplishing installation of BuilderRED.

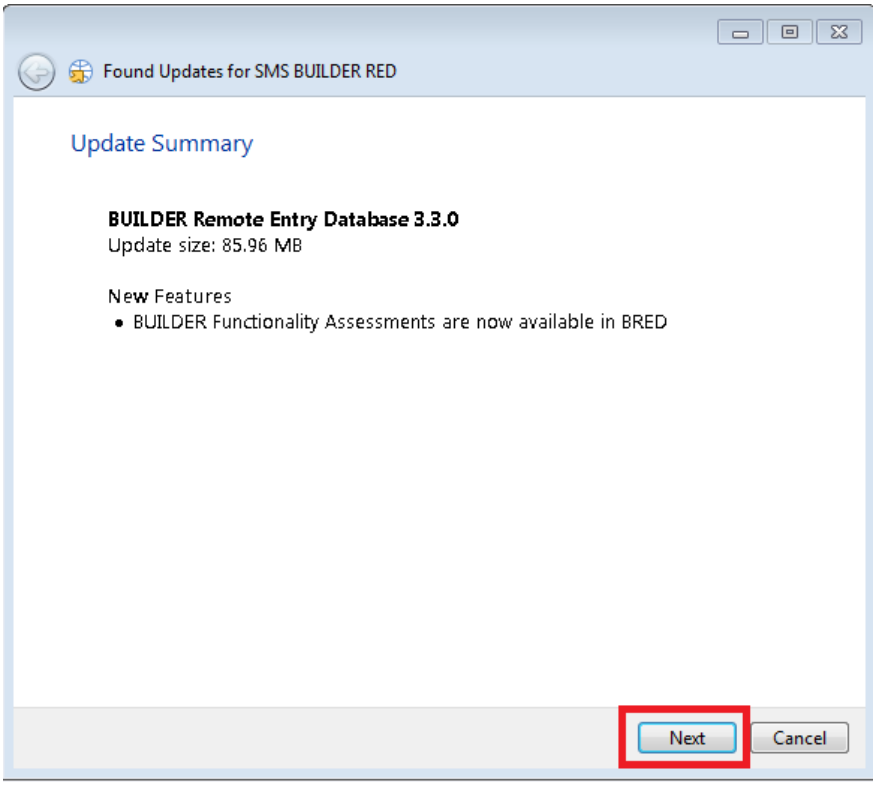
Option A: Use Microsoft Update

Step 1. Open the **Start** Menu and select **All Programs.**

Step 2. In the list of programs, click on the name of the previous version of **SMS**[1].
Step 3. Select Check for Updates.



Step 4: At the "Updates" popup window, click the **Next** button.



Step 5. Follow the online instructions for the rest of the BuilderRED installation.

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[1]Sustainment Management System

Step 6. If Microsoft Silverlight Version 5 is not already installed on your computer, follow the manufacturer's instructions to install it.

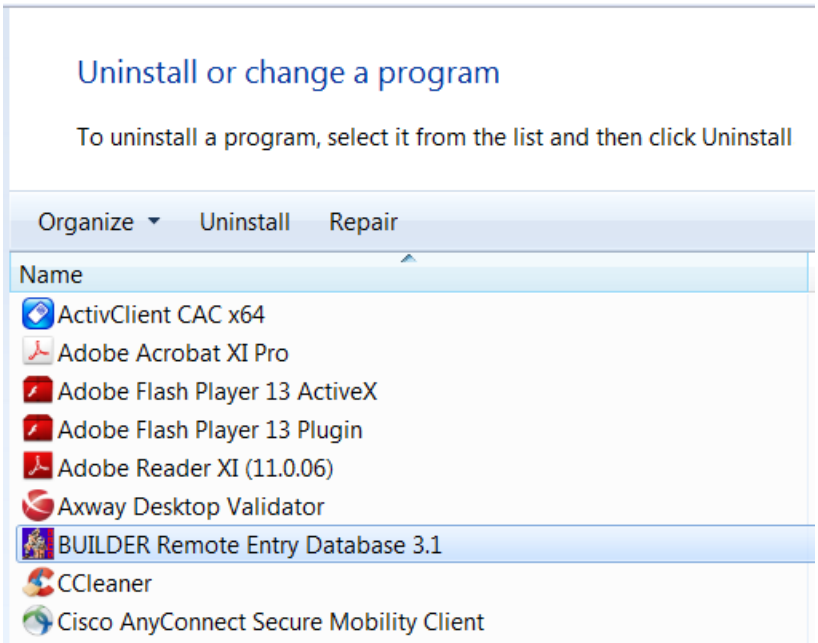
Option B: Uninstall and Re-Install BuilderRED

Remove All Older Versions

Step 1. Before BuilderRED version 3.3.7 is installed, all older versions of the program must be removed first. To remove old versions of BuilderRED, do one of the following:

a. Open **My Computer** > **Control Panel** > **Add/Remove Programs**. Or,
b. At the Start menu, open the Control Panel and select **Programs and Features**.

Step 2. In the list of programs, right-click the older BuilderRED version and select **Uninstall** from the right-click menu.



Download and Install BuilderRED

Step 3. After the old version or versions have been successfully removed, download the BuilderRED Version 3.3.7 software and follow the installation wizard directions.

Install Microsoft Silverlight Version 5

Step 4. If Microsoft Silverlight Version 5 is not already installed on your computer, follow the manufacturer's instructions to install it.

Loading Data into BuilderRED (BRED)

Step 1: Preparation

Before you can record inventory or inspection data in BuilderRED, first a database containing necessary information needs to be created in BUILDER. This happens as a result of entering an Organization and one or more Site(s) into BUILDER.

Once this information, or more, is in place in BUILDER, then a Site or Building(s), or narrower subsets, can be exported to and opened in BuilderRED. This section describes the export process.

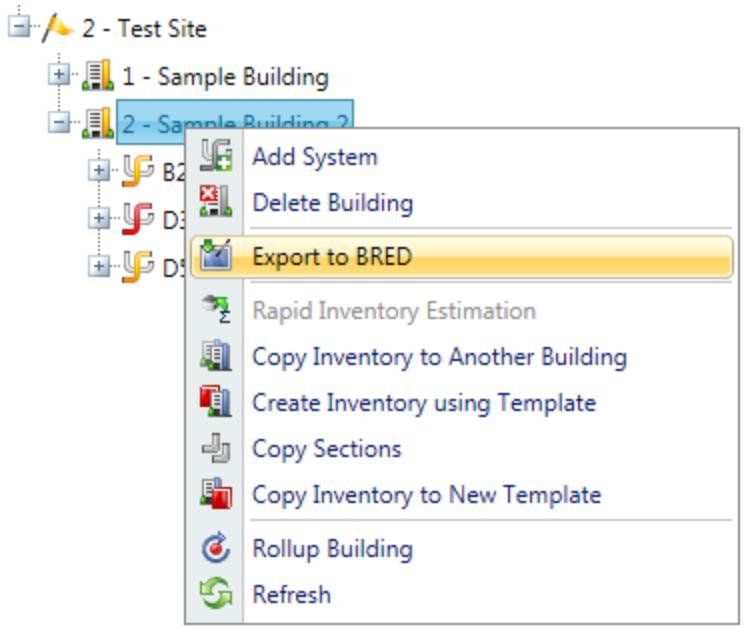
> **Best Practice**: Before performing an export from BUILDER to BuilderRED, it's a good idea to designate in advance a folder on your (exporting) computer that is specifically for **BRED**[1] export files. Depending on how your computer system is set up, export files may automatically route to your Desktop, your Downloads file, or to a TEMP file. On your first download you can determine where this location is and create a BRED export folder there, or you can designate an entirely new location.

Step 2a: How To Export a BUILDER File with Images to BuilderRED

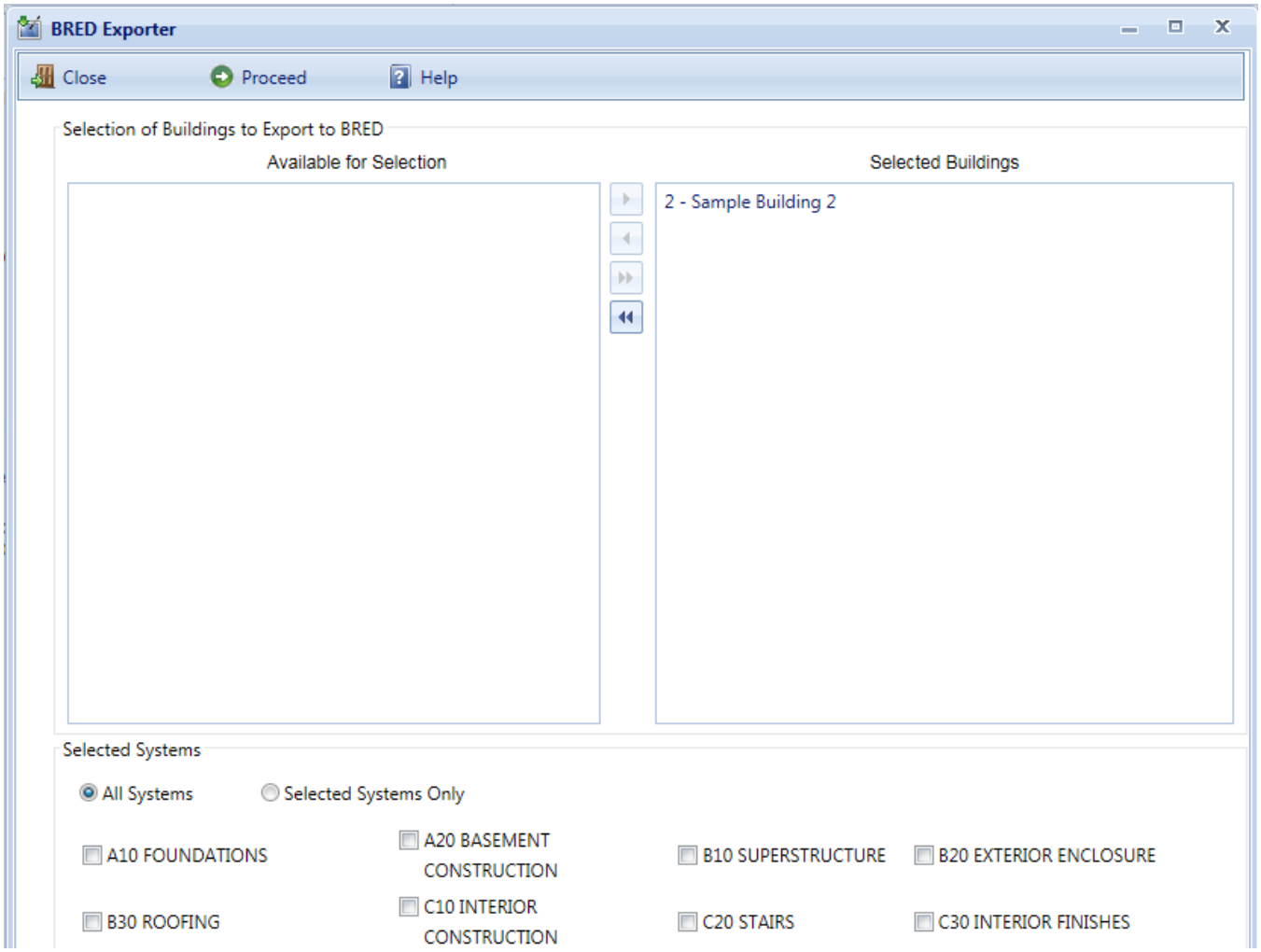
On your desktop computer or where you are using BUILDER, do the following:

1. In the BUILDER navigation tree, right-click the lowest level node (Site, Complex, or Building) that contains the items you wish to export.
2. Select the **Export to BRED** option:

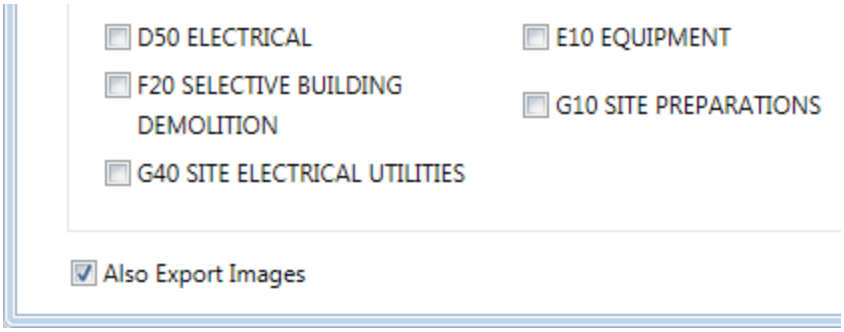
[1] BUILDER Remote Entry Database (BuilderRED)



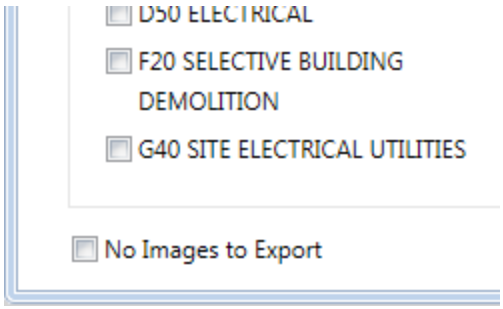
3. In the "BRED Exporter" window, do one of the following:
    a. Choose **All Systems** (radio button), or
    b. Select specific Systems (radio button and checkboxes):



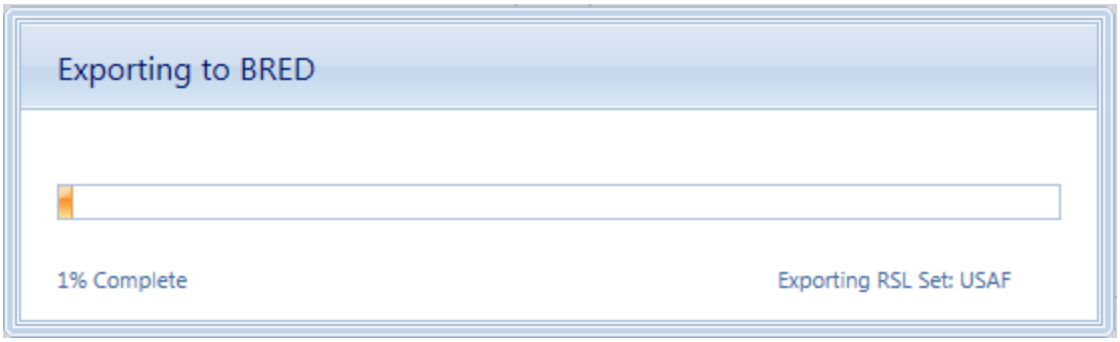
4. (Optional) In order to download images along with the BRED file, you must select **Also Export Images** at the bottom of BRED Exporter Window, as shown below:



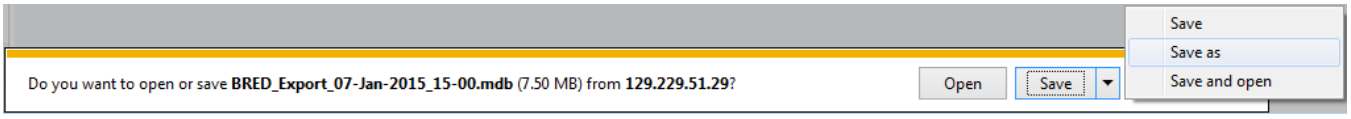
Note: If instead of **Also Export Images** you see **No Images to Export**, it means that the Building(s) you have selected to export do(es) not currently have any images:



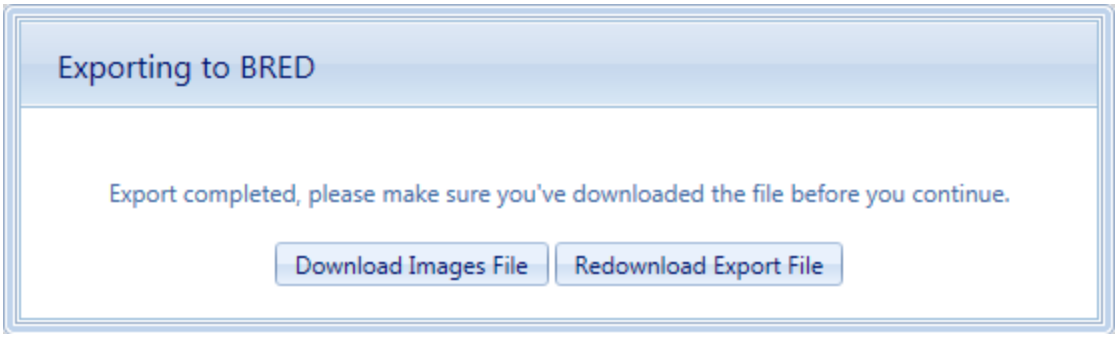
5. To start the export, click the **Proceed** button near the top of the window. *A progress bar will display as the BRED database file is downloaded first*:



6. After the database file has successfully downloaded, select the **Save as** option to choose a file location for it:



7. If the BRED file did *not* download correctly, click on **Redownload Export File**, then repeat the previous two steps.



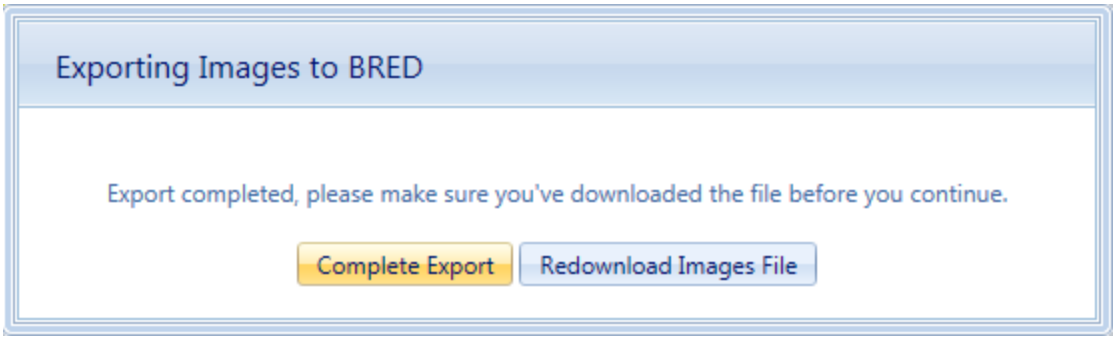
8. If you are *not* downloading images, next select **Complete Export** to finish the export process; when this is finished, skip to **How To Open an Imported Database in BuilderRED** in the documentation below.

9. If you *are* downloading images, click on **Download Images File** to start the second download (the download of the images file into BRED):

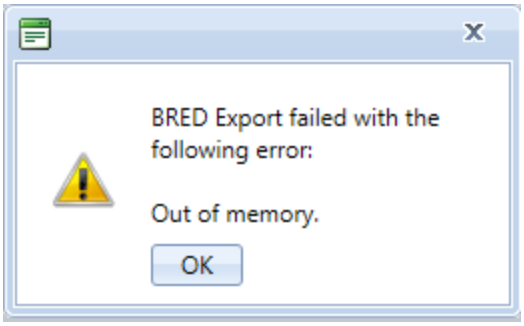
10. After the second download completes, click **Save as** and navigate to the same file location as your BRED database file.

    IMPORTANT: This must be the same file location where your BRED database file is stored.

11. Lastly, select **Complete Export** to finish the export process:



Known Issue with Image Export from Builder



If the BRED Export error message shown above displays after you try to download the image file from BUILDER, that indicates that somewhere in the exported files there is an attachment (such as a PDF, an Excel file, etc.) that is not an image. The workaround is to export the Building(s) without images.

Step 2b: How To Export a BUILDER File to BuilderRED Without Images

It is very important to understand that you can still add and import photos into BUILDER through BuilderRED without first downloading images from BUILDER.

Some Buildings (facilities) within your site can already contain several hundred photos. If you know beforehand that you will not need to view or edit these existing photos from the BUILDER site in BuilderRED, the best practice is to just download the BRED file without images.

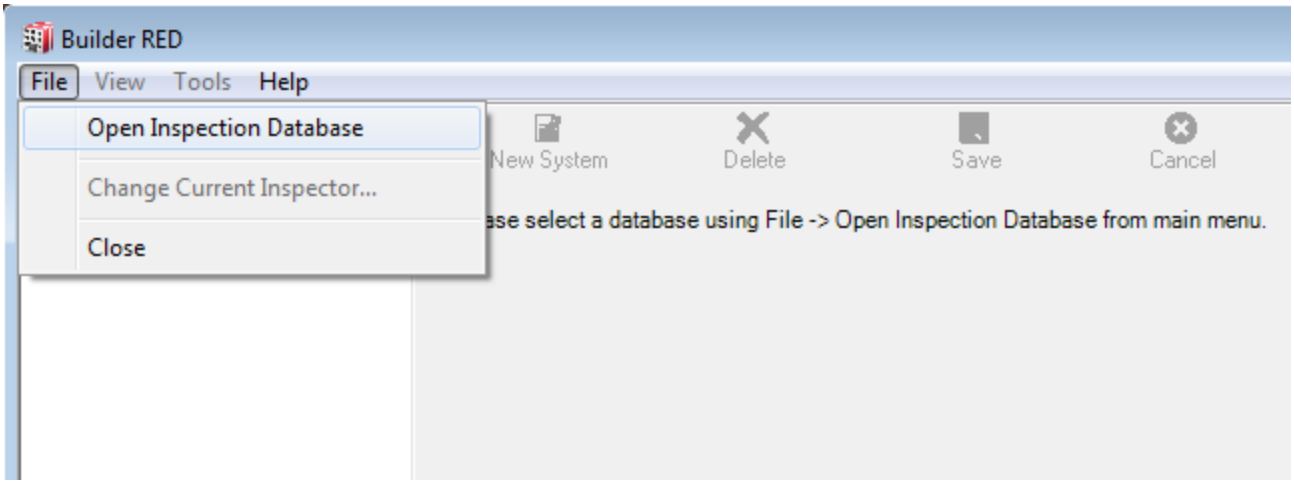
To download the BRED file without images:

- Run through the same BuilderRED export process outlined previously for importing with images, but ignore the **Also Export Images** checkbox.

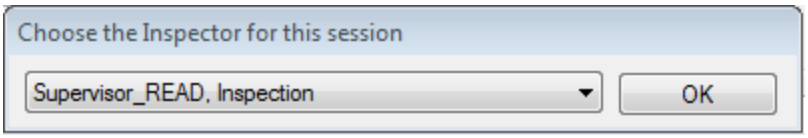
Step 3: How To Open an Exported Database in BuilderRED

Once the BRED software has finished loading, do the following:

1. Select **File** > **Open Inspection Database**:



2. Locate the BRED file that was previously downloaded; either (a) double-click it, or (b) select it and activate the **Open** button.
3. At the prompt, select your name from the Inspector dropdown list and activate the **OK** button.



4. If you cannot find the appropriate name on the list, contact your BUILDER support agent.

Step 4: Working With the Data in BuilderRED

For an introduction to working with the data in BuilderRED, see the "BuilderRED Basics" chapter in the Help documentation, immediately following.

Chapter Three:

BuilderRED BASICS

Overview of the BuilderRED Process

When using BuilderRED to perform inventory or inspections:

1. Install the current version of BuilderRED, if not already done (See "How To Install BuilderRED " on page 19.)
2. Load the desired data into BuilderRED by exporting it from BUILDER (See "Loading Data into BuilderRED (BRED)" on page 22).
3. Note that when exporting data from BUILDER to BuilderRED, exporting the associated image files is optional. You will still be able to import new, additional images into BUILDER whether or not you have exported any images out to BuilderRED.
4. If performing inspections, be aware that by default, both BuilderRED and BUILDER enforce a 30-day time window for editing inspections. You have an additional 29 days after the date of an inspection to alter the records, whether this alteration takes place while the records are still in BuilderRED, or in BUILDER after import.

   Note: This default time window can be changed in BUILDER but not in BuilderRED.
5. If performing inventory, you will be able to create additional Buildings (facilities) and new Systems, Components, and Sections as needed in BuilderRED.

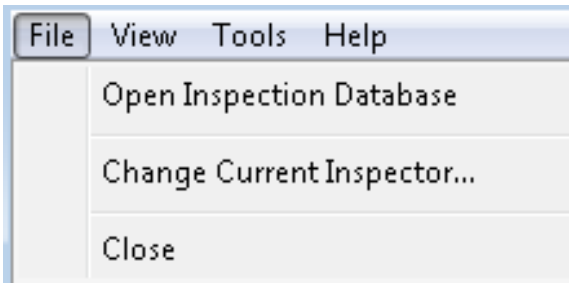
6. When finished, you will need to use BUILDER again to import your updated information back into BUILDER. The most up-to-date information on this step in the process will be in the online BUILDER documentation, but to get an idea of how it works, see "Importing Data from BuilderRED to BUILDER" on page 160

7. If you performed inspections and completed their import into BUILDER, the new data will be reflected in the Condition or Functionality Indexes after a rollup is done. Rollups are automatically performed nightly, or if you need to see the change in the indices sooner, you can do a manual rollup in BUILDER.

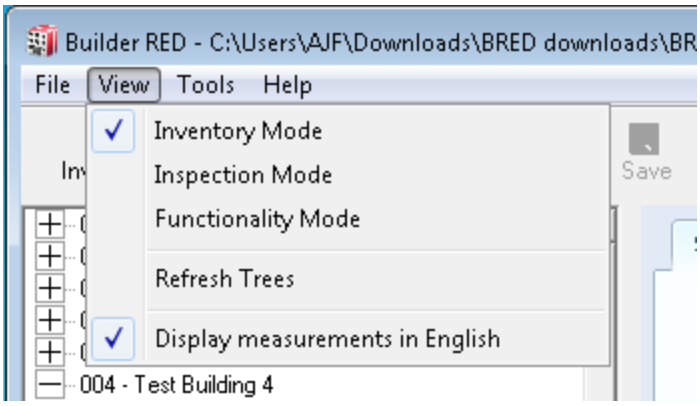
The BuilderRED Menu Bar: Overview

In BuilderRED, these menus are located on the menu bar at all times: **File**, **View**, **Tools**, and **Help**. The following list shows the functions that can be initiated from the persistent menu bar.

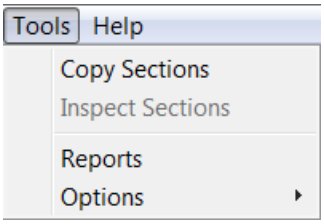
1. The **File** menu is used to:
   - Open the inspection database that was exported from BUILDER into BuilderRED
   - Change the current inspector
   - "Close BuilderRED" on page 34.



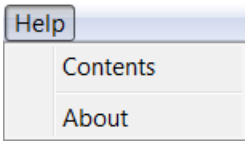
2. The **View** menu is used to:
   - Change between the Inventory, Inspection, and Functionality modes
   - Refresh the Inventory, Inspection, and Functionality trees
   - Change the units of measure between Metric and English.



3. The **Tools** menu is used to:
    - Copy multiple Sections from one floor to another
    - Add multiple Sections to inspect at a sample location
    - Generate reports



4. The **Help** menu is used to:
    - Open the contents of the BuilderRED Help file
    - Open the About section of the BuilderRED Help file

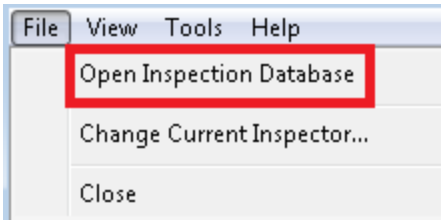


The BuilderRED Menu Bar: Operation Instructions

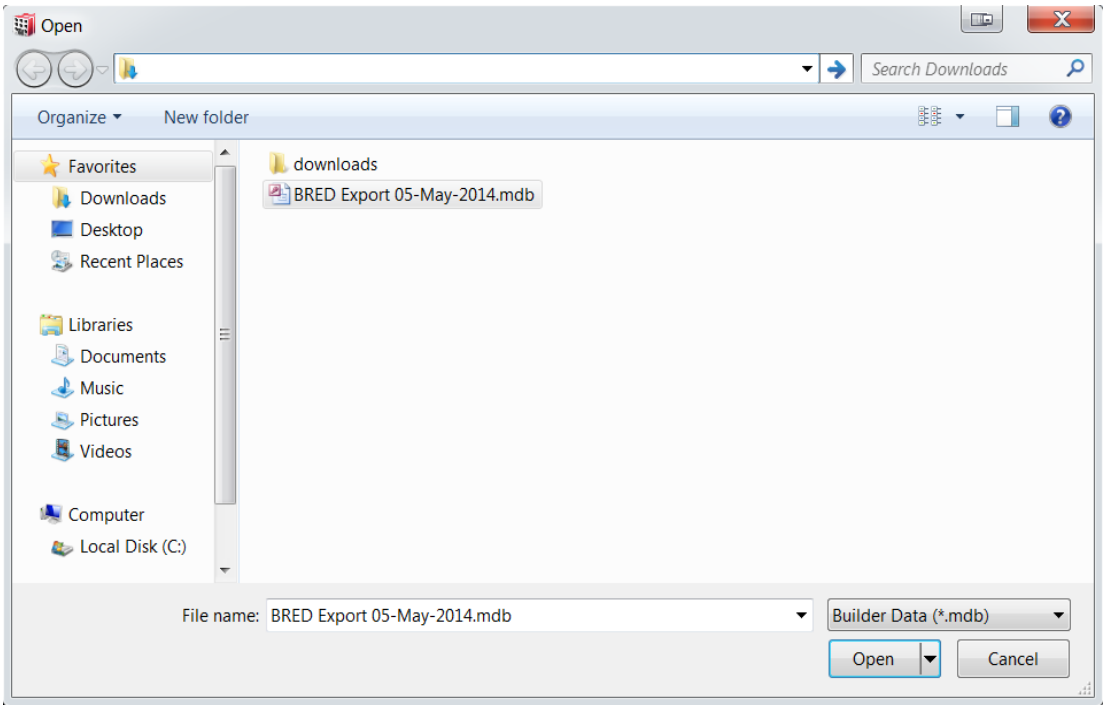
Open an Inspection Database

To open an inspection database:

1. Select **Open Inspection Database** from the **File** menu.



2. Locate and select the inspection database with the *.mdb extension you wish to open in BuilderRED.



3. Activate the **Open** button (lower right). The database will open in BuilderRED, and new inventory and inspection data can now be recorded.

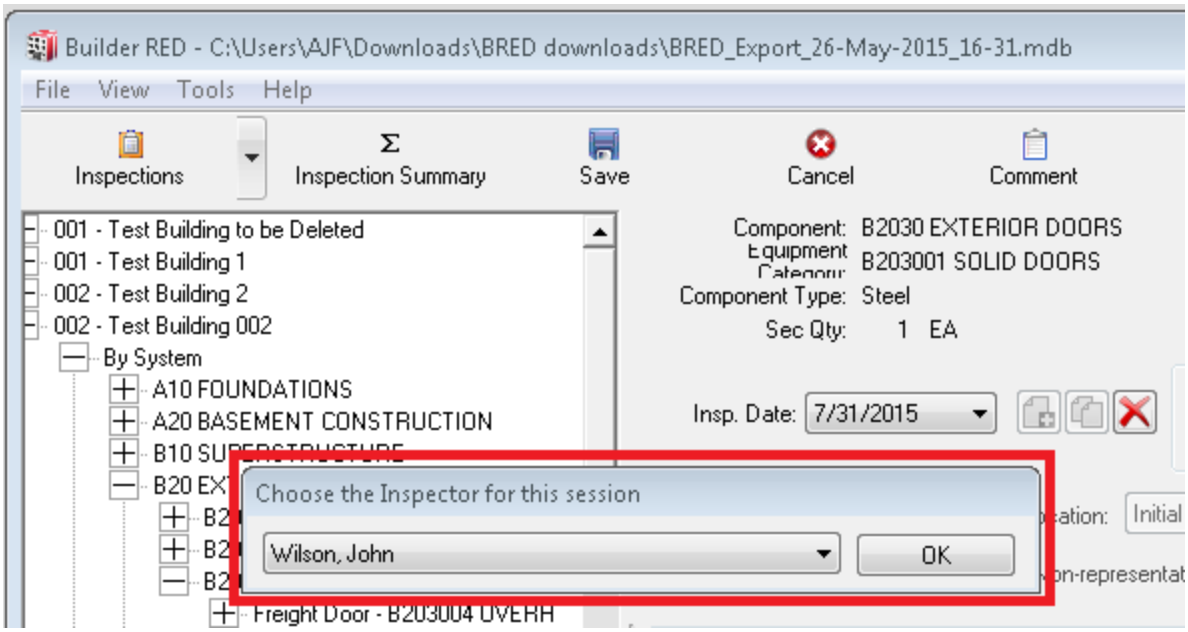
> **WARNING:** Many of the BuilderRED system files are also Access databases, and therefore also have an *.mdb extension. *Do not get these databases confused with inspection database files when trying to open your inventory.*

Choose or Change the Inspector

Before you can perform inspections in BuilderRED, you must first select the appropriate Inspector name from a dropdown menu. In BuilderRED, there are two alternate ways to choose an Inspector:

a. The first time you enter Inspections mode, you will be automatically prompted to choose an Inspector.
b. At any time, you can select **Change Current Inspector** from the **File** menu.

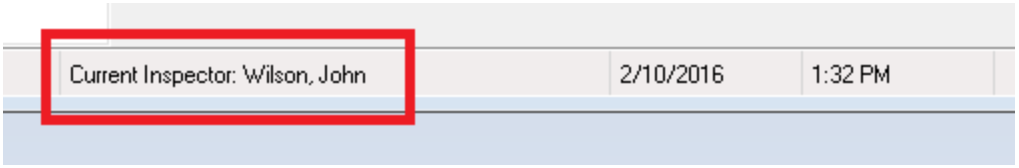
In either case, the "Choose the Inspector" popup window will appear:



To choose an existing Inspector at the "Choose the Inspector..." window,

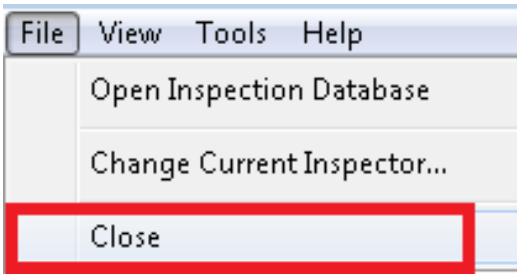
1. Expand the dropdown list.
2. Select the appropriate Inspector name. (*The list will then contract again, showing just that name.*)
3. Activate the **OK** button.

At the bottom of the screen, you will be able to see the name of the inspector displayed:



Note: If you do not see your name in the list, contact your BUILDER support representative.

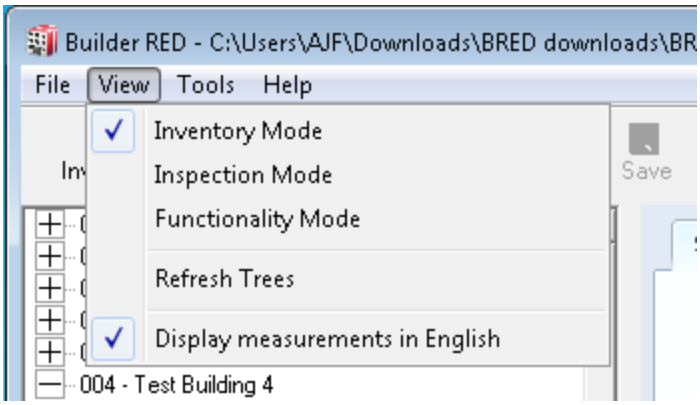
Close BuilderRED



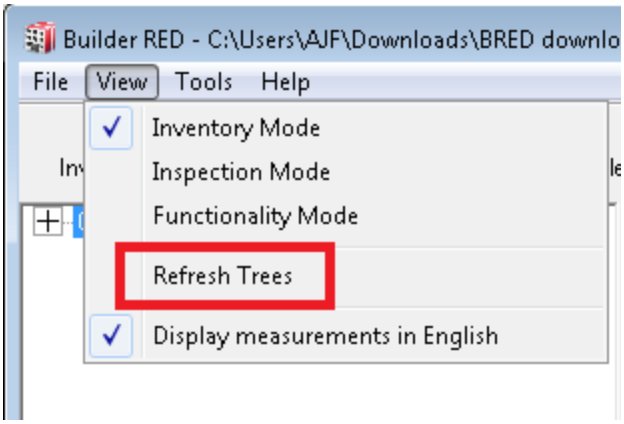
Selecting this option will close the BuilderRED software. If you have made unsaved changes, the program will prompt you to save before exiting.

Change Mode Using the View Menu

Selecting the **View** option in the BuilderRED menu bar allows you to switch the mode BuilderRED is operating in. Your current mode is indicated by a checkmark.

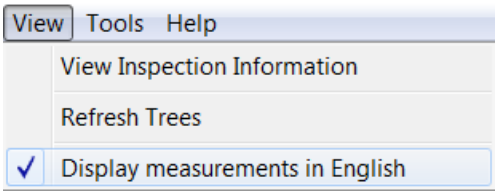


Refresh Trees



Selecting the **Refresh Trees** option from the **View** menu refreshes the inventory, inspection, and functionality trees to ensure that the most up-to-date data is shown in them.

Display Measurements in English



Selecting this option allows you to toggle the unit of measure between the English system and the Metric system.

- If a checkmark appears next to "Display measurements in English," all measurements displayed are in the English system.
- If no checkmark appears, all measurements are displayed in the Metric system.

To change the units of measurement between English and Metric:

1. Open the **View** menu.
2. Select the **Display measurements in English** menu option to toggle between English measurements and metric.

BuilderRED Modes

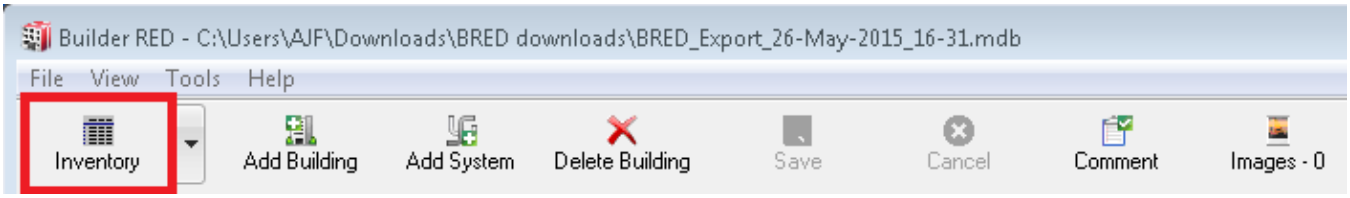
The Three BuilderRED Modes

BuilderRED Version 3.3 allows you to switch between three main operating modes: inventory, inspections, and functionality (functionality assessment). This is in contrast to the previous version where there were only two operating modes.

Inventory Mode

In this mode, you can view, add, edit, and delete Building, System, Component, and Section data.

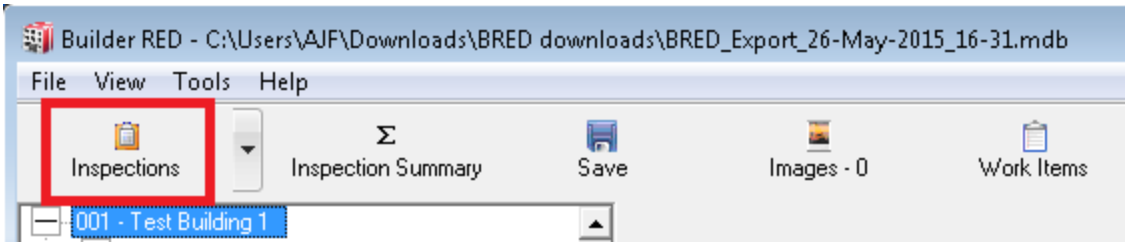
> **Note:** When the **Inventory** icon and label are visible, it means that you are in Inventory mode. *This is in contrast to BuilderRED Versions 3.2 and previous*.



Inspections Mode

In this mode, you can view past inspections and create new inspections.

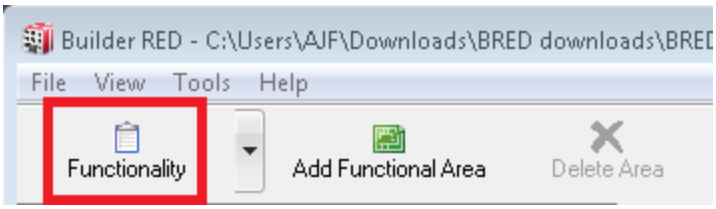
> **Note:** When the **Inspections** icon and label are visible, it means that you are in Inspections mode. *This is in contrast to BuilderRED Versions 3.2 and previous*.



Functionality Mode

In this mode, you can view past functionality assessments and create new ones.

> **Note:** When the **Functionality** icon and label are visible, it means that you are in Functionality mode.



Switching Between Modes in BuilderRED

Choose one of the following methods to change modes in BuilderRED:

a. Click or tap the leftmost (Mode toggle) button on the BuilderRED toolbar until it displays the mode you want.
b. Activate the down arrow at the right edge of the Mode button, then select the desired mode from the dropdown list.
c. Select the desired mode from the **View** menu. See "Change Mode Using the View Menu" on page 34.

Chapter Four:

INVENTORY

Basics of the Inventory Toolbar and Tree

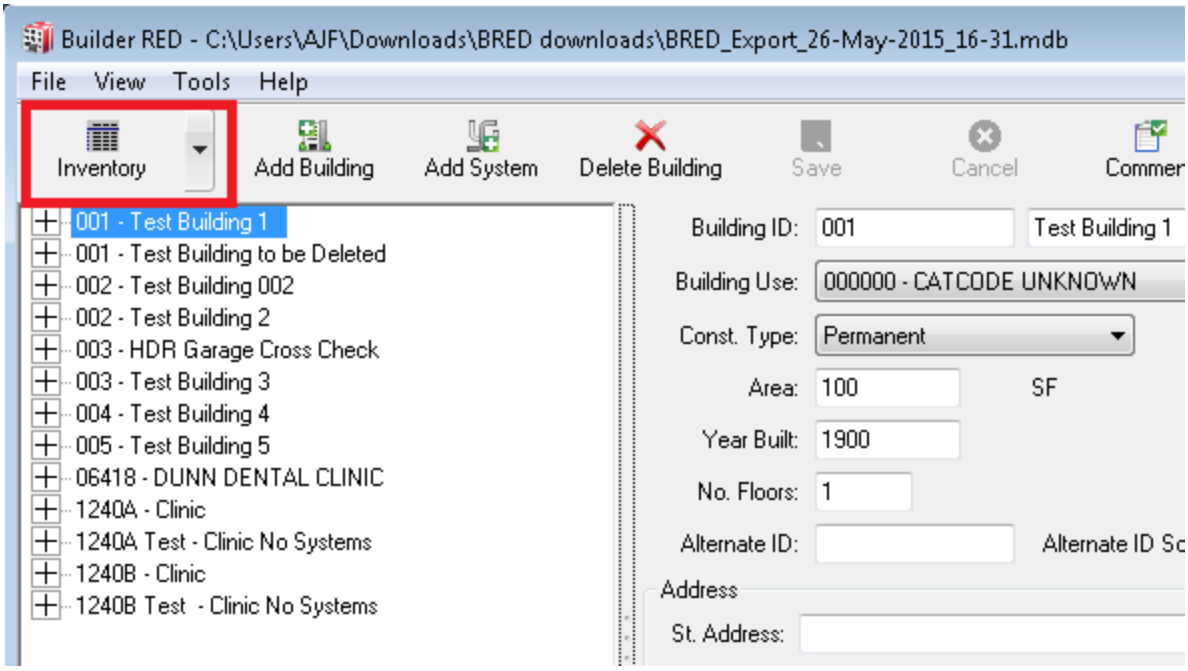
One advantage of BuilderRED is the ability to collect and edit inventory data in Inventory mode. When collecting inventory data in a facility for the first time, it is recommended that you collect the inventory data first and perform the inspection second, even though BuilderRED allows you to do both simultaneously. If inventory is already present from a previous audit, you can view this information and make changes in BuilderRED if necessary.

Select Inventory Mode

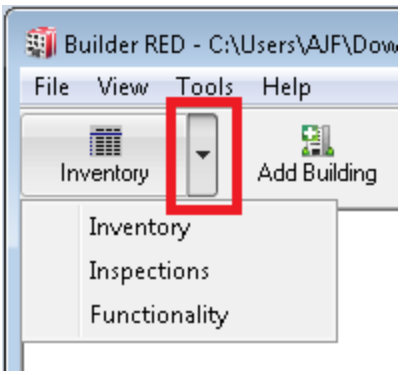
To operate in Inventory mode, do one of the following:

a. Tap or click the leftmost button (Mode toggle) on the BuilderRED toolbar until the **Inventory** icon and label appear on the button.

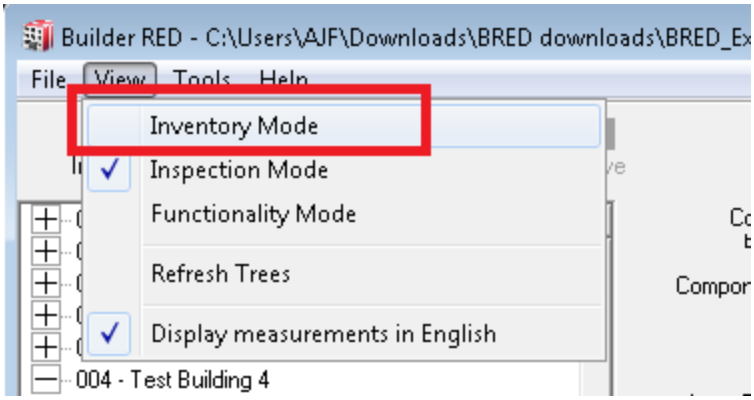
> **Note**: If you are seeing the **Inventory** button on the toolbar, that means you are already in Inventory mode. *This is different from BuilderRED Versions 3.2 and previous*.



b. Activate the down arrow at the right edge of the Mode toggle button, then select "Inventory" from the dropdown list.

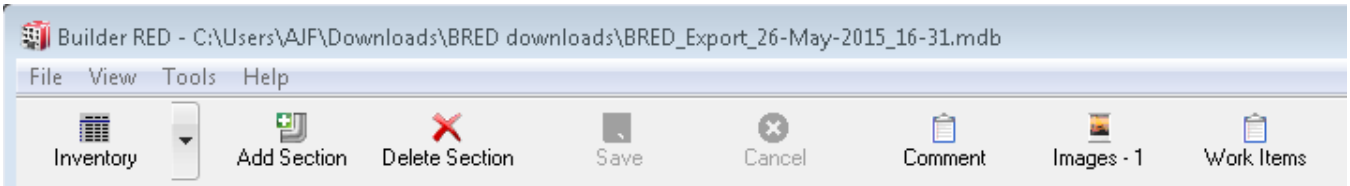


c. Alternatively, select **Inventory Mode** from the [View menu](#).



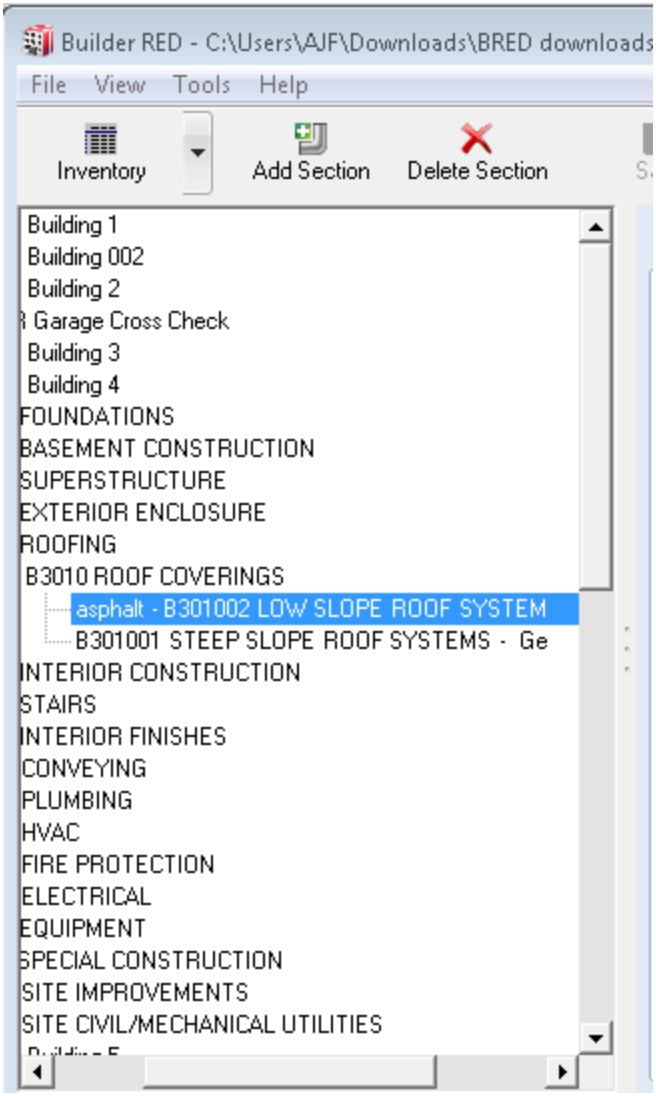
Inventory Toolbar

In Inventory mode, the following toolbar, with minor variations, will appear:



Inventory Tree

In the split window, the left side displays the Inventory tree, which acts as a map of the inventory in the database.



The Inventory tree organization is:

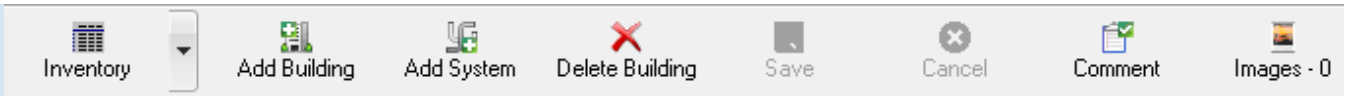
- Building
  - System
    - Component
      - Section

Here, the tree can be expanded by activating the "+" next to an inventory level, or collapsed by activating the "-" next to an inventory level. To select a particular inventory level, tap or left-click on it. The information pertaining to that inventory level will be displayed in the right side of the split screen.

Inventory Toolbar Variations

The Inventory Toolbar will appear in one of four different ways, depending on your location in the inventory tree. (Some items that are here shown grayed out may be active, depending on what is or is not selected.)

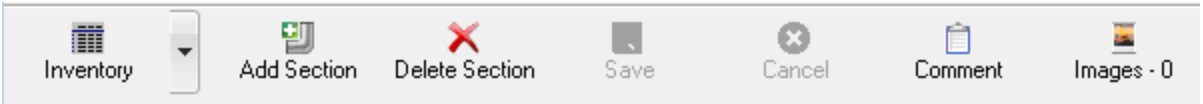
At the Building level:



At the System level:

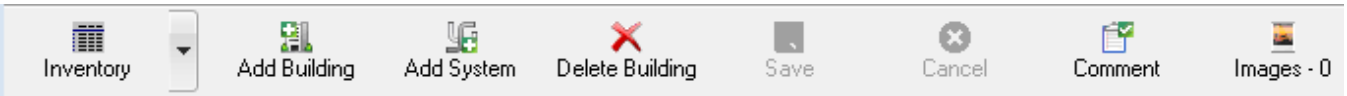
At the Component level:

At the Section level:



Building (Facility) Basics

The BuilderRED hierarchy begins with the Building (facility) level. The navigation tree on the left side of BuilderRED displays each of the Buildings in the database currently opened in BuilderRED. Clicking or tapping on a Building highlights its name and will offer the following toolbar options:



- **Mode.** This button identifies the mode you are in. Tap or click it to advance to Inspections mode or Functionality mode.
- **Add Building.** Activate this button to add a new Building/facility.
- **Add System.** Activate this button to add a new System.
- **Delete Building.** Activate this button to delete a Building/facility.
- **Save**. Activate this button to save changes made to Building/facility information in the right hand side of the window.
- **Cancel**. Activate this button to cancel all changes made to Building/facility information since the last save.
- **Comment**. Activate this button to add Building/facility comments. If there is a check mark on the icon, it means that comments have already been entered for this Building.
- **Images**. Activate this button to attach add, view, or delete images at the Building level. The number after the word **Images** shows how many images (that have been attached during the current BuilderRED session and/or imported from BUILDER) are associated with the Building in BuilderRED.

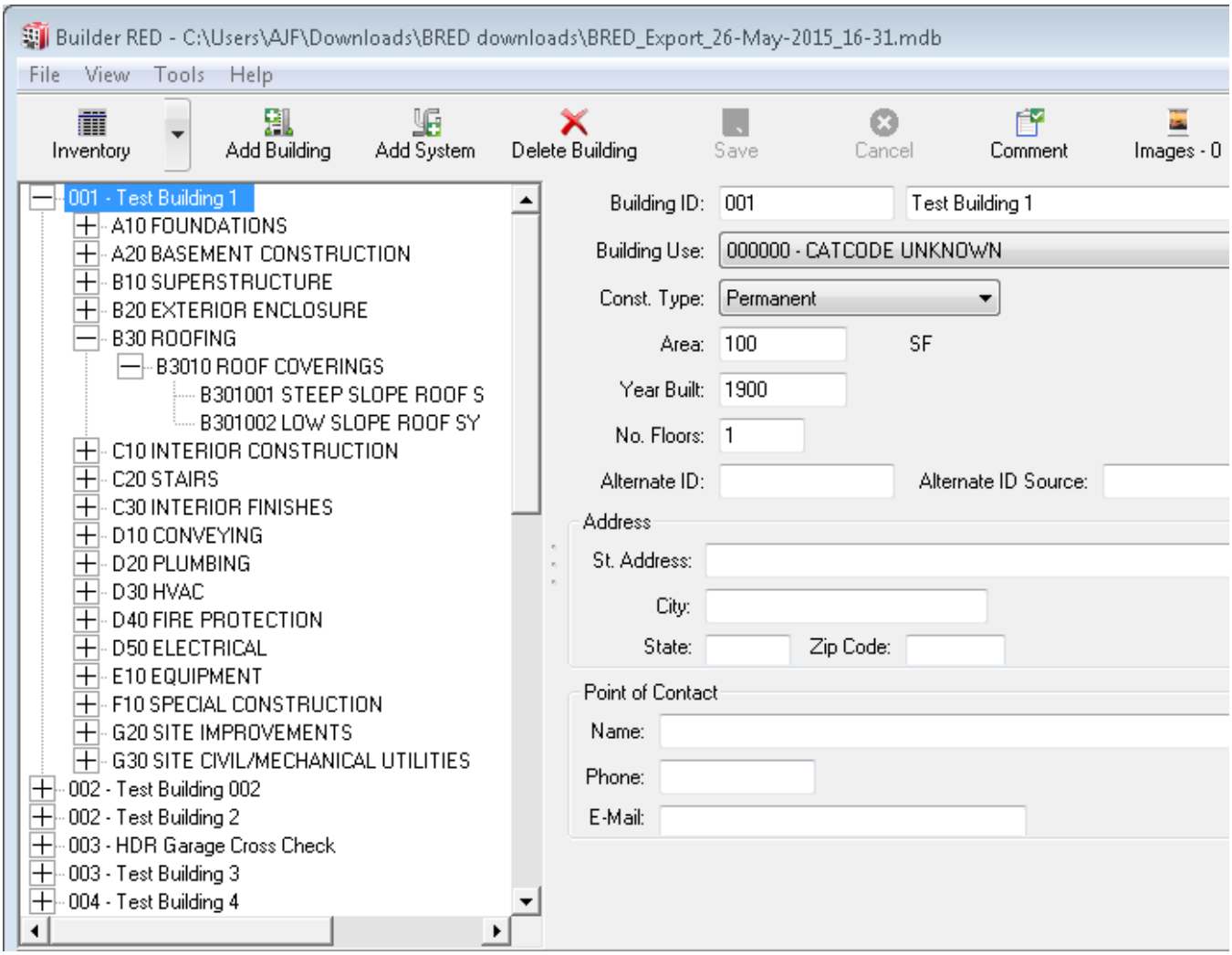
  > **Note:** There may be additional images for the Building stored in BUILDER that did not need to be exported.

To view or edit information about a Building, see "View or Edit Building (Facility) Information" below.

View or Edit Building (Facility) Information

View Building Information

The tree on the left side of BuilderRED displays each of the Buildings/facilities in the database. Tapping or clicking on a Building highlights its name and displays the Building/facility information to the right. Information shown includes the Building Use type, construction type, address, point of contact, etc. Note that side by side just below the toolbar are the "Building ID" number and Building name fields, to remind users where they are on the tree map at all times.



Edit Building Information

In addition to viewing the Building/facility information, you can edit this information in BuilderRED if desired. To edit Building/facility information:

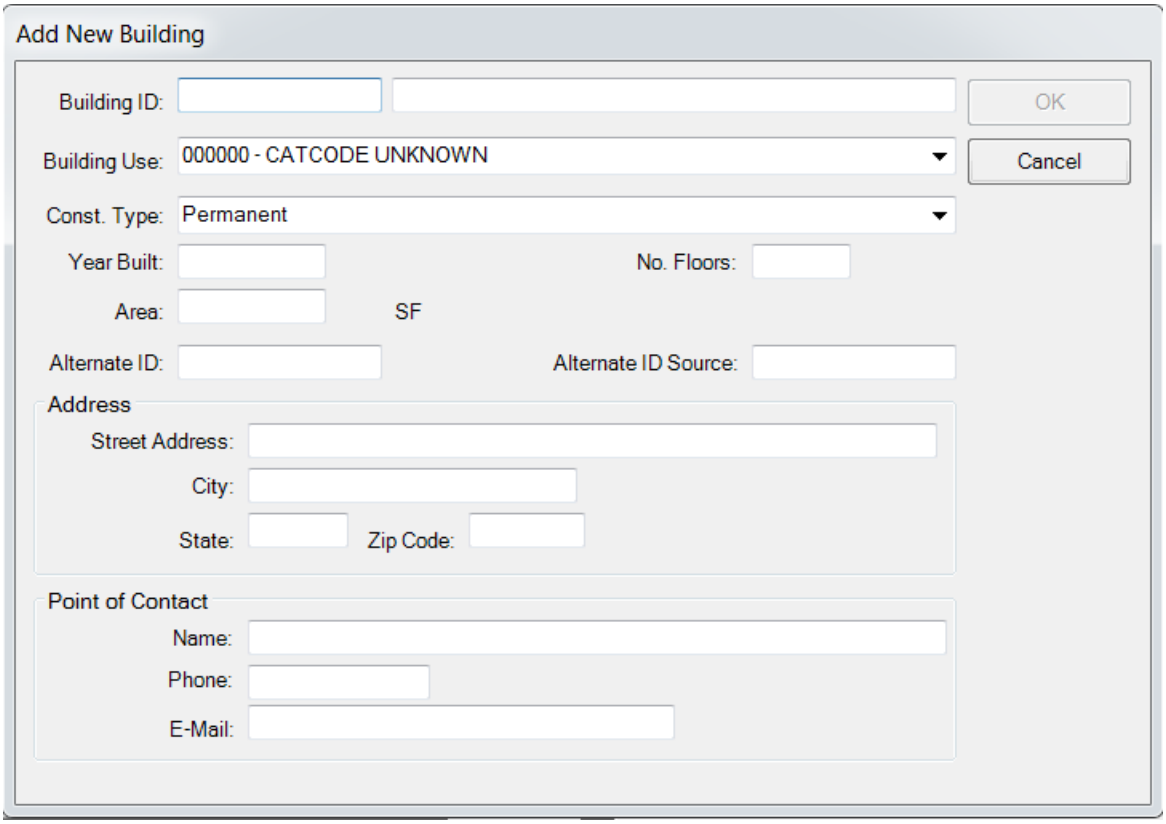
1. Edit the Building/facility information fields desired.
2. Activate **Save** on the BuilderRED toolbar to save your changes to the database; alternatively, activate **Cancel** to discard the changes made to the Building/facility information.

Add a Building

To add a new Building/facility to the BuilderRED database:

1. Activate the**Add Building** icon on the BuilderRED toolbar:

The "Add New Building" window will appear:



2. Enter the information for the new Building/facility. Fields are described in the list below.
   - **Building ID.** Required. This is the unique identifier, either a number or a combination of letters and numbers, for the facility.
   - **Building Name.** Optional. This unlabeled field is directly to the right of Building ID. A Building/facility name can be selected that users will recognize more quickly or easily than the Building ID.
   - **Building Use.** Required. Select from dropdown list. If you do not see a suitable Building Use category in the list, use "CATCODE UNKNOWN"
   - **Construction Type ("Const. Type").** This is a very general category. Select from the dropdown list between Permanent, Semipermanent, Temporary, and Leased construction types.
   - **Year Built.** Required.
   - **Number of Floors ("No. Floors").** Required.

- **Area.** Required. If the unit of measure is English, give the area in square feet (look for "SF" to the right of the entry box for area). Otherwise, give the area in square meters (SM). To change between metric and English measurement systems, select **View** on the menu bar and check or uncheck the "Display Measurements in English" option.
- **Alternate ID.** Optional.
- **Alternate ID Source.** Optional.
- **Street Address, City, State,** and **Zip Code.** Optional. Enter the street address, city, state, and zip code of the Building/facility.
- **Point of Contact Name, Phone,** and **Email.** Optional.

3. Activate the **OK** button to save the new facility to the database and to the navigation trees.
4. If you don't want to save the Building/facility, then activate **Cancel** instead, to discard the information without saving it to the database.

> **Note:** if the cursor is in a required entry field, you may need to enter a value in that field before you can activate **Cancel**.

Delete a Building (Facility)

> **WARNING – Best Practice:** Because deleting a Building will delete all the inventory and inspection data associated with that Building/facility, you might want to consider the alternative of changing the Building Status after the Building data has been imported into BUILDER, instead of deleting the Building.

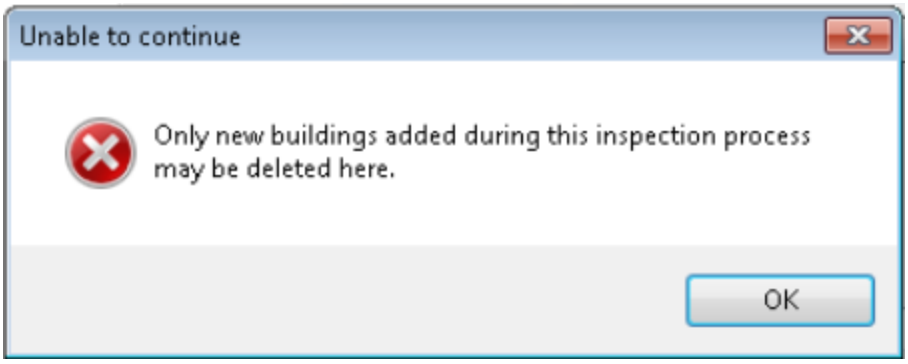
To delete a Building (facility) from the BuilderRED database:

1. In the Inventory tree, select the Building/facility you wish to delete.
2. Activate the **Delete Building** button on the BuilderRED toolbar:

*After you select the **Delete** option for a Building, one of the following will happen:*

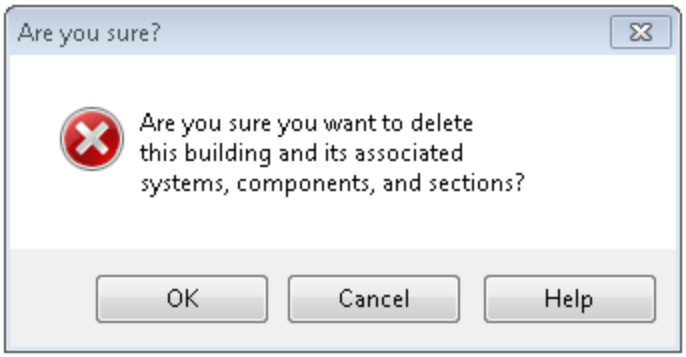
a. If the Building was exported from BUILDER rather than created during your current **BRED**[1] session, you will receive the following error message:

[1]BUILDER Remote Entry Database (BuilderRED)



This type of Building will need to be deleted in BUILDER after you re-import.

b. If the Building was created during your current BRED session, you will be allowed to delete it. A confirmation prompt will appear:



3. Choose **OK** to delete the Building; alternatively, choose **Cancel** to cancel deleting the Building. If you select **OK**, the Building will be removed from the database and from the inventory trees.

System Basics

The System level follows the Building (facility) level in the BuilderRED hierarchy. There are twelve (12) Building Systems in BuilderRED, each of which is comprised of Components that perform a similar function in the Building.

Tapping or clicking on a System highlights its name and will offer the following toolbar options to the user:

- Mode. Shows which mode you are in. Click or tap the icon to change modes.
- Add System. Activate this icon to add new a System.

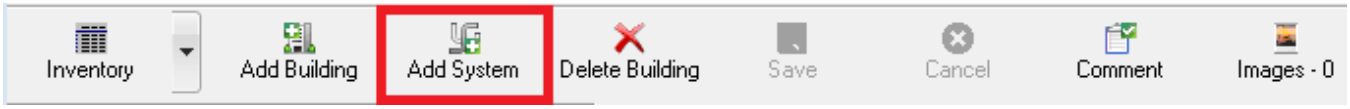
- Add Component. Activate this icon to add a new Component.
- Delete System. Activate this icon to delete a System.
- Images. Activate this button to attach, view, or delete images at the System level. The number after the word **Images** shows how many images (that have been attached during the current BuilderRED session and/or imported from BUILDER) are associated with the System in BuilderRED.

  Note: There may be additional images for the System stored in BUILDER that did not need to be exported.

Add a New System

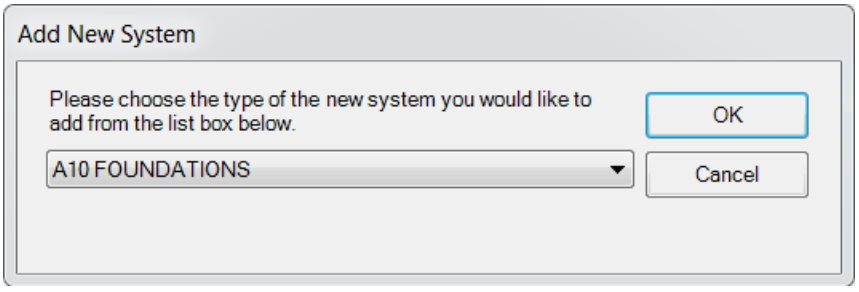
To add a System to a Building in BuilderRED:

1. In the Inventory tree, select the Building you wish to add the System to.
2. Activate the **Add System** button on the BuilderRED toolbar:



3. Alternatively, if you have another System in the same Building selected, you can activate **Add System** on that toolbar as follows:

The "Add New System" window will appear:



4. From the dropdown list, choose the System to be added to the Building.

   Note: Each Building can contain only one System of each type. The dropdown list for adding a new System will display only the System types that do not already exist in the Building.

5. Choose **OK** to save the new System; alternatively, activate the **Cancel** button to discard the System without saving it to the database. After you save the System, it will appear in the navigation trees.

Delete a System

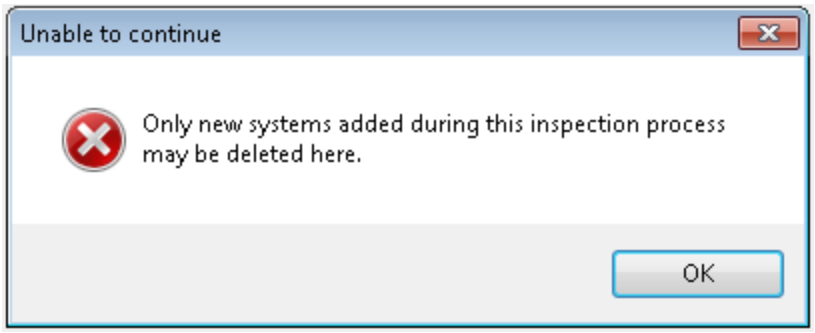
WARNING: Deleting a System will delete all the inventory and inspection data associated with that System and all of the Components and Sections contained within it.

To delete a System from a Building in BuilderRED:

1. In the Inventory tree, select the System you wish to delete.
2. Activate the **Delete System** button on the BuilderRED toolbar:

*After you select the **Delete** option for a System, one of the following will happen:*

a. If the System was exported from BUILDER rather than created during your current **BRED**[1] session, you will receive the following error message:

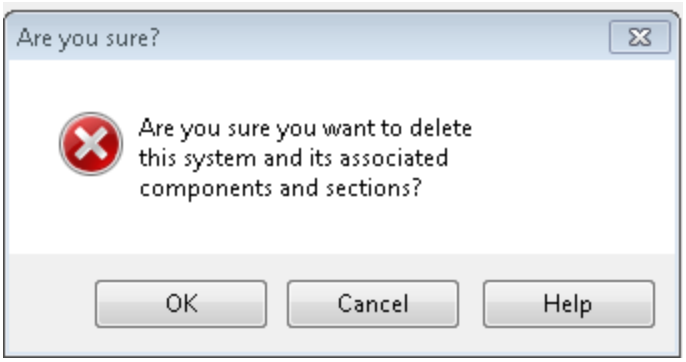


This type of System will need to be deleted in BUILDER after you re-import.

b. If the System was created during your current BRED session, you will be allowed to

[1]BUILDER Remote Entry Database (BuilderRED)

delete it. A confirmation prompt will appear:



3. Choose **OK** in order to to delete the System; alternatively, activate **Cancel** to cancel deleting the System. If you select **OK**, the System will be removed from the Inventory and Inspection trees, and from any Functional Area it might be contained in.

Component Basics

The Component level follows the System level in the BuilderRED hierarchy. There are numerous Components for each System in BuilderRED, each of which is comprised of Sections that perform a similar function in the Building/facility. Tapping or clicking on a Component highlights its name and will offer the following toolbar options to the user in Inventory mode:

- Mode. Shows which mode you are in.
- Add Component. Activate this button to add a new Component.
- Add Section. Activate this button to add a new Section.
- Delete Component. Activate this button to delete a Component.
- **Images**. Activate this button to atach, view, or delete images. The number after the word **Images** shows how many images(that have been attached during the current BuilderRED session and/or imported from BUILDER) are associated with the Component in BuilderRED.

  Note: There may be additional images for the Component stored in BUILDER that did not need to be exported.

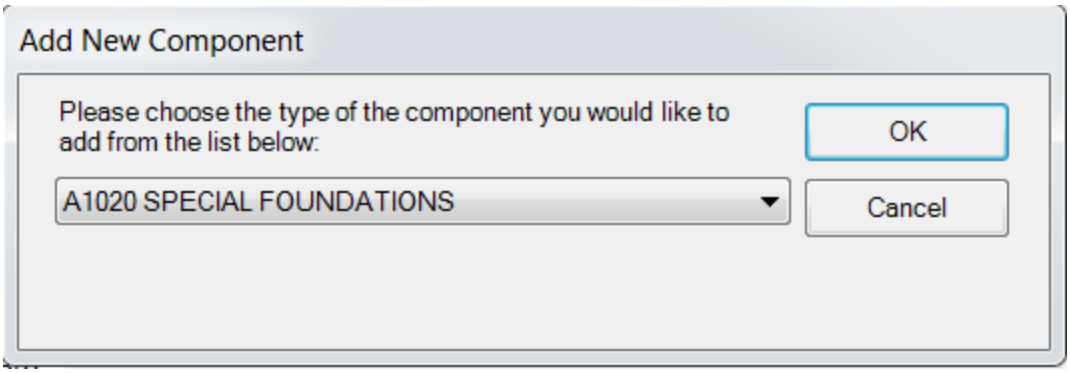
Add a New Component

To add a Component to a System in BuilderRED:

1. In the Inventory tree, select the System you would like to add the Component to.
2. Activate the **Add Component** button on the BuilderRED toolbar:

3. Alternatively, if you have another Component in the same System selected, you can add a sibling Component by activating **Add Component** on that toolbar as follows:

The "Add New Component" window will appear:



4. From the dropdown list, choose a Component to add to the System.

   Note: Each System can contain at most one Component of each type. The drop-down list for adding a Component will display only the Component types that do not already exist for the System.

5. Choose **OK** to save the new Component; alternatively, activate the **Cancel** button to discard the Component without saving it to the database. After you save the Component, it will appear in the navigation trees.

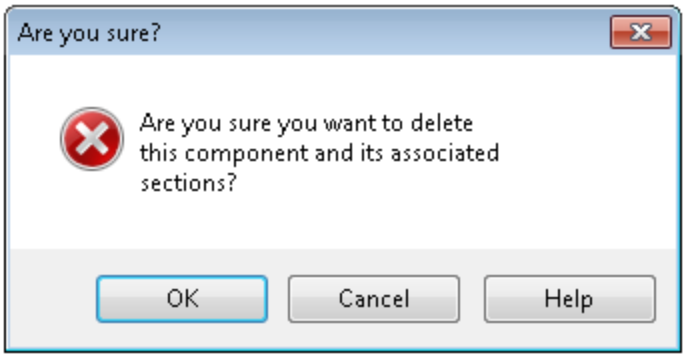
Delete a Component

WARNING: Deleting a Component will delete all the inventory and inspection data associated with that Component and the Sections within it.

To delete a Component from a System in BuilderRED:

1. In the Inventory tree, select the Component you wish to delete.
2. Activate **Delete Component** on the BuilderRED toolbar:

A confirmation prompt will appear:

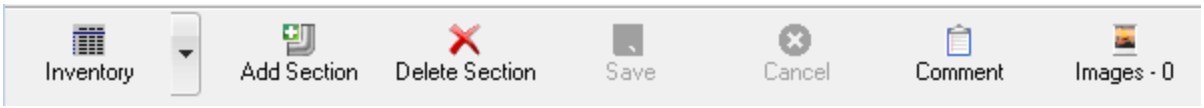


3. Choose **OK** to delete the Component; alternatively, activate the **Cancel** button to cancel deleting the Component. If you select **OK**, the Component will be removed from the Inventory and Inspection trees, and from any Functional Area it might be contained in.

Section Basics

The Section level follows the Component level and is the final level in the BuilderRED hierarchy. A Section, also called Component-Section, contains specific information about a particular Component-Section name, material/equipment category, Component type, quantity, year built/renewed, whether or not it is painted, and if so, the last time it was painted. A Component can be divided into sections based on one or a combination of the criterion above. See the "Sectioning Process" section below for a complete description of the sectioning procedure.

Tapping or clicking on a Section highlights its name and will offer the following toolbar options to you:



- **Mode.** Shows which mode you are in. Tap or click this button to advance to other modes.
- **Add Section.** Activate this button to add a new Section.
- **Delete Section.** Activate this button to delete a Section.
- **Save**. Activate this button to save changes made to Section information.
- **Cancel**. Activate this button to cancel all changes made to Section information since the last save.

- **Comment**. Activate this button to add Section comments.
- **Images**. Activate this button to attach, view, or delete images at the Section level. The number after the word **Images** shows how many images (that have been attached during the current BuilderRED session and/or imported from BUILDER) are associated with the Section in BuilderRED.

  Note: There may be additional images for the Section stored in BUILDER that did not need to be exported.

About the Sectioning Process

A Component can be divided into Sections based on:

- Material/equipment category
- Component type
- Component age
- Component location in the Building/facility.

If there are large differences in any of the criteria listed above, a Component should be broken into two or more Sections. When sectioning, there are a few guidelines that should be followed:

- Generally, it is best to go with as few Sections as possible. Because the number of Sections created will affect the amount of time spent on data entry and inspection, it is practical to create a smaller number of larger Sections.
- Section only when there are differences in material/equipment category and Component type and sufficient quantities exist to warrant separate management units.
- Deterioration and Maintenance and Repair needs, costs, and timing may vary and need to be considered in addition to age, materials, and location within the Facility.
- There are other, less obvious, reasons for sectioning. You may wish to manage different areas of the Facility differently based on use or other reasons.
- When sectioning equipment components with multiple units of the same equipment and age, section based on the managerial unit. That is, if it is expected to manage them as essentially one unit , then one Section will suffice. However, if it is expected that over time, they will be managed individually, then each should be its own Section.
- Section names do NOT have to be unique. If no Section name is desired or not necessary, name the Section "**N/A**[1]."
- The sum of the Section amounts/quantities will equal the Component amount/quantity.

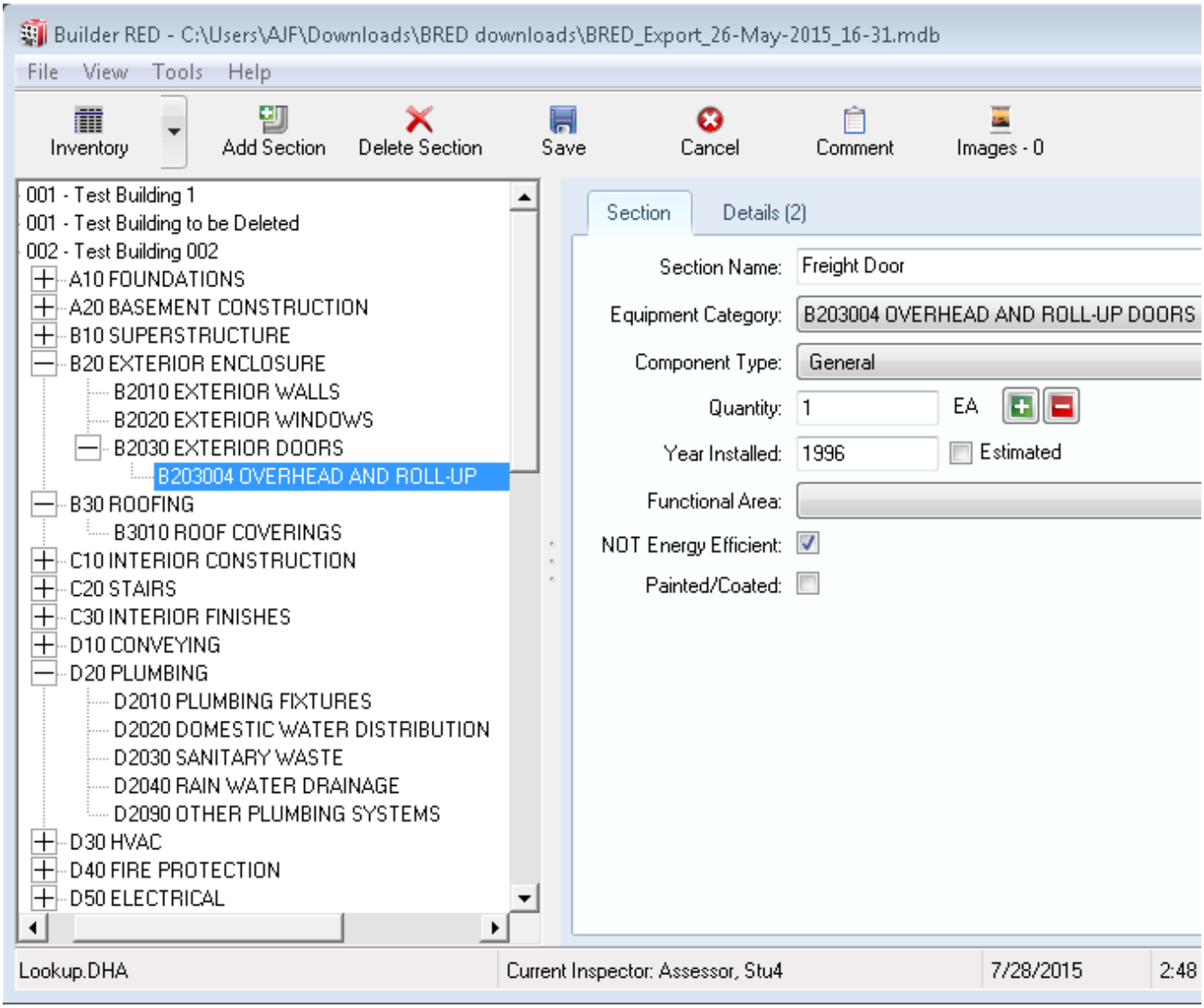
View and Edit Section Information

The navigation tree on the left side of BuilderRED displays each of the Buildings/facilities in the database opened in BuilderRED.

---

[1]Not Applicable

Opening the navigation tree to the Section level and clicking on a Section highlights its name and displays the Section information to the right. Section information shown includes the material/equipment category, Component type, quantity, year installed/renewed, etc. Click on each field for a more thorough description of its contents.



In addition to viewing the Section information, you can also edit the information in BuilderRED if necessary. To edit any of the Section information fields:

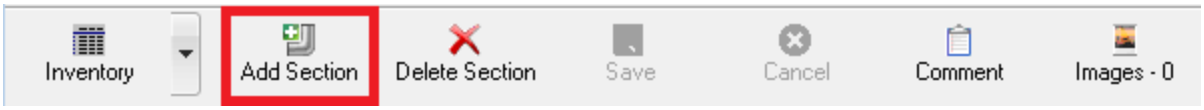
1. Select the desired Section.
2. Edit the information in the appropriate fields located in the body of the window.
3. Activate **Save** on the BuilderRED toolbar to save your changes to the Section to the database; alternatively, activate **Cancel** to discard your changes.

Add a New Section

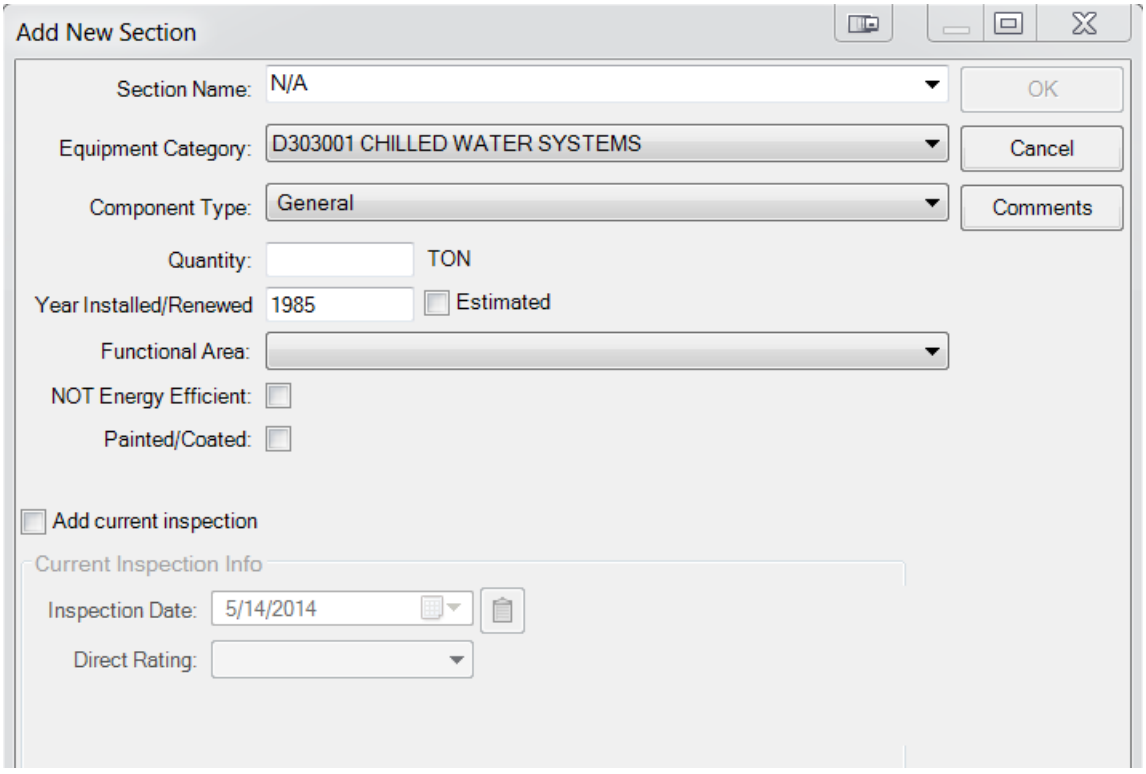
To add a Section to a Component using BuilderRED:

1. In the Inventory tree, select the Component you wish to add the Section to.
2. Click the **Add Section** button on the BuilderRED toolbar:

3. Alternatively, if you have another Section in the same Component selected, you can add a sibling Section by activating **Add Section** on that toolbar as follows:



The "Add New Section" window will appear:



4. Enter the information for the new Section. Quantity and Year Installed/Renewed are required fields, even if the Year is estimated.

5. Activate the **Comments** button to add a comment:

6. When finished entering the information, activate the **OK** button to save the new Section to the database; alternatively, activate **Cancel** to discard the Section without saving it to the database. After you save the Section, it will appear on the inventory tree.

Copy Sections

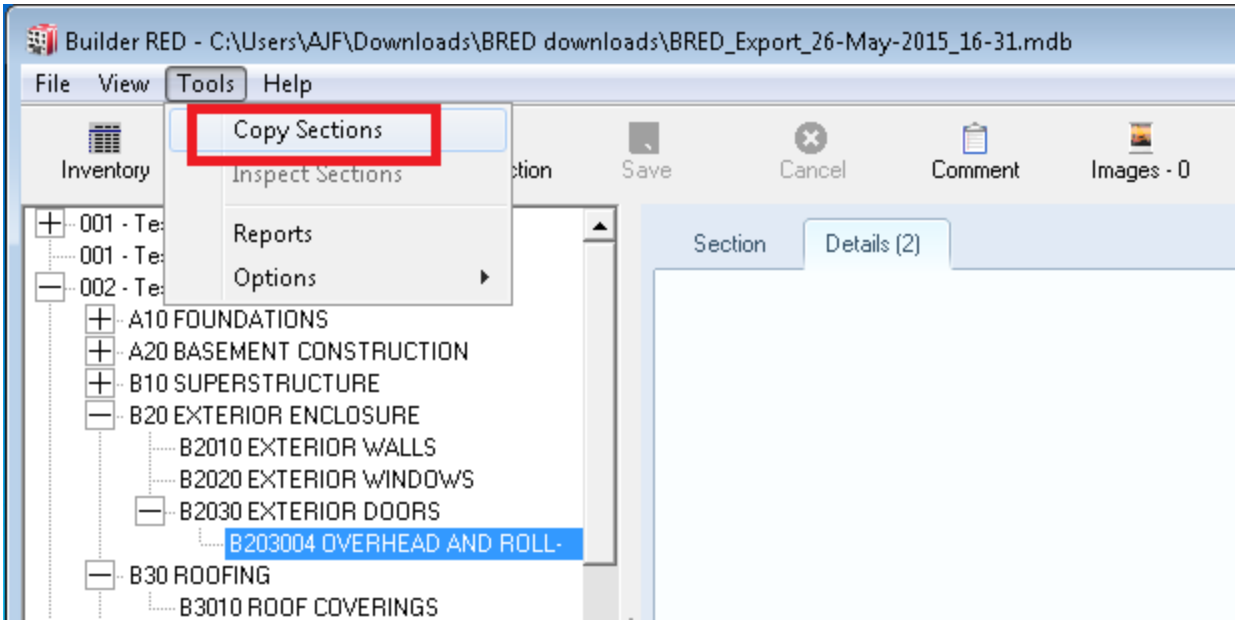
BuilderRED allows you to copy pre-existing Sections from one area of a Building/facility to another by using the **Copy Sections** option.

An example of when to use this option is in a multistory building with similar or identical inventory from floor to floor. The first floor can be inventoried and then copied to other floors, saving time and reducing the cost of the inventory process.

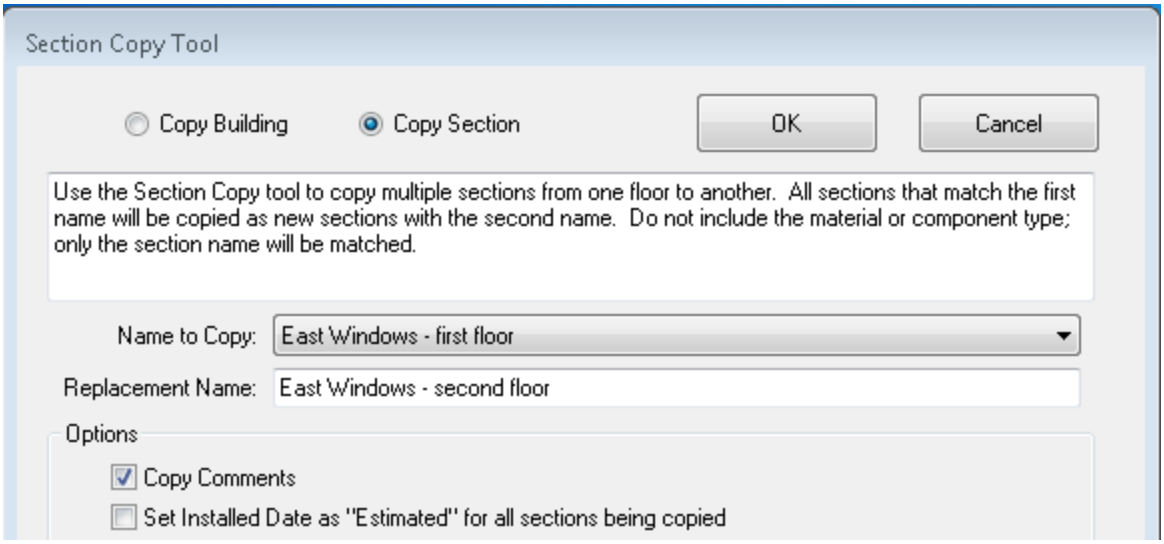
> **Note**: **Copy Sections** can only be selected while in Inventory mode.

To copy individual Sections in BuilderRED:

1. Select **Copy Sections** in the **Tools** menu.



The "Section Copy Tool" window will appear.



2. Select the **Copy Section** radio button.
3. Select the Section to be copied from the dropdown list at "Name to Copy."
4. In the "Replacement Name" text box, type a name for the duplicate Section that will be created.
5. Mark the "Copy Comments" checkbox if appropriate.

6. Unless you know that the duplicated Section has the same install date as the Section it is being copied from, mark the checkbox for "Set Installed Date as 'Estimated' for all Sections being copied."
7. Activate the **OK** button to copy and save the new Section to the database; alternatively, activate **Cancel** to close the "Section Copy Tool" window without saving the Section duplicate to the database.

After saving, all of the copied Sections will appear in the navigation trees.

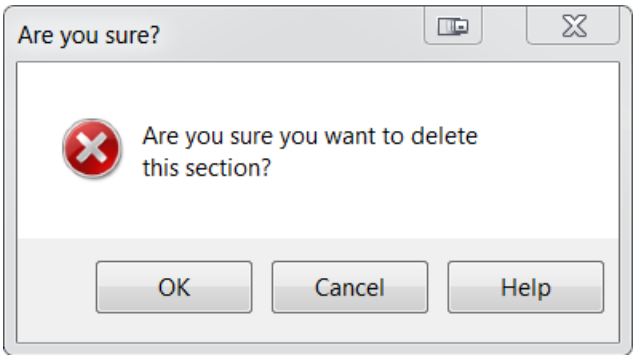
Delete a Section

> **WARNING:** Deleting a Section will delete all the inventory and inspection data associated with that Section.

To delete a Section from a Component in BuilderRED:

1. In the Inventory tree, select the Section you wish to delete.
2. Activate the **Delete Section** button on the BuilderRED toolbar:

A confirmation prompt will appear:



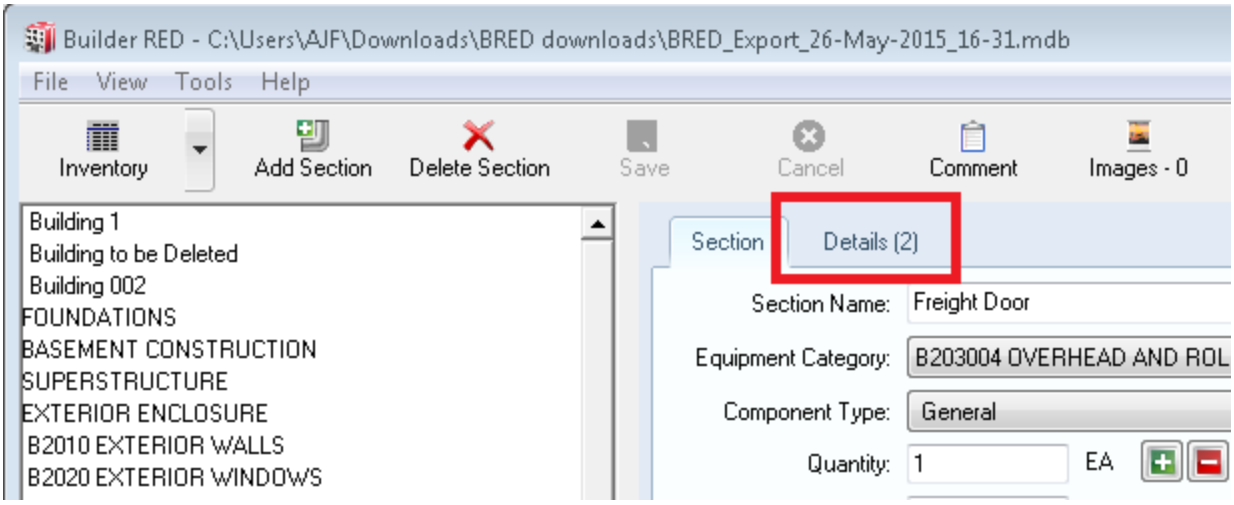
3. Choose **OK** to delete the Section. Alternatively, activate the **Cancel** button to cancel deleting the Section. If you select **OK**, the Section will be removed from the Inventory and Inspection trees, and from any Functional Area it might be contained in.

Section Details

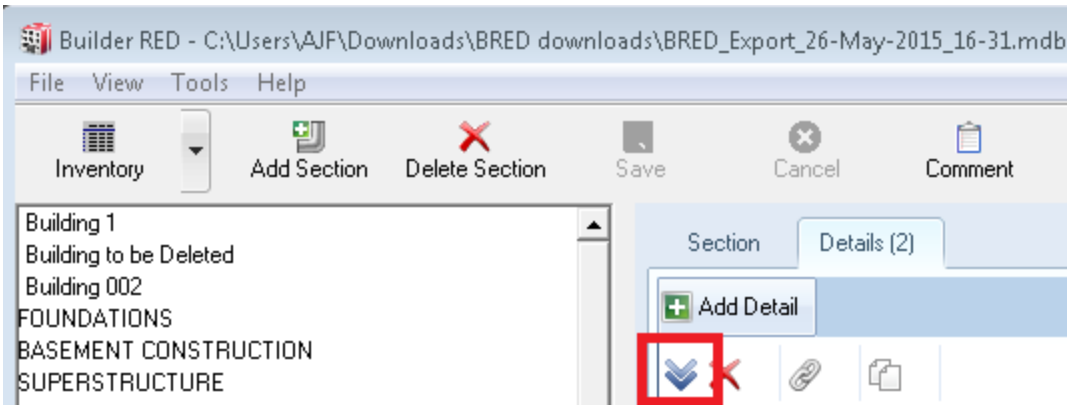
Many times, additional inventory information for a Section can be recorded. This is especially true for equipment components such as HVAC or electrical components. Recording this information as often as possible is strongly recommended and will be a valuable asset for later inspections. Some of the information to be recorded for the Section Details can typically be found on the equipment's panel or nameplate.

To record the equipment's details in BuilderRED:

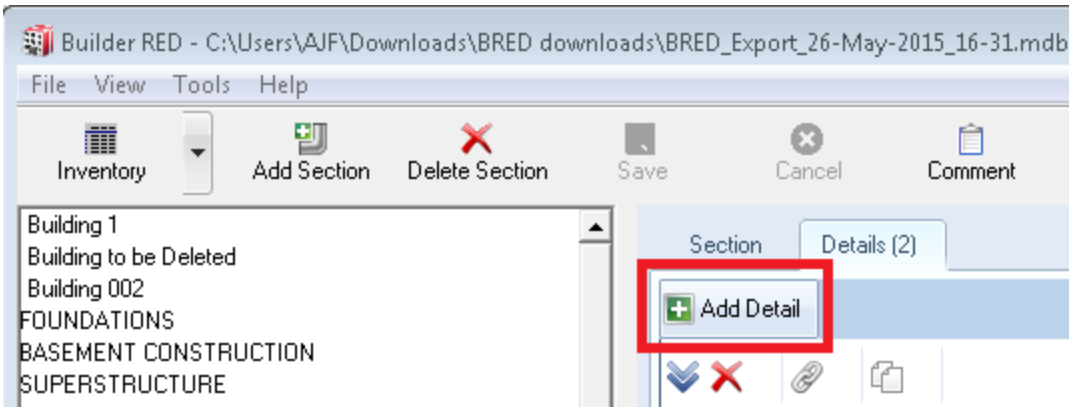
1. In the Inventory tree, select the Section.
2. Next, select the **Details** tab.



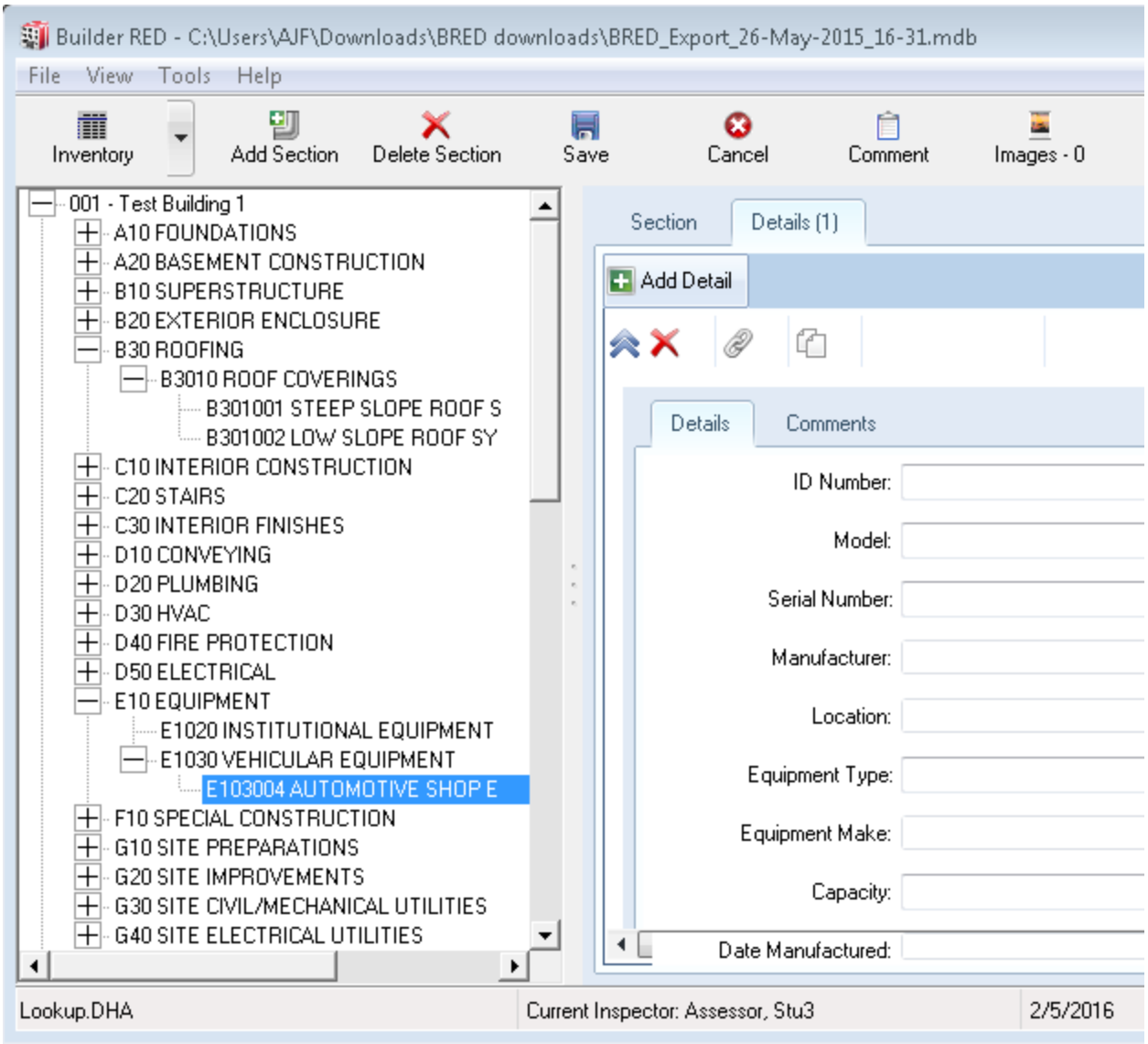
3. Activate the down arrow (chevron) to expand the Section Details record.



4. Alternatively, if the Section details do not appear and there also is no chevron, activate the **Add Detail** button first, then the down arrow (chevron).



The equipment entry window will appear in the right window pane:



5. Enter the Section information.
6. Activate the **Save** button to save the Section details to the Section. Alternatively, activate **Cancel** to discard the Section details without saving them to the Section.

Chapter Five:

INSPECTIONS MODE

About Inspections

About Inspection Types

Two types of inspections, or condition assessments, can be performed in BuilderRED:

Distress Surveys

The *distress survey* is the most accurate, reproducible, and consistent condition assessment type. It provides a detailed record of what's wrong with the Component-Section through a visual assessment of each subcomponent present in the desired Component-Section. The distress types, their severity levels, and their density are recorded for each subcomponent.

Direct Ratings

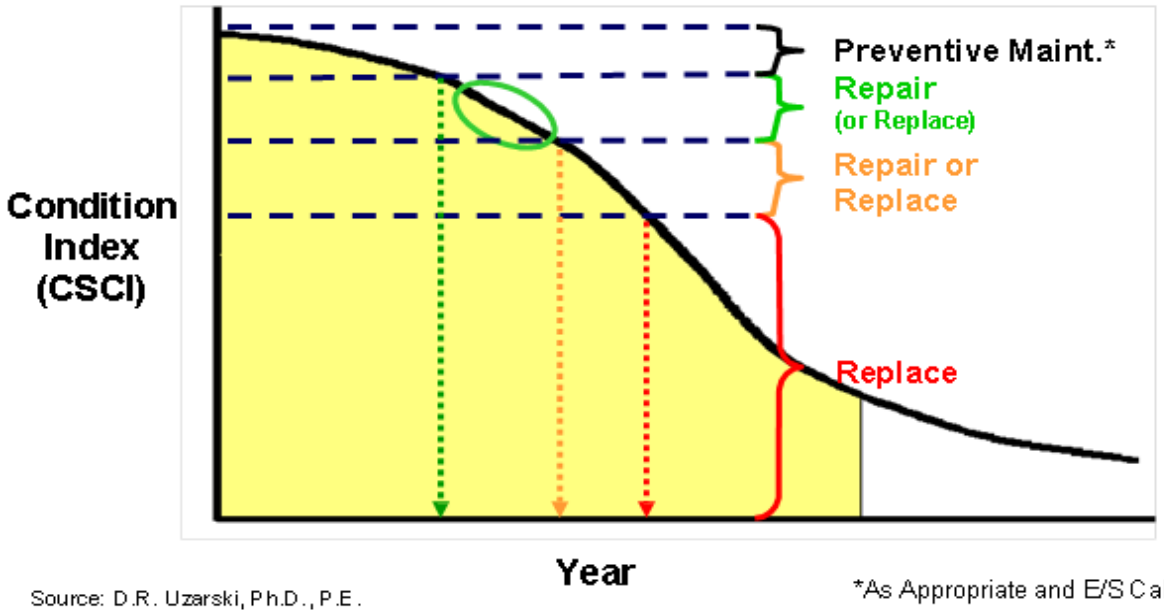
The *direct condition rating* assessment is a less accurate, but much quicker type for performing a condition assessment. It involves visually inspecting each Section as a whole, evaluating it against a set of rating criteria, and selecting the appropriate rating for the overall Section.

Choosing the Type of Condition Survey

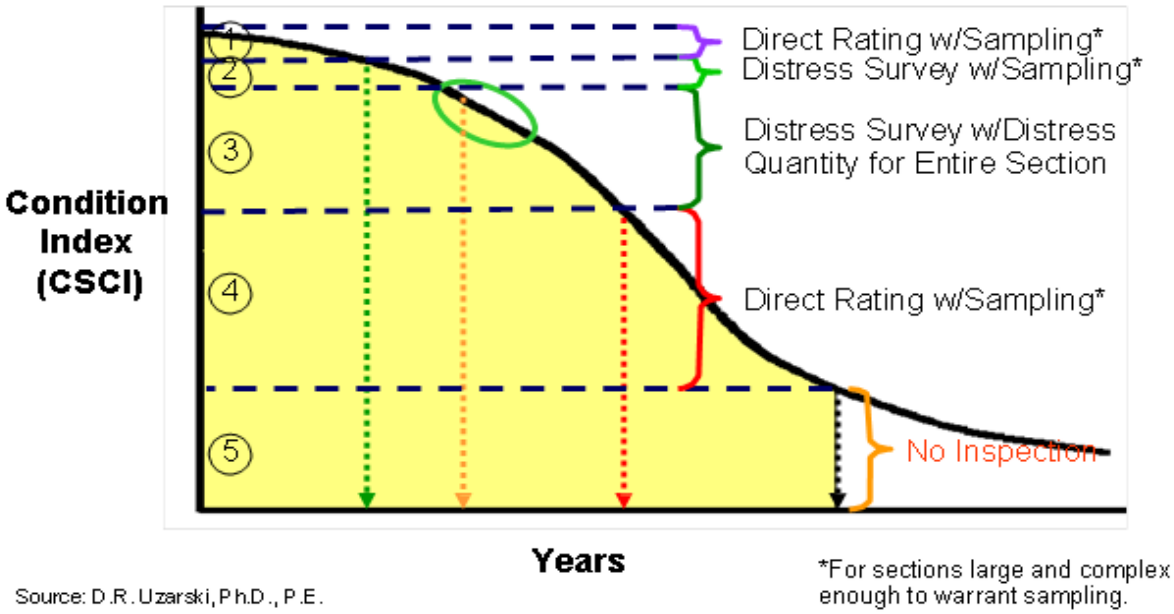
Although both condition assessment types can be used for the same objective, there are some factors that need to be considered when selecting the appropriate type. When a facility (Building) is new, or when inspecting a relatively new Section with a long expected service life, using a direct condition rating will probably be sufficient. As a Component-Section begins to deteriorate, more

data can be gathered during the inspection using a distress survey. When the inspection data or condition index trend indicates a problem requiring some type of work effort, an off-line development of project specifications can carry the burden of collecting more detailed data. The goal is to inspect more often and concentrate project development efforts on the M&R work for which you are most likely to allocate resources. More detail is provided in the Knowledge-Based Condition Assessment Manual, which is included with the BUILDER program.

In general, where on the life cycle curve the Section is at the time of inspection can be used to determine the type of assessment that should be performed. The figure below displays the type of sustainment/restoration (i.e. work) needs based on condition.



The figure below matches a suggested condition survey inspection type to condition in support of those work needs.



Summarizing the figures:

- Direct ratings with sampling should be performed in the preventative maintenance region of the Component-Section condition index (**CSCI**[1]) curve.
- Distress surveys with sampling should be performed in the preventative repair region of the CSCI curve.
- Distress surveys for the entire Component-Section should be performed in the repair or replace region of the CSCI curve.
- Direct ratings with sampling or no inspect should be performed in the replace region of the CSCI curve, depending on how low the CSCI is.

Knowledge-Based Inspection Scheduling Tool

The Knowledge-Based Inspection Scheduling tool is designed to select from your entire inventory a subset of Component-Sections that should be considered for inclusion in the next round of condition assessments and determines the condition assessments type to perform on those sections based on standards you can set. This tool can be used in BUILDER or BuilderRED to create the list of sections to inspect and types of assessments to perform on them and used during your assessments using the BuilderRED software.

About Frequency of Inspections

Traditionally, the frequency of condition survey inspections is set on some sort of a fixed schedule. They may be two-year inspections, three-year, or another interval based on facility importance,

[1]Component-Section Condition Index - a condition rating for the component section

available funding, policy and doctrine, and other factors. Unfortunately, on a fixed schedule some Component-Sections will be inspected too often and others will not be inspected often enough. The knowledge-based condition survey inspection (**KBCSI**[1]) approach abandons the fixed schedule in favor of a flexible approach based on supporting the criteria below.

Scheduling Criteria

• Facility Importance

Logically, the Buildings/facilities that are most important should demand more attention than those that are less important. Importance is measured by the mission dependency index (**MDI**[2]). If an MDI analysis has not been performed, Building Use can be used as a surrogate metric.

• Component-Section Importance

Also, logically, the Component-Sections that are most important or critical to facility usefulness should demand more attention than Component-Sections that are less important. Through the Sustainment Management System Tools menu, you can access a library of Component Importance Indexes.

• Service Life

All other factors being equal, Component-Sections with shorter service lives need to be inspected more often than those with longer lives because more change is expected from year to year.

• Remaining Service Life

Remaining service life (**RSL**[3]) is important when the Component resides in zones 1 and 5. In zone 1, if the RSL is long, inspection is needed less often than if it is short. Also, in zone 4, condition survey inspections should be scheduled at specific points prior to RSL going to zero.

• Maintenance Life

Component-Sections with shorter maintenance lives need to be inspected more often than those with longer lives because more change is expected from year to year. If the frequency is too far apart, it's possible to slip by the "sweet spot" between condition surveys.

• Remaining Maintenance Life

The remaining maintenance life (**RML**[4]) will set the timing for condition surveys. RML minus one year is a key time for performing a condition survey inspection. Also, Scenarios deployed with BUILDER will recommend work needs in future years. This forms the basis for the long-range

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[1]Knowledge-Based Condition Survey Inspection
[2]Mission Dependency Index - measures the relative importance of a Building
[3]Remaining Service Life
[4]Remaining Maintenance Life

work plan. A condition survey inspection with distress quantities should be scheduled for the end of maintenance life minus one year.

• Rate of Deterioration

Component-Sections that are rapidly deteriorating need to be inspected more often, especially if the rate is greater than expected.

• Specific Distress Tracking

A past condition survey inspection may have revealed a particular distress type or severity level that requires either elevation to a higher severity level or calls for a period of more frequent inspections to track how fast the density is growing (if at all).

• Condition Zone

As discussed under Remaining Service Life above, the condition zone serves to determine the type of condition survey to perform. It also affects frequency when viewed with RML and RSL.

• Condition Standards

Standards affect condition zone range, Building/facility importance, and Component-Section importance, which in turn affect condition assessment frequency.

• Maximum Time-Frame between Condition Surveys

Applying the above criteria may result in specific Component-Sections not getting a condition survey inspection for several years. This criterion assures that no more than a certain number of years transpires between condition surveys.

Creating Knowledge-Based Condition Survey Inspection Plans

The Knowledge-Based Inspection Scheduling tool is designed to select from your entire inventory a subset of Component-Sections that should be considered for inclusion in the next round of condition assessments and determines the condition assessments type to perform on those sections based on any or all of the criteria described above. This tool can be used in BUILDER to create the list of sections to inspect and types of assessments to perform on them and used during your assessments using the BuilderRED software. For more information about the Knowledge-Based Inspection Scheduling tool, consult the Sustainment Management System Help documentation.

About Knowledge-Based Inspection Scheduling

The Knowledge-Based Inspection (**KBI**[1]) feature in BUILDER 3.3 designed to select from your entire inventory a subset of Component-Sections that should be considered for inclusion in the next round of condition assessments using BuilderRED.

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[1]Knowledge-Based Inspection

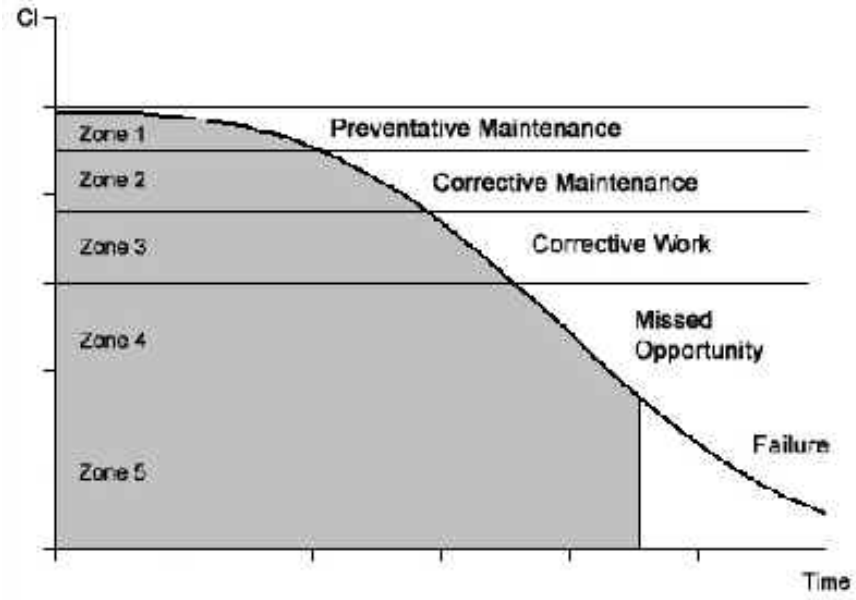
In addition to selecting candidates for inspection, the KBI feature is also able to determine the type of condition assessments to perform. The selection algorithm is based on pieces of data (knowledge) associated with the Component-Section that are compared with user-defined parameters.

> **Note:** The KBI feature is an optional tool. It can assist in selecting candidates for condition assessment if other structured programs for scheduling inspections are lacking.

How Candidates for Condition Assessment are Selected

Determining When to Perform a Condition Assessment

As stated above, the **KBI**[1] feature needs to compare knowledge about the Component-Section with user-defined parameters to determine when condition assessment are to be performed. These parameters are input when creating a standard and must be input for each of the five condition zones shown in the figure below.



The user-defined parameters for the KBI feature and include:

- **CI**[2] **Lower Bound.** The lower bound of the CI range of the condition zone. Providing the lower bound for each zone breaks the condition curve as shown above.
- **Maximum Inspection Interval.** The maximum amount of time, in years, between condition assessments in each condition zone.
- **Number of Inspections in Zone.** The maximum number of condition assessments that should be performed in each condition zone.

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[1] Knowledge-Based Inspection
[2] Condition Index

- **Degradation Factor.** The ratio of the maximum relative rate of deterioration to the expected rate of deterioration when a condition assessment is triggered. That is, if the deterioration rate were set to 2, any measured deterioration rate greater than twice the expected rate would trigger another inspection.

Based on the projected CI of the Component-Section, the **KBI**[1] feature determines which range the Component-Section is in, and how many inspections to perform in that range. It then calculates the time between inspections to accomplish this. This interval is compared to the maximum inspection interval, and the lesser of the two becomes the allowable inspection interval.

When the time since the last inspection becomes greater than the allowable interval between condition assessments, the Component-Section is flagged for inclusion into the next round of assessments. In addition, if the rate of deterioration of the CI seen by the last condition assessment is greater than the allowable rate of deterioration determined by the deterioration factor discussed above, the Component-Section will also be flagged for inclusion into the next round of assessments.

Determining the Type of Condition Assessment to Perform

Once the **KBI**[2] program selects the subset of recommended Component-Sections for inclusion into the next round of assessments, it must determine the method that will be used for each condition assessment. Based on the CI range that the component is projected to be in, the general guidelines below apply.

Range	Procedure
1	Direct
2	Distress
3	Distress
4	Direct
5	Direct

In some instances, a more detailed level of condition assessment may be warranted regardless of the guidelines recommended above. If a more detailed assessment was performed previously, the same method will be recommended again for zones 1 - 3. This means, for example, if the Component-Section is still in range 1 and the previous condition assessment method was a distress survey, the KBI program would recommend a distress survey be performed.

[1]Knowledge-Based Inspection
[2]Knowledge-Based Inspection

Creating an Inspection Schedule in BUILDER

For instructions how to create an Inspection Schedule in BUILDER, see the BUILDER documentation on Condition Assessment.

Exporting Inspection Work Items to BuilderRED

If you generate Work Items before exporting to BuilderRED, the Work Items will be exported along with their associated Component-Sections.

About Inspecting by Sampling or Not Sampling

When performing condition assessments, you can perform inspections by:

- **Sampling.** Condition assessments by sampling do not inspect the entire Component-Section, rather just a percentage of it. See "" below below for a complete description of when to sample condition assessments.
- **Not Sampling.** Condition surveys by not sampling inspect the entire Component-Section. See "" on page 69 section below for a complete description of when to not sample condition assessments.

Sampling

When Sampling Should be Used

Performing a condition assessment by sampling should be done when the Component-Section is large, complex, and/or discontinuous. In a practical sense, this means that the entire Component-Section is not readily viewable. The decision to sample will be a judgment call made by the inspector based on size of the facility/Building and on the Component-Section quantity. Sampling rates (above the minimum) are up to the discretion of the inspector and/or organizational policy. Both sampling and not-sampling approaches can be used in the same Building for different Component-Sections.

General examples of when sampling is desirable include, but are not limited to:

- Any Component-Section with the unit-of-measure "each"
- A quantity greater than one and each one well separated from another
- Component-Sections spread over several rooms
- Exterior walls on all but the smallest of buildings

Representative and Non-Representative Samples

Condition assessment samples may be representative or non-representative. Representative samples are those that are in a "typical" condition for the Component-Section as a whole. This, however, does not mean that they are exactly in the same condition; some variation is expected. Non-

representative samples are those that are not in typical condition for the Component-Section as a whole (i.e. in significantly better or worse condition).

When performing condition surveys by sampling, each sample must be marked as representative or non-representative. For a detailed explanation of determining if samples are representative or non-representative,see "About Representative and Non-Representative Samples" on the next page.

Minimum Representative Sample Quantities

After the representative samples have been chosen, they are ready to be inspected. A minimum number of samples must be inspected for each Section as follows:

- The numbers of representative samples to be taken of a specific Component-Section with the unit-of-measure of "each" are:
  - One (1) sample when the Component-Section quantity is 1-4.
  - Two (2) samples when the Component-Section quantity is 5-9.
  - At least three (3) samples when the Component-Section quantity is 10 or more.
  - AND a minimum of 10% of the Component-Section quantity.
- The number of representative samples to be taken of a specific Component-Section with the unit-of-measure of square feet or linear feet are:
  - One (1) sample when the number of potential samples is 1-4.
  - Two (2) samples when the number of potential samples is 5-9.
  - At least three (3) samples when the number of potential samples is 10 or more.
  - AND a minimum of 10% of the Component-Section quantity.

Specific Sampling Suggestions

Some specific examples of sample locations are:

- Specific rooms inside of a Facility (e.g., “Room 110”), where all of the various Component-Sections in that room would be sampled (e.g. ceiling, walls, wall finish, floor, floor covering, light fixtures, etc.).
- Exterior wall locations (e.g. “North Wall,” etc.), where all Component-Sections included in that wall would be sampled (e.g. wall surface, doors, windows, awnings, lights, etc.).
- A Component-Section consisting of ten roof ventilating fans (all ten are the same), samples could be “Fan 1”, “Fan 2”, etc.
- Interior doors denoted by room number (e.g. a hallway has many doors leading to rooms, so select the requisite number of doors with each door being a sample).
- Specific structural columns, beams, frames, trusses.
- A specific Component-Section (e.g. fireplace) with a quantity greater than one, but still a small number (e.g. two or three) and they are geographically separated such that they cannot be inspected together. Inspect each one as a sample with a specific location. All need to be inspected to be in conformance with the minimum sample quantity addressed above.
- If an entire Component-Section happens to be co-located at a defined sample location where other Component-Sections were sampled (e.g. a fireplace in a room selected for sampling of

walls, ceiling, flooring, etc.), that Component-Section can either be included in the sample location or simply inspected without sampling.
- In general, do what makes sense, but ensure that the rules are followed.

Not Sampling

When "Not Sampling" Should be Used

Performing a condition survey inspection by not sampling should be done when the Component-Section is small, simple, and/or continuous. In a practical sense, this means that the entire Component-Section is readily viewable. The decision not to sample will be a judgment call made by the inspector based on Building size and the number of Component-Sections. Both sampling and not sampling approaches can be used in the same Building for different Component-Sections.

General examples of when not sampling is desirable include, but are not limited to:

- Any Component-Sections with the unit of measure "each" and only one exists or they are clustered together
- Roof sections
- Chimneys
- All Component-Sections in very small buildings

About Representative and Non-Representative Samples

Samples may be representative or non-representative. Representative samples are those that are in a "typical" condition for the Component-Section as a whole. This, however, does not mean that they are exactly in the same condition; some variation is expected. Non-representative samples are those that are not in typical condition for the Component-Section as a whole (i.e. in significantly better or worse condition).

The designation as representative or not will affect the condition index. Non-representative samples are considered isolated and thus have less of an influence on the condition index than representative samples. Representative sample locations and sample sizes are determined by the layout of the given facility (Building).

Representative

Representative Sample Creation and Selection

A few simple rules to follow when creating and selecting representative samples:

- A general walk-through of the facility is recommended prior to selecting samples to ensure that they are representative.

- Use discrete facility (Building) discontinuities--for example, entire rooms; wall corners--to help delineate sample boundaries, especially when the quantity has a unit of measure of square feet or linear feet.
- When an area of the facility is selected for sampling, it is recommended, but not required, that all of the Component-Sections present at that location be inspected as part of the sample (e.g. all Component-Sections for all Systems found in a room).
- Specific Component-Sections with a unit-of-measure of "each" should most often be sampled individually.
- Sample sizes for Component-Sections with a unit-of-measure of "each" need not be restricted to one.
- Sample sizes are often situation specific. Try to have them of approximate equal size, but be practical.
- Ensure that all samples are properly identified as to location, including room number or name.
- When sampling is used for a given condition survey inspection cycle, either the distress survey or the direct condition rating approach must be used for a given Component-Section.

Non-Representative

Non-Representative Sampling Rules

A few simple rules to follow when inspecting non-representative samples:

- Inspect non-representative Component-Sections in addition to the required representative sample quantity amounts.
- Ensure that the non-representative samples are designated as such.

Basics of the Inspections Toolbar and Tree

The inspection process is an integral part of the Building Management System. With the data from the inspections, the condition of Sections, Components, Systems, and facilities (Buildings) as a whole can be computed in BUILDER. After the condition has been assessed, the maintenance and repair of the installation can be planned.

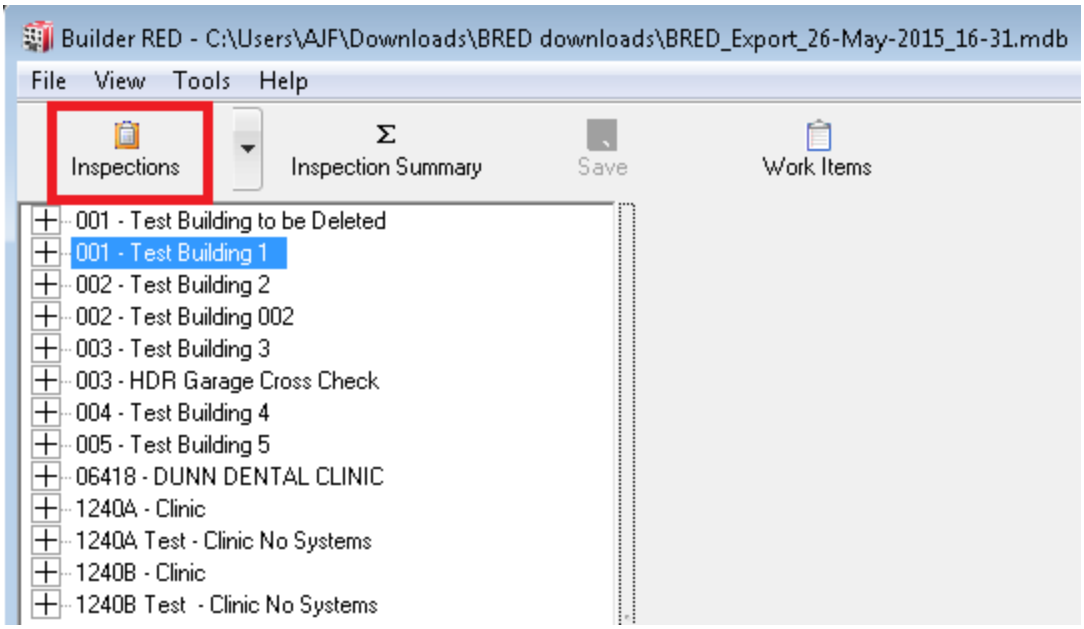
While in Inspections mode in BuilderRED, you can record new inspection data for individual Sections. Additionally, BuilderRED allows you to view previous inspection data for Sections and to determine the change in condition since the last evaluation.

Select Inspections Mode

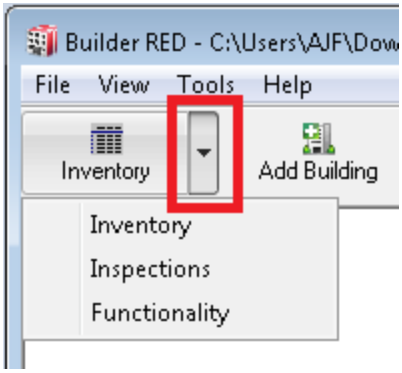
To operate in Inspections mode, do one of the following:

a. Tap or click the leftmost button (Mode toggle) on the BuilderRED toolbar until the **Inspections** icon and label appear on the button.

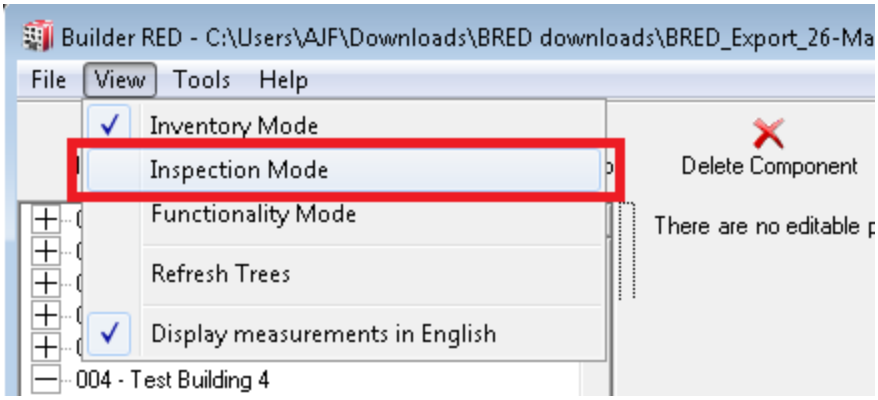
> **Note**: If you are seeing the **Inspections** button on the toolbar, it means that you are already in Inspections mode. *This is different from BuilderRED Versions 3.2 and previous*.



b. Activate the down arrow at the right edge of the mode icon, then select "Inspections" from the dropdown list.

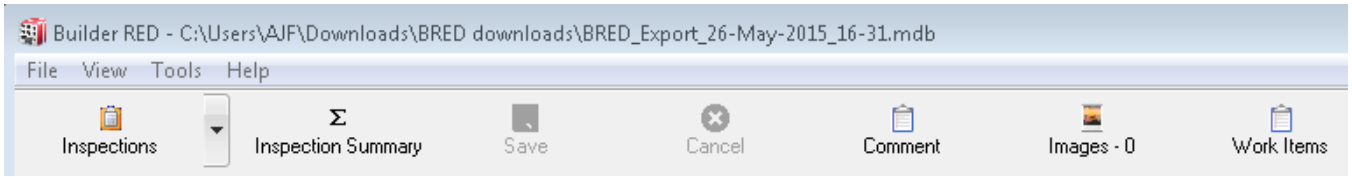


c. Select **Inspection Mode** from the **View** menu.



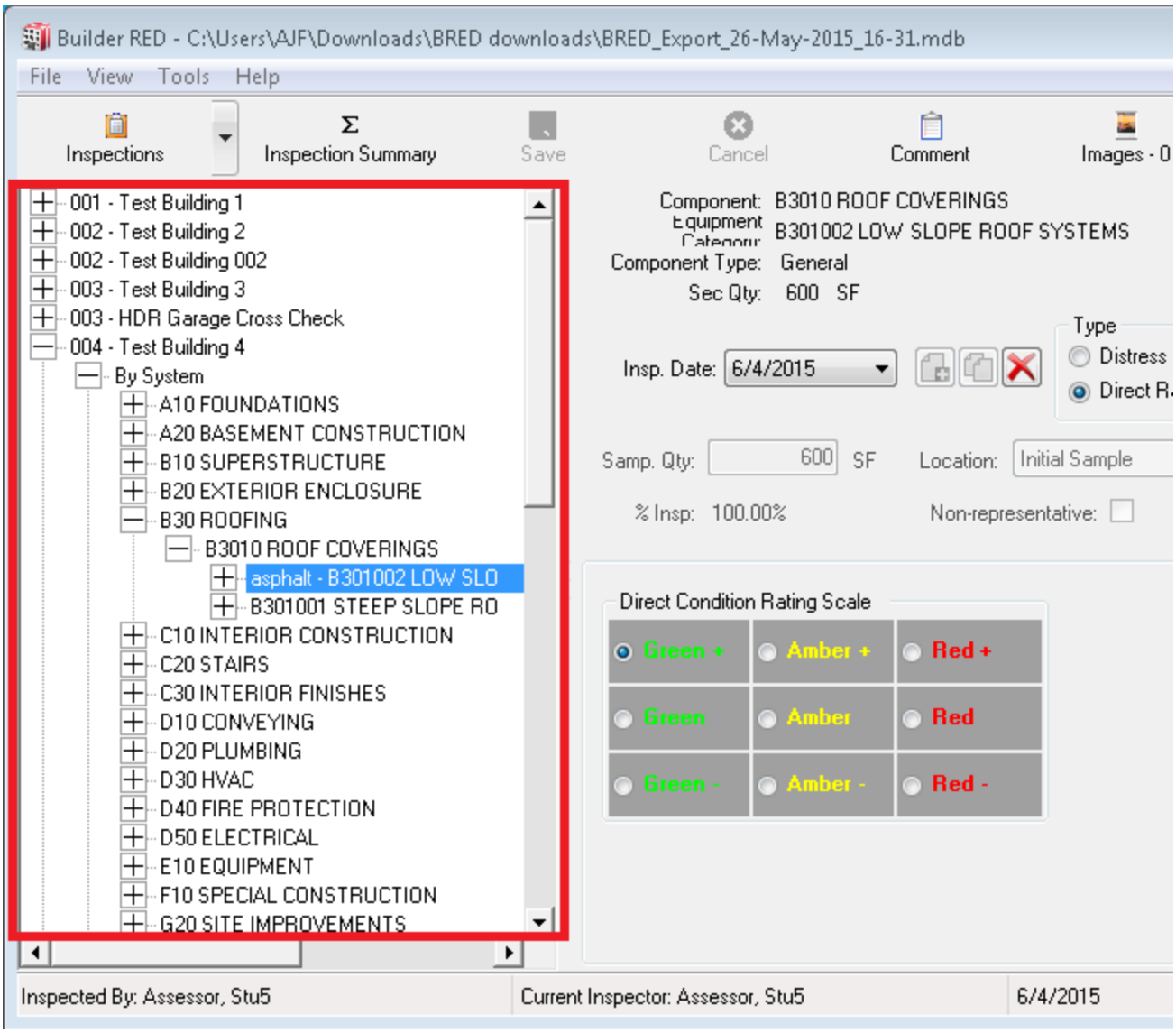
Inspections Toolbar

In Inspections mode, the following toolbar, with variations, will appear:



Inspections Tree

In the split window, the left side displays the Inspections tree, which acts as a map of the Inspections data in the database.



The Inspections tree organization is:

- Building
  - By System
    - System
      - Component
      - Section
        - Sample Location
  - By Sample Location
    - Sample location
    - Component
      - Section

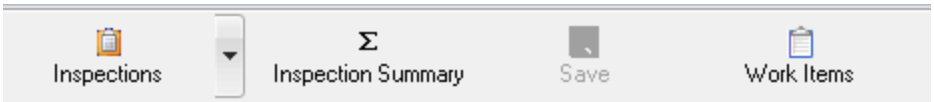
Here, the tree can be expanded by activating the "+" next to an inspection level, or collapsed by activating the "-" next to an inspection level.

To select a particular inspection level, tap or click on it in the navigation tree. Inspection information pertaining to that inspection level will be displayed in the right side of the split screen. In Inspections mode, there is no inspection information above the Section level.

Inspections Toolbar Variations

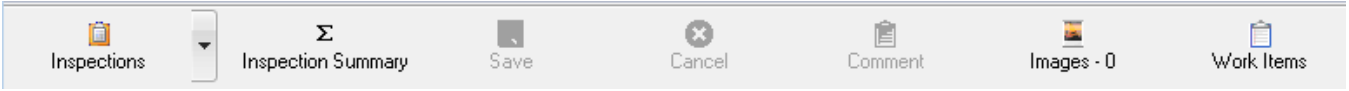
The Inspections toolbar may appear in one of three different ways, depending on your in the inspection tree. (Some items that are here shown grayed out may be active, depending on what is or is not selected.)

At the Building level:



At the System or Component level:

At the Section level:

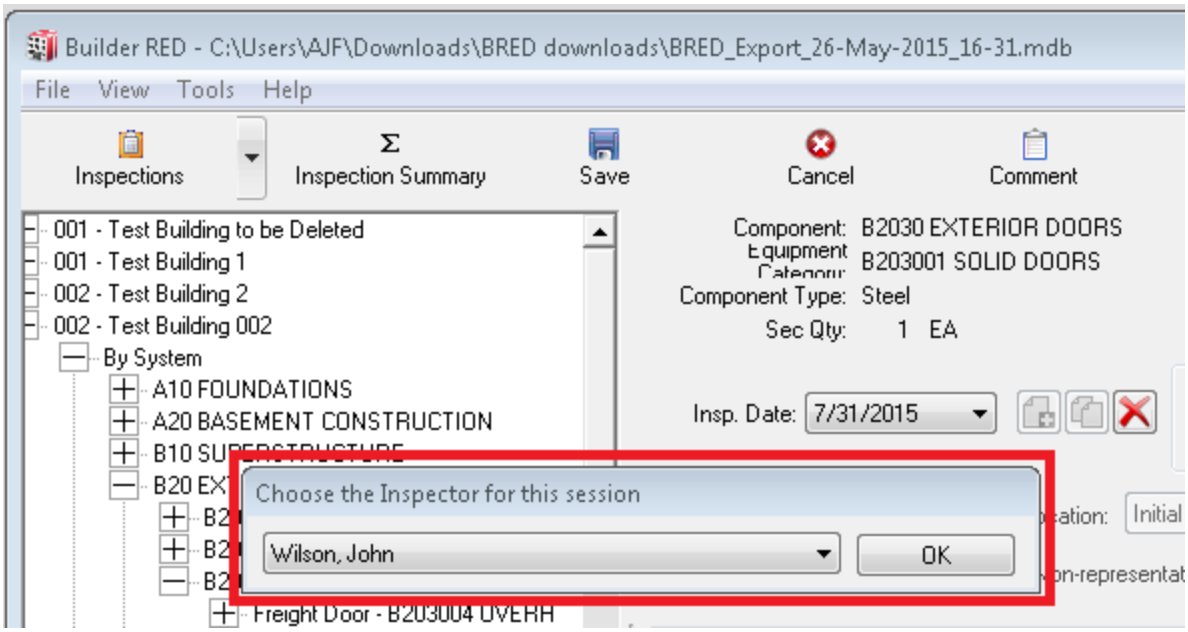


Choose or Change the Inspector

Before you can perform inspections in BuilderRED, you must first select the appropriate Inspector name from a dropdown menu. In BuilderRED, there are two alternate ways to choose an Inspector:

a. The first time you enter Inspections mode, you will be automatically prompted to choose an Inspector.
b. At any time, you can select **Change Current Inspector** from the **File** menu.

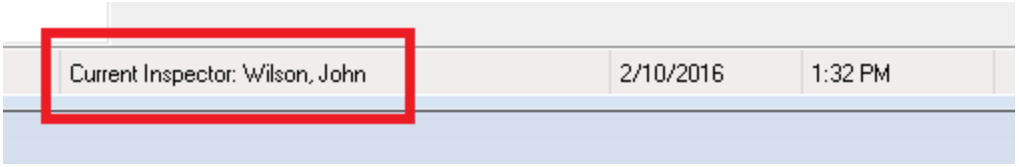
In either case, the "Choose the Inspector" popup window will appear:



To choose an existing Inspector at the "Choose the Inspector..." window,

1. Expand the dropdown list.
2. Select the appropriate Inspector name. (*The list will then contract again, showing just that name.*)
3. Activate the **OK** button.

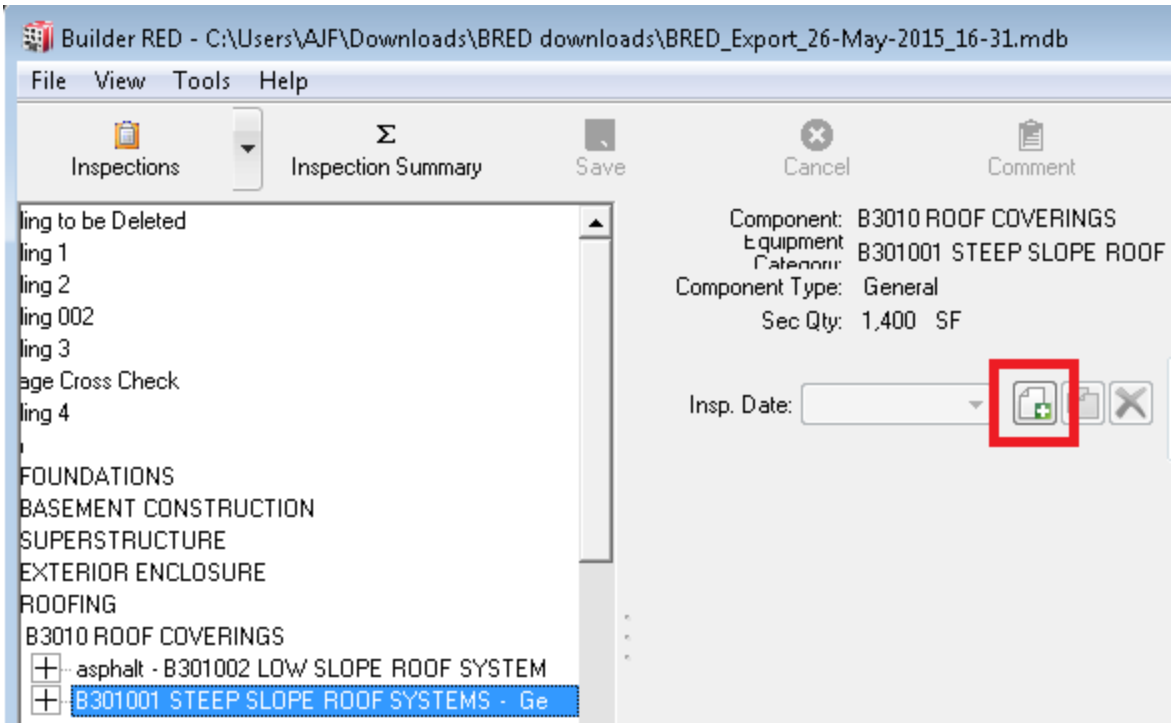
At the bottom of the screen, you will be able to see the name of the inspector displayed:



> **Note:** If you do not see your name in the list, contact your BUILDER support representative.

New Inspection

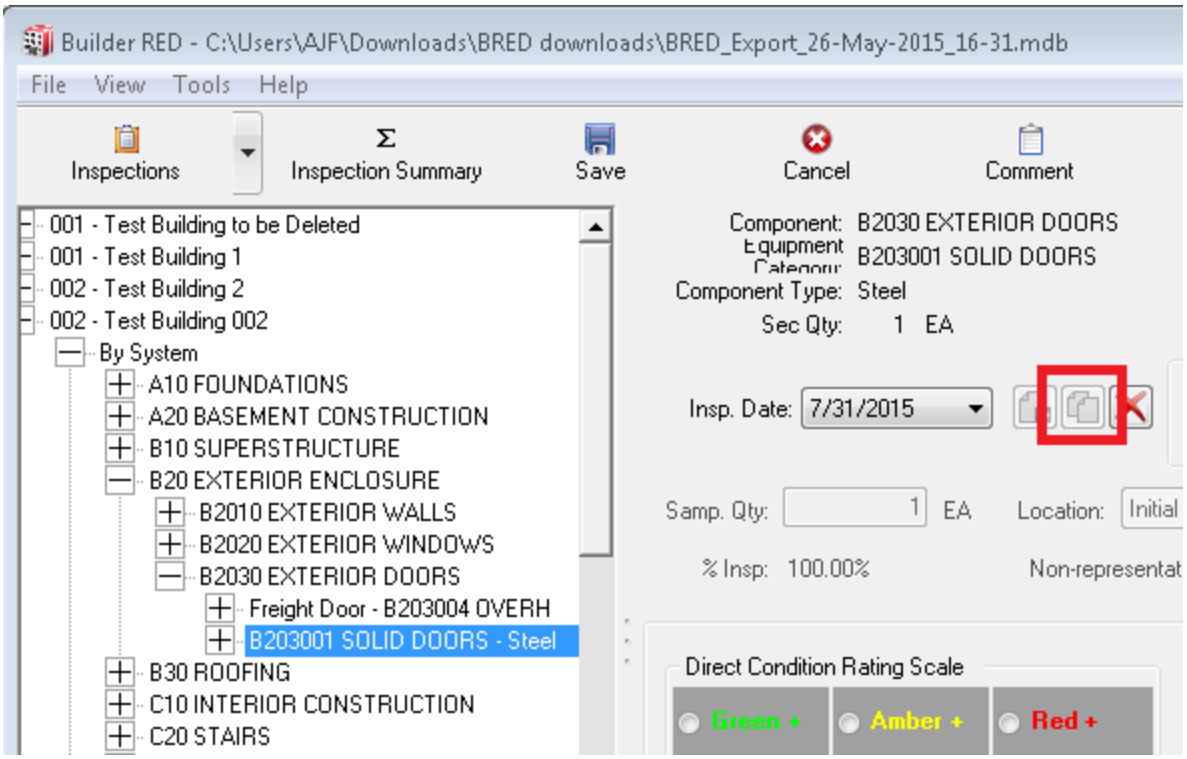
Activating the **New Inspection** button creates a blank, new inspection for the current date for the Section selected in the Inspection tree.



Alternatively, if you want to incorporate information from a previous inspection, you can select "Copy Inspection" below.

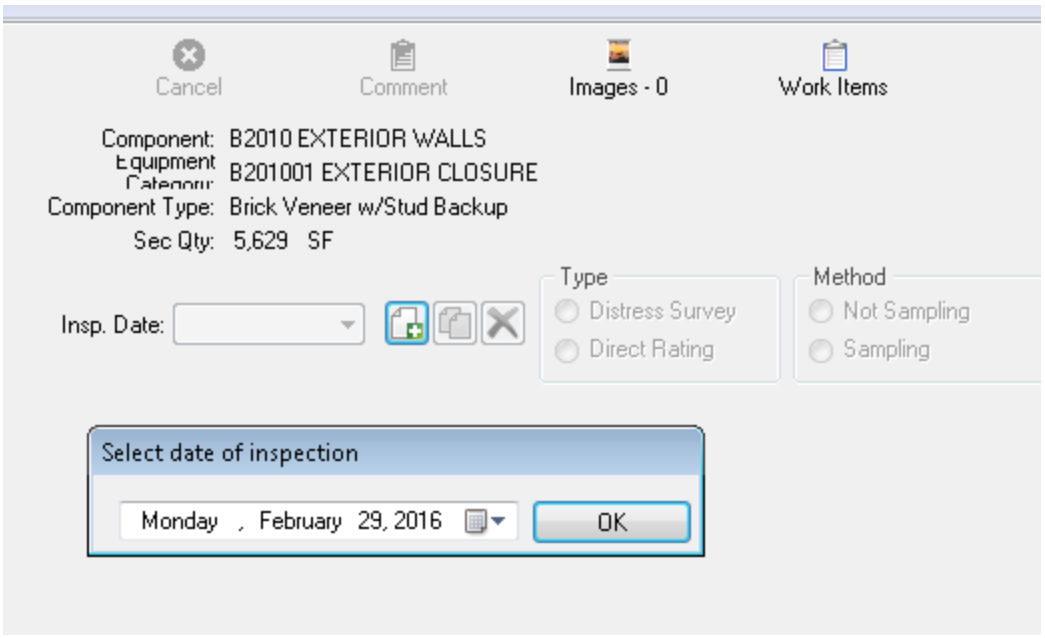
Copy Inspection

Activate the **Copy Inspection** button (see the red box in the illustration) to copy the inspection data from the most recent inspection of a Section to a new, editable inspection:



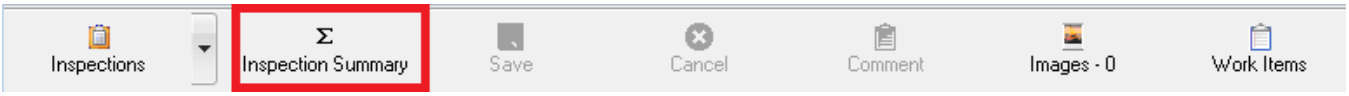
Inspection Date

This field contains a dropdown list of the dates of inspections for the current Section. You can view the inspection data for each date by selecting the appropriate date from the dropdown list. Viewing past inspection information can be very useful, especially when the same sample areas are used for each inspection.



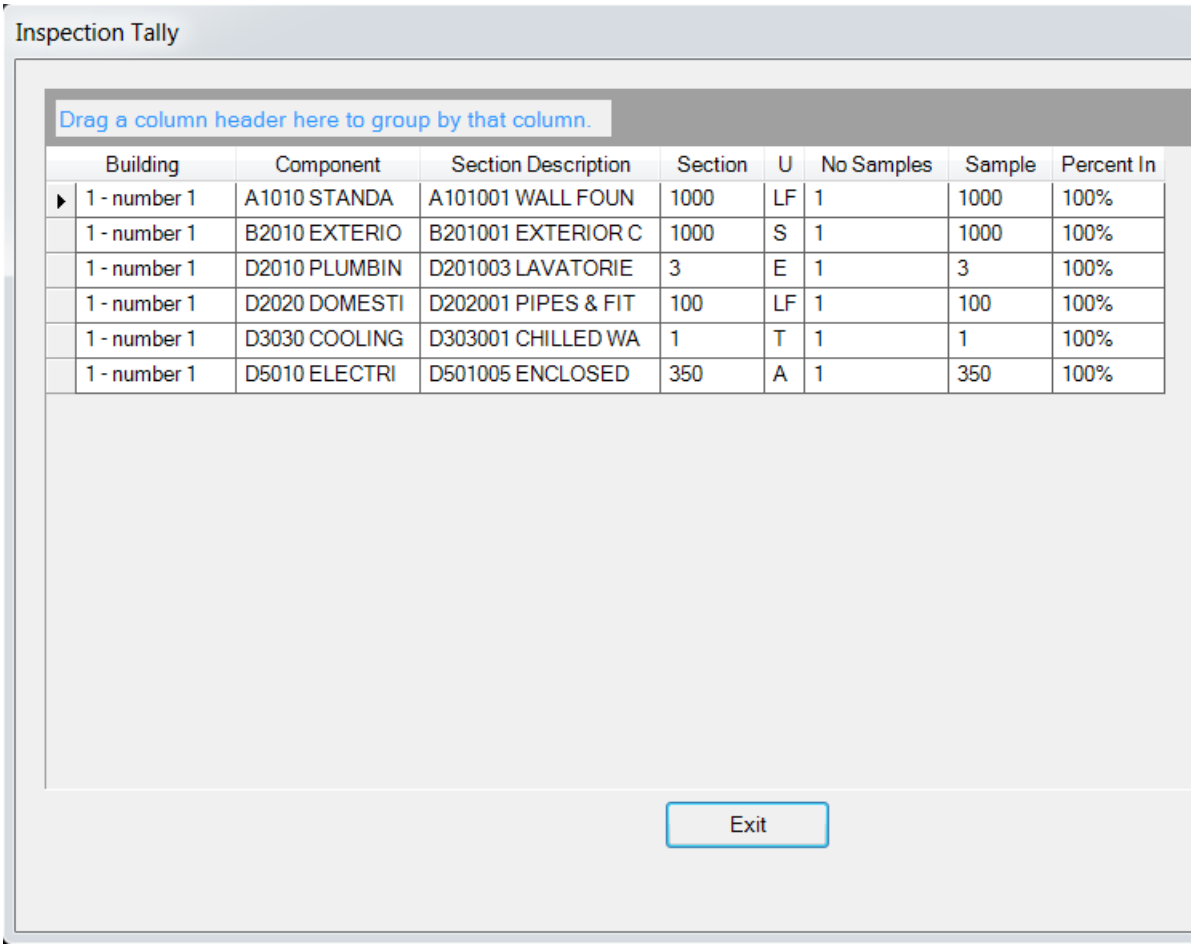
When the desired date is showing, activate the **OK** button.

Inspection Summary



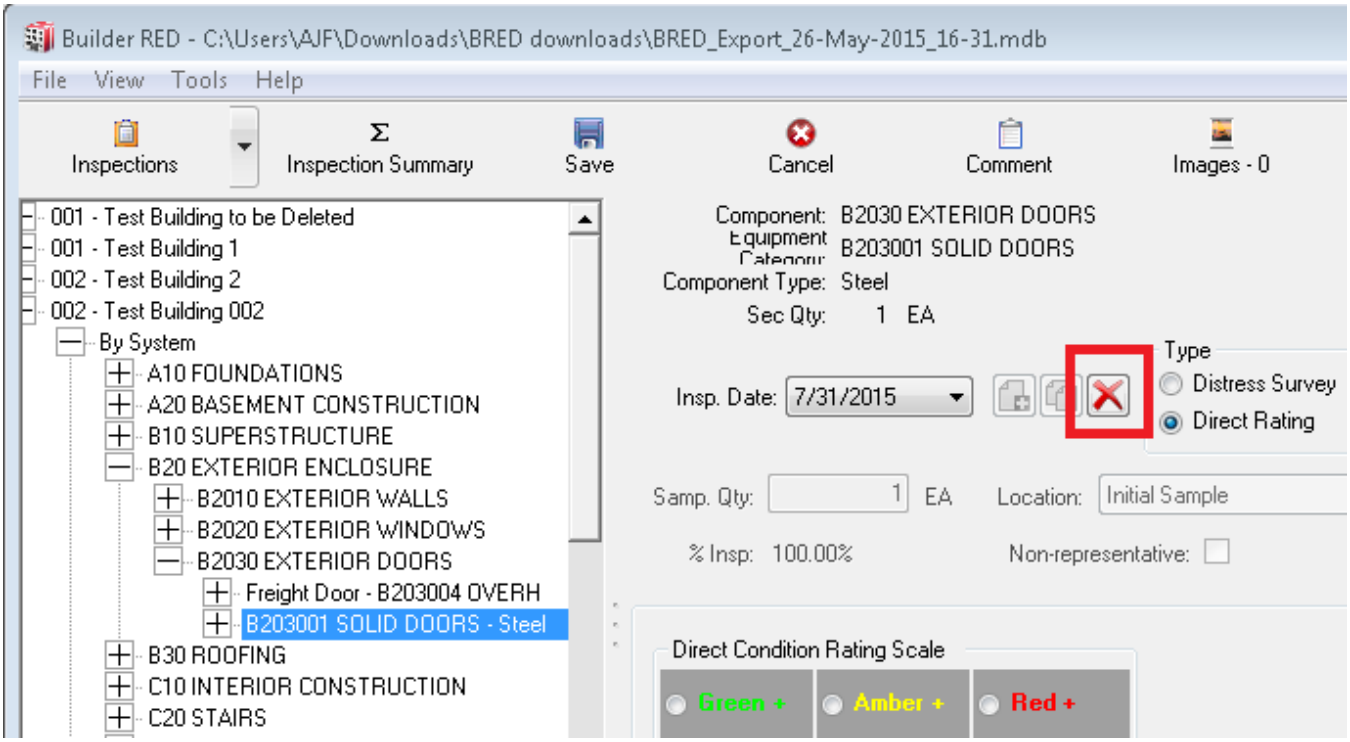
When you tap or click the **Inspection Summary** button on the BuilderRED toolbar, the "Inspection Tally" window will pop up and display the following:

- The Components and Sections inventoried in a facility (Building)
- The Section quantity
- The number of samples inspected for each Section
- The quantity of the Section that has been inspected
- The percentage of the Section that has been inspected



To close the popup window, activate the **Exit** button.

Delete an Inspection



Activating the **Delete Inspection** button (outlined in red in the image above) will delete the current inspection.

> **Note:** The **Delete Inspection** button can only be used on editable inspections. It cannot be used on old inspections copied over from BUILDER.

About Performing Inspections in BuilderRED

Inspections, also called "condition assessments" or "condition surveys", are key to successful maintenance. They can be manually scheduled, or you can take advantage of the Knowledge-Based Inspection Scheduling tool that is designed to select from your entire inventory a subset of Component-Sections that should be considered for inclusion in the next round of condition assessments. For more detail about the methods used to select Sections that should be inspected, see "About Frequency of Inspections" on page 62.

There are two inspection types available: Direct Inspection, and Distress Survey (see "About Inspection Types" on page 60). In addition to selecting Sections that should be inspected, the Knowledge-Based Inspection Scheduling tool is able to determine the type of condition assessment to perform, based on standards you can set.

Note: Paints and coatings are generally rated separately from the Component-Sections they are on. For more information about inspecting paints and coatings, see "Perform a Paint Rating - Direct Rating" on page 85 and "Perform a Paint Rating - Distress Survey" on page 94.

Perform a Direct Rating

What Is a Direct Rating?

A direct rating involves visually inspecting each Component-Section or sample, evaluating that item against a set of rating criteria, and selecting the appropriate rating. The following sections describe the steps in this process.

Keep in mind that direct ratings give an overall evaluation of a Section and do not reflect the condition of any specific subcomponent.

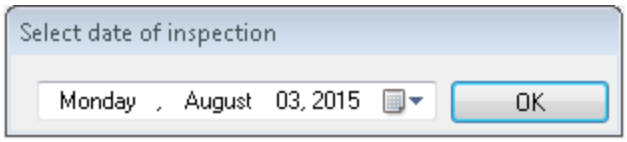
Note: You will have 30 days from the inspection date to edit the inspection data. The time the data is editable is called "The 30-day window."

Direct Rating Inspection Steps

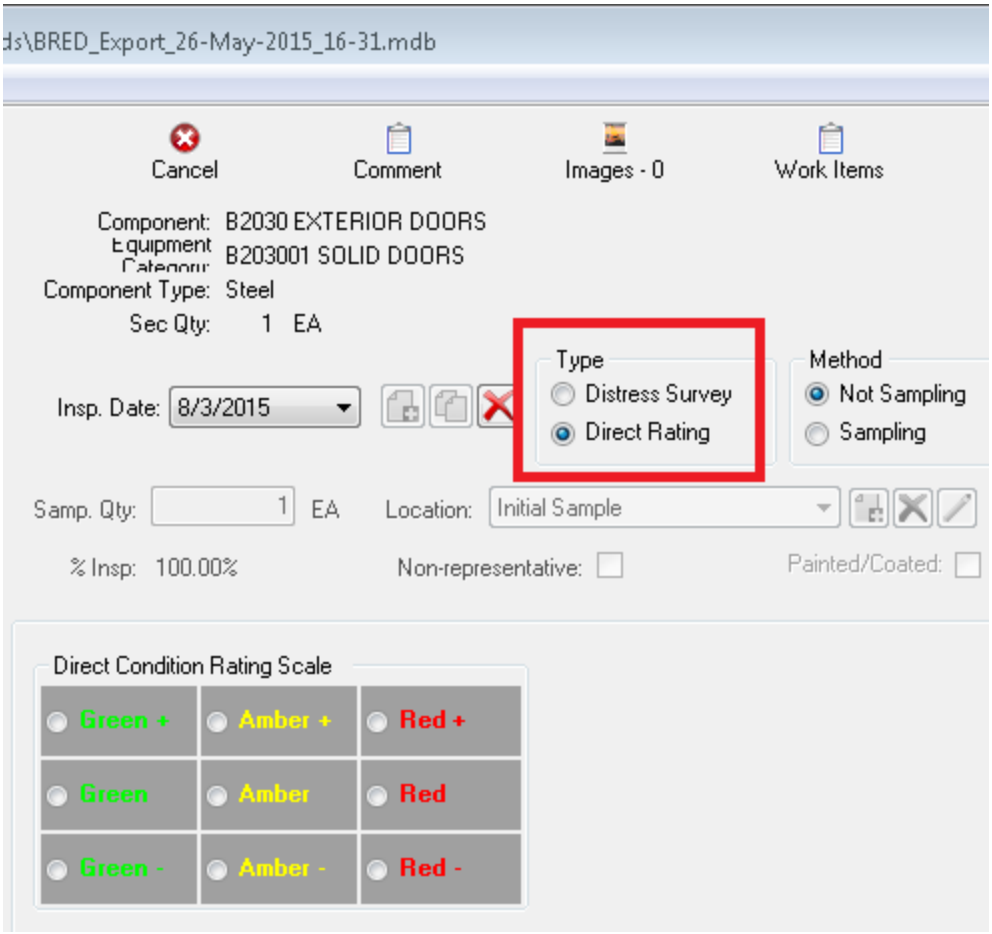
Set up the Survey Type and Method

To initiate a condition survey and set up its type and method:

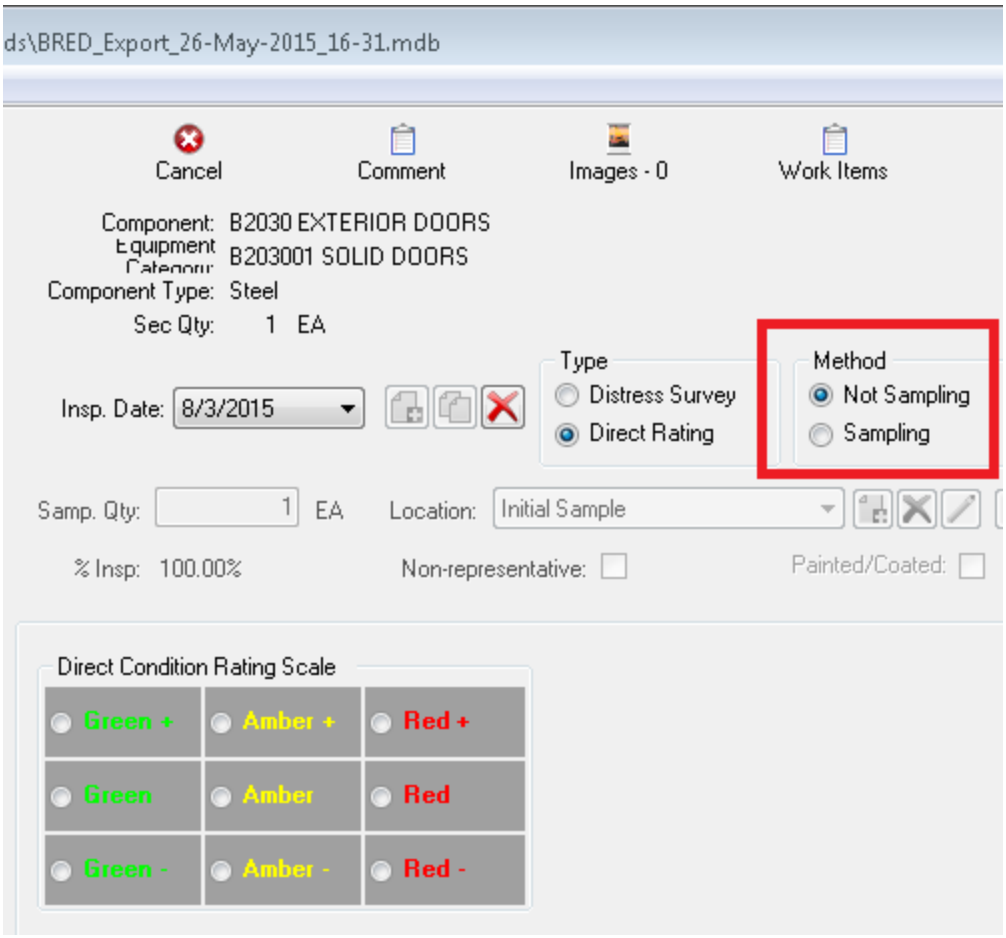
1. In the Inspections tree, select the Component-Section to inspect.
2. Create a new inspection (or copy an existing inspection).
3. Select the date of the inspection in the popup window. The default should be the current date.



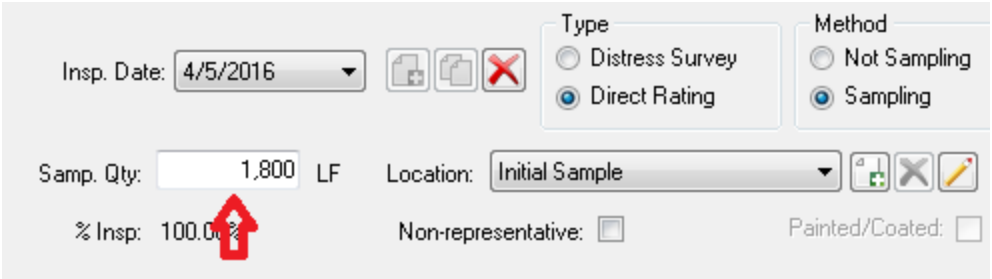
4. Inspection Type: Select the **Direct Rating** radio button if it is not already selected.



5. Inspection Method: Choose between **Sampling** and **Not Sampling** as your inspection method. Read "About Inspecting by Sampling or Not Sampling" on page 67 for more information.

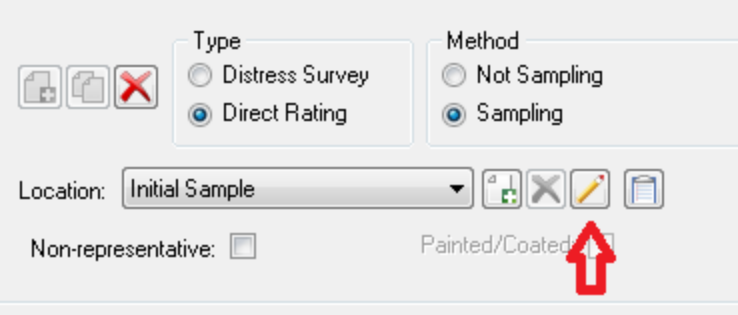


6. If you select **Sampling**, enter the appropriate information:
   - **Sample Quantity ("Samp. Qty")**. Enter here the quantity or amount of the Component-Section being sampled at the current location. Below this field, you will see what percentage this quantity is of the Component-Section.

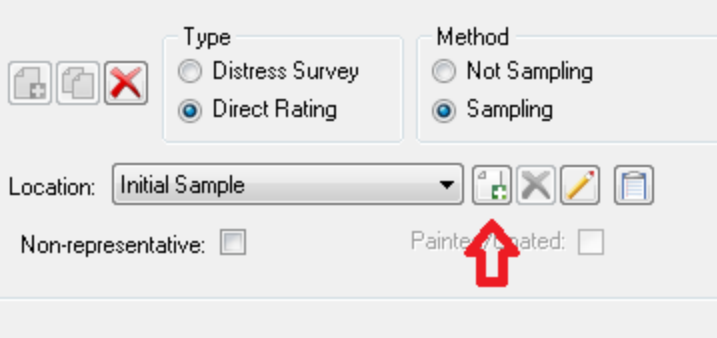


   - **Location**. This dropdown list contains the names of the sample inspection locations for the current Component-Section. Inspection data for the different sample locations can be viewed by selecting the locations from the dropdown list. Actions you can perform here are:

1. To edit the sample location name, activate the pencil icon:



2. To add a sample location, activate the **New** icon:



- **Non-representative**. If the condition of the inspected sample is not representative of the condition of the Component-Section, mark the "Non-representative" checkbox, located below the sample **Location** field. For more information, read "About Representative and Non-Representative Samples" on page 69.

7. If you select **Not Sampling**, you may go directly to designating a color rating for the Component-Section.

Designate the Direct Rating

You will designate the direct rating level by selecting one of nine radio buttons in the 3 x 3 table of options. In choosing which rating to select,

1. Determine the appropriate color rating for the Component-Section or sample:
   - Red - Serious condition problems; major M&R is needed.
   - Amber - Condition is generally adequate; M&R would be prudent and make economic sense.
   - Green - Condition is good; minor maintenance, repair, or preventive maintenance may be needed but major M&R is not.
2. Determine the appropriate level of the color rating:
   - High (+) - the best condition within the color rating.
   - Middle - the middle condition within the color rating.
   - Low (-) - the worst condition within the color rating.

To select a color rating, refer to the Chart of Color Ratings below, or see "Appendix G: Color Chart for Direct Ratings" on page 253

.

Comments/Paint Rating

1. Activate the Comments icon  (located to the right of the Location dropdown bar) to enter any comments about the component rating.

   Note: If the rating is Amber or below, you should enter a comment.

2. Enter paint/coating rating data if the Component-Section is painted or coated. The "Painted/Coated" checkbox will be marked and the "Paint/Coating Condition Rating" table will appear only if the "Painted/Coated" checkbox for that Component-Section was marked while in Inventory mode.

Save the Inspection

1. Activate **Save** in the toolbar to save the inspection data for the Section to the database.
2. Alternatively, if you wish to discard the inspection data without saving it to the database, activate **Cancel** instead.

Chart of Color Ratings

Rating	SRM Needs	Rating Definition
Green (+)	Sustainment consisting of possible preventive maintenance (where applicable).	Entire component-section or component-section sample free of observable or known distress.
Green	Sustainment consisting of possible preventive maintenance (where applicable) and minor repairs (corrective maintenance) to possibly few or some subcomponents.	No component-section or sample serviceability* or reliability* reduction. Some, but not all, minor (non-critical) subcomponents may suffer from slight degradation or few major (critical) subcomponents may suffer from slight degradation.
Green (-)		Slight or no serviceability or reliability reduction overall to the component-section or sample. Some, but not all, minor (non-critical) subcomponents may suffer from minor degradation or more than one major (critical) subcomponent may suffer from slight degradation.
Amber (+)	Sustainment or restoration to any of the following: Minor repairs to several subcomponents; or Significant repair, rehabilitation, or replacement of one or more subcomponents, but not enough to encompass the component-section as a whole; or Combinations thereof.	Component-section or sample serviceability or reliability is degraded, but adequate. A very few, major (critical) subcomponents may suffer from moderate deterioration with perhaps a few minor (non-critical) subcomponents suffering from severe deterioration.
Amber		Component-section or sample serviceability or reliability is definitely impaired. Some, but not a majority, major (critical) subcomponents may suffer from moderate deterioration with perhaps many minor (non-critical) subcomponents suffering from severe deterioration.
Amber (-)		Component-section or sample has significant serviceability or reliability loss. Most subcomponents may suffer from moderate degradation or a few major (critical) subcomponents may suffer from severe degradation.
Red (+)	Sustainment or restoration required consisting of major repair, rehabilitation, or replacement to the component-section as a whole.	Significant serviceability or reliability reduction in component–section or sample. A majority of subcomponents are severely degraded and others may have varying degrees of degradation.
Red		Severe serviceability or reliability reduction to the component-section or sample such that it is barely able to perform. Most subcomponents are severely degraded.
Red (-)		Overall component-section degradation is total. Few, if any, subcomponents salvageable. Complete loss of component-section or sample serviceability.

Perform a Paint Rating - Direct Rating

Sections that are painted or coated are usually, but not always, evaluated separately from the Component-Section itself. Paints include the various items used to preserve the substrate and/or provide aesthetics, while coatings are intended to include such items as varnishes, stains, and water seals and serve the same purposes as paints.

Paint Rating Definitions

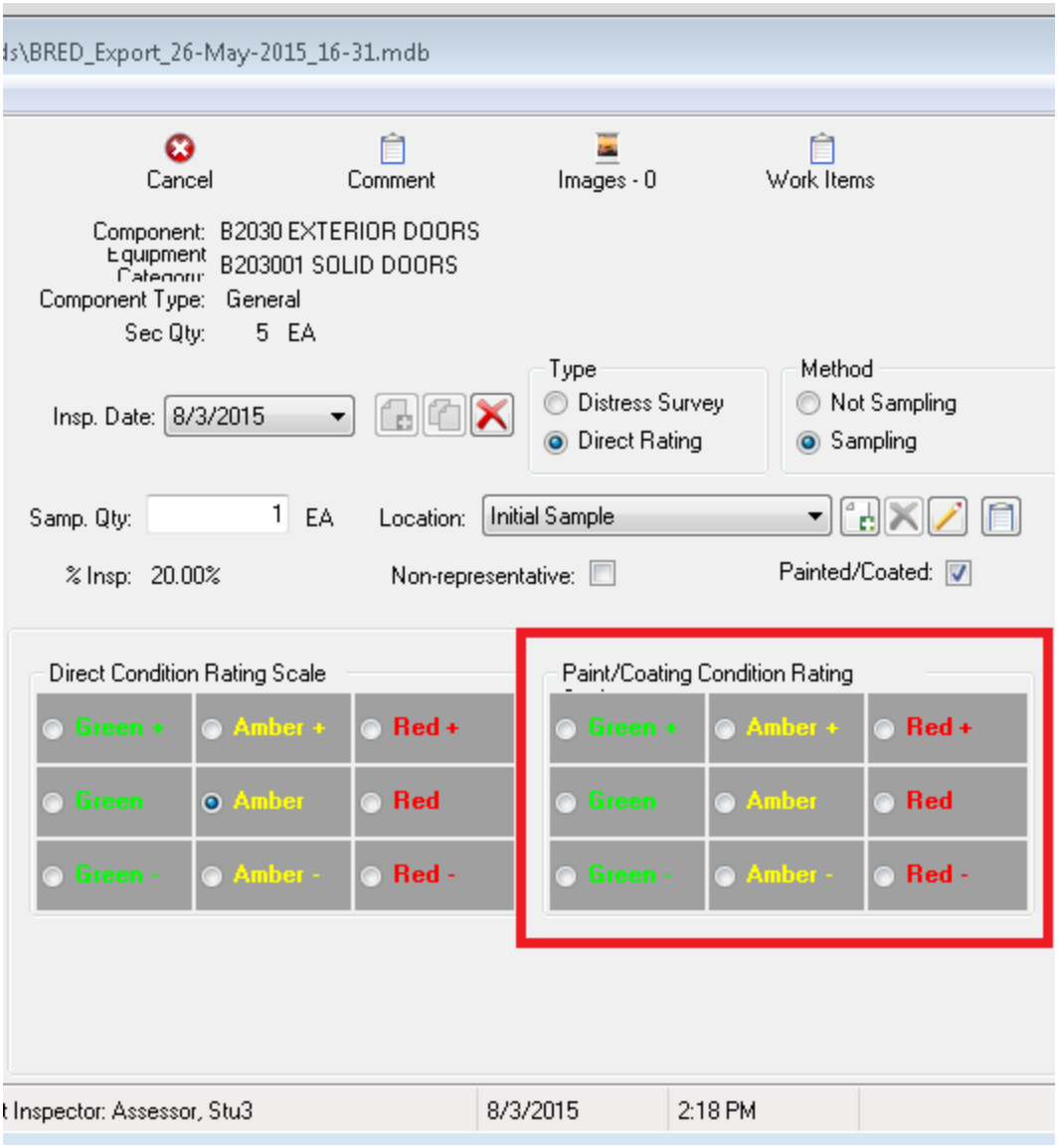
Paint/coating ratings are based on the direct condition rating approach. Ratings of "Green," "Amber," and "Red" are used along with (+) and (-). This direct approach is used with both distress surveys and direct condition types of condition assessments. The paint rating definitions are based on the percent of paint/coating deteriorated shown in the figure below:

Rating	% Deteriorated	Relative Amount Deteriorated
Green (+)	0.00 – 0.03	Up to about 1"x 4" in a 8'x 10' area; 1/32" in a 10' length; or 3 in 10,000
Green	0.03 – 0.10	Between about 1"x 4" and 1"x 12" in a 8'x 10' area; 1/32" and ⅛" in a 10' length; or 3 and 10 in 10,000
Green (-)	0.10 – 0.30	Between 1"x 12" and 3"x 12" in a 8'x 10' area; ⅛" and ⅜" in a 10' length, or 1 and 3 in 1000
Amber (+)	0.30 – 1.00	Between 3"x 12" and 10"x 12" in a 8'x 10' area; ⅜" and 1¼" in a 10' length; or 3 and 10 in 1000
Amber	1.00 – 3.00	Between 10"x 12" and 18"x 18" in a 8'x 10' area; 1¼" and 3¾" in a 10' length; or 1 and 3 in 100
Amber (-)	3.00 – 10.0	Between 1'x 2½' and 1'x 8' in a 8'x 10' area; 3¾" and 12" in a 10' length; or 3 and 10 in 100
Red (+)	10.0 – 17.0	Between 1'x 8' and 1¾'x 8' in a 8'x 10' area; 1' and 1¾' in a 10' length; or 10 and 17 in 100
Red	17.0 – 33.0	Between 1¾'x 8' and 3⅓'x 8' in a 8'x 10' area; 1¾' and 3⅓' in a 10' length; or 17 and 33 in 100
Red (-)	33.0 - 100	Greater than 1/3 of area, length, or amount

Paint Ratings for Direct Ratings

When performing a direct condition rating, the Component-Section's paint or coating in its entirety is rated. To perform the paint rating:

1. Choose the correct paint rating for the overall Component Section. The "% Deteriorated" in the table shown above is to be based on the painted portions only. The image below shows the nine rating options available for direct paint rating not using sampling.



2. Activate **Save** on the BuilderRED toolbar to save the paint/coating rating data for the Section to the database. Alternatively, if you wish to discard the paint/coating rating data without saving it to the database, activate **Cancel** instead.

Perform a Distress Survey

What Is a Distress Survey?

A distress survey involves visually inspecting each subcomponent present in the Section and recording the distress types, their severity levels, and their quantity or density present. The following sections describe the steps in this process.

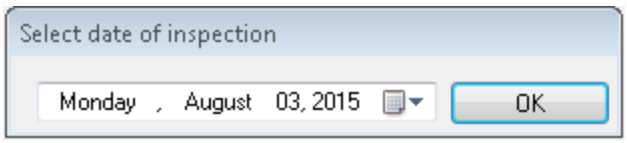
Note: You will have 30 days from the inspection date to edit the inspection data. The time the data is editable is called "The 30-day window."

Inspection Steps

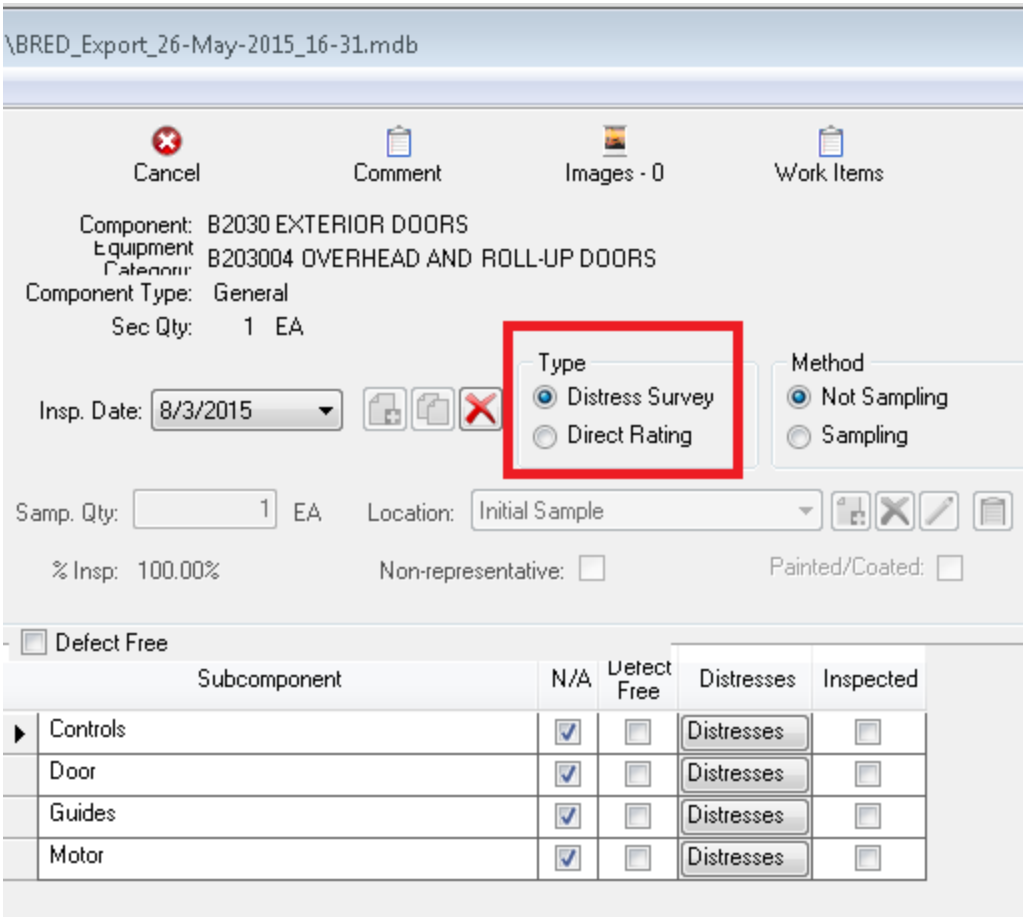
Set up the Survey Type and Method

To initiate a condition survey and set up its type and method:

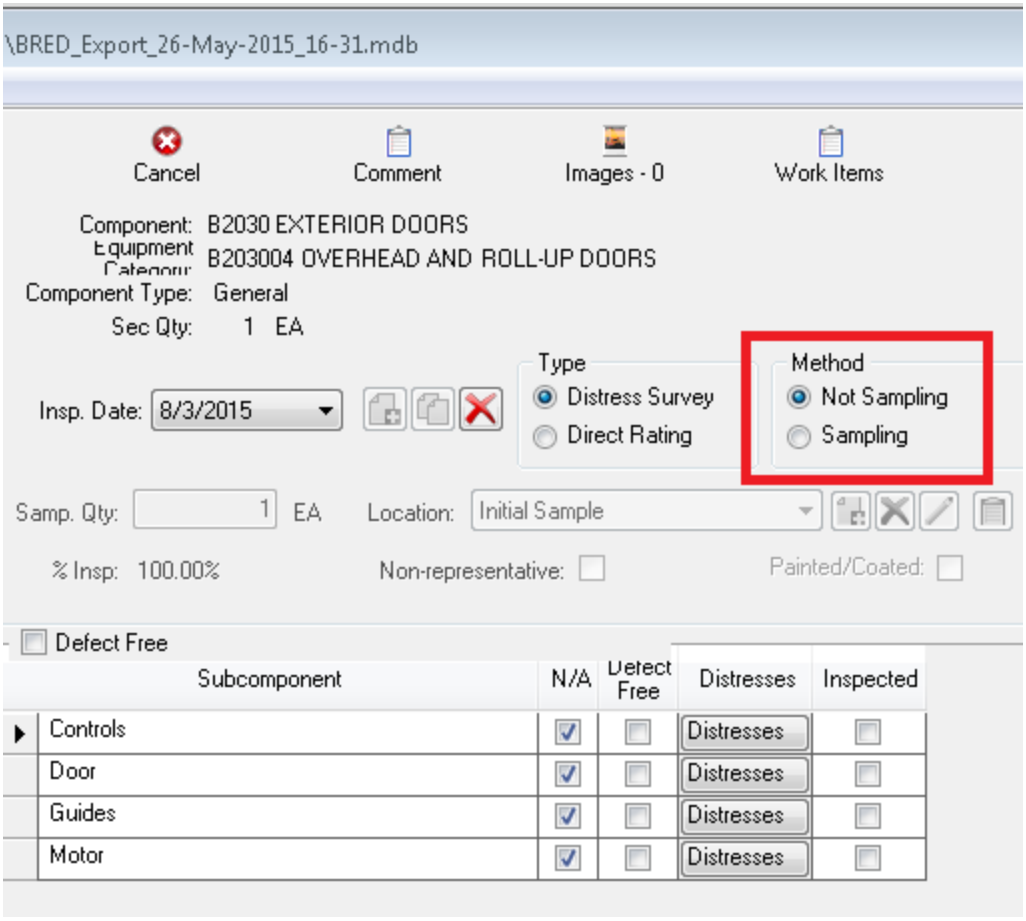
1. In the Inspections tree, select the Component-Section to inspect.
2. Create a new inspection (or copy an existing inspection).
3. Select the date of the inspection in the popup window. The default should be the current date.



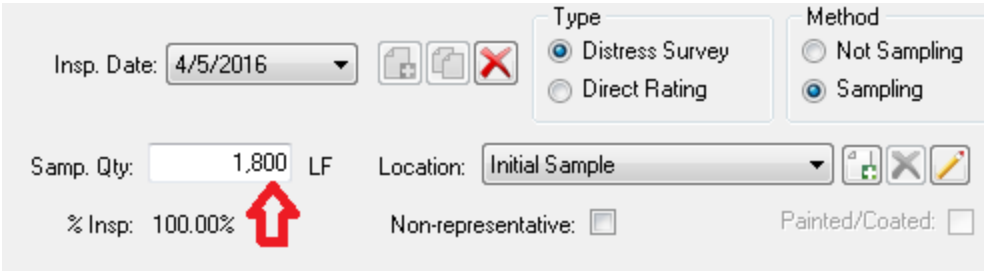
4. Inspection Type: Select the **Distress Survey** radio button.



5. Inspection Method: Choose between **Sampling** and **Not Sampling** as your inspection method. Read "About Inspecting by Sampling or Not Sampling" on page 67 for more information.



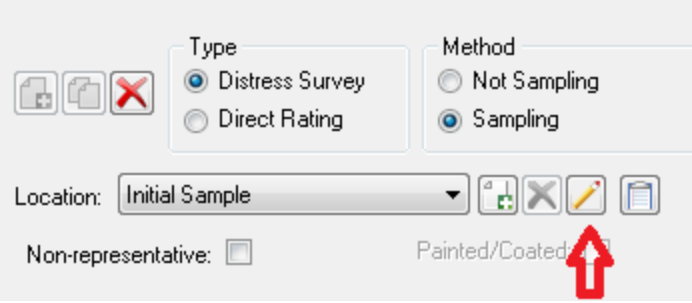
6. If you select **Sampling**, enter the appropriate information as follows:
   - **Sample Quantity ("Samp. Qty")**. Enter here the quantity or amount of the Component-Section being sampled at the current location. Below this field, you will see what percentage this quantity is of the Component-Section.



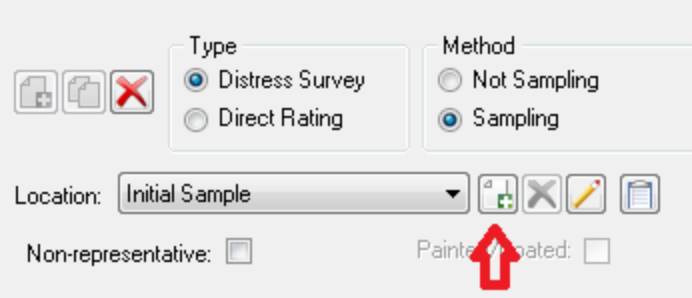
   - **Location**. This dropdown list contains the names of the sample locations which the current Component-Section has been inspected at. Inspection data for the different

sample locations can be viewed by selecting the locations from the dropdown list. Actions you can perform here are:

1. To edit the sample location name, activate the pencil icon:



2. To add a sample location, activate the **New** icon:



- **Non-representative**. If the condition of the inspected sample is not representative of the condition of the Component-Section, mark the "Non-representative" checkbox, located below the sample **Location** field. For more information, read "About Representative and Non-Representative Samples" on page 69.

7. If you select **Not Sampling**, you may proceed directly to entering distress ratings.

Enter Distress Ratings

1. Inspect each subcomponent present in the Section and record the distresses present for each subcomponent. For instructions how to record distresses, see "Inspection Checklist" on the next page
2. Enter paint/coating rating data if the Component-Section is painted or coated.

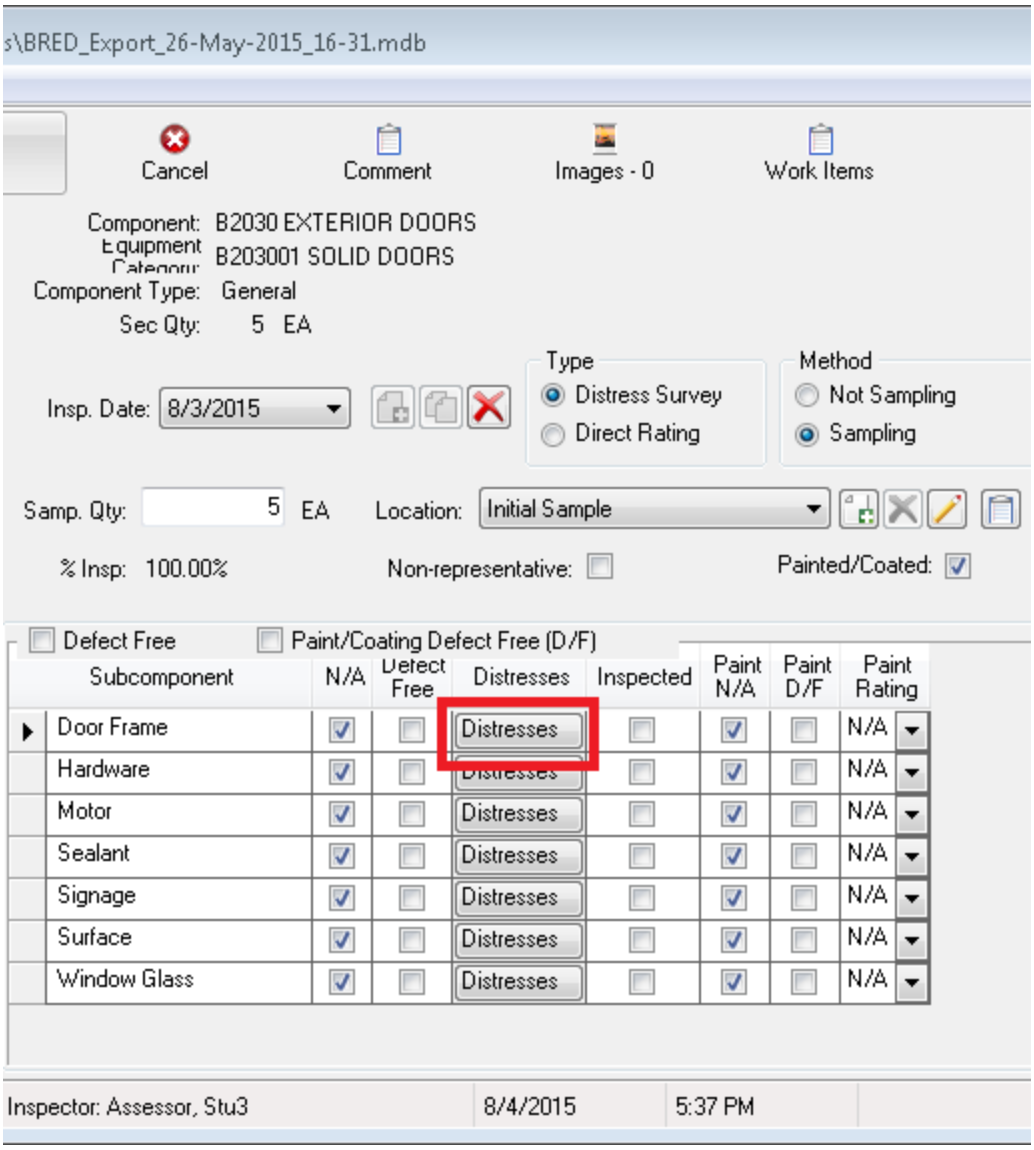
The complete distress definitions can be found here:

- Distress Survey Definitions
- "Built-Up Roofing Distress Survey Definitions" on page 1
- "Single Ply Roofing Distress Survey Definitions" on page 1
- "Shingled Roofing Distress Survey Definitions" on page 1

Save the Inspection

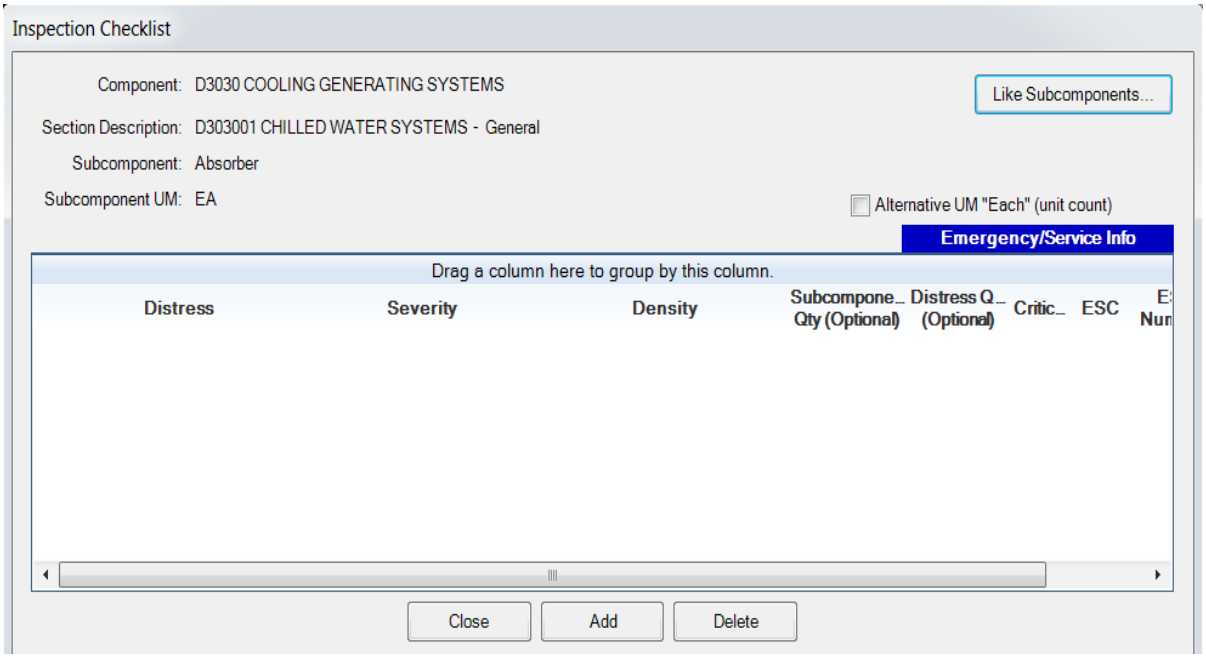
1. Activate **Save** on the toolbar to save the inspection data for the Section to the database.
2. Alternatively, if you wish to discard the inspection data without saving it to the database, activate **Cancel** instead.

Inspection Checklist



Activating a **Distresses** button will open the "Inspection Checklist" popup window which shows distresses data for the selected subcomponent.

At this window, you can "Add a Distress" on the next page to or "Delete a Distress" on page 93 from the subcomponent:

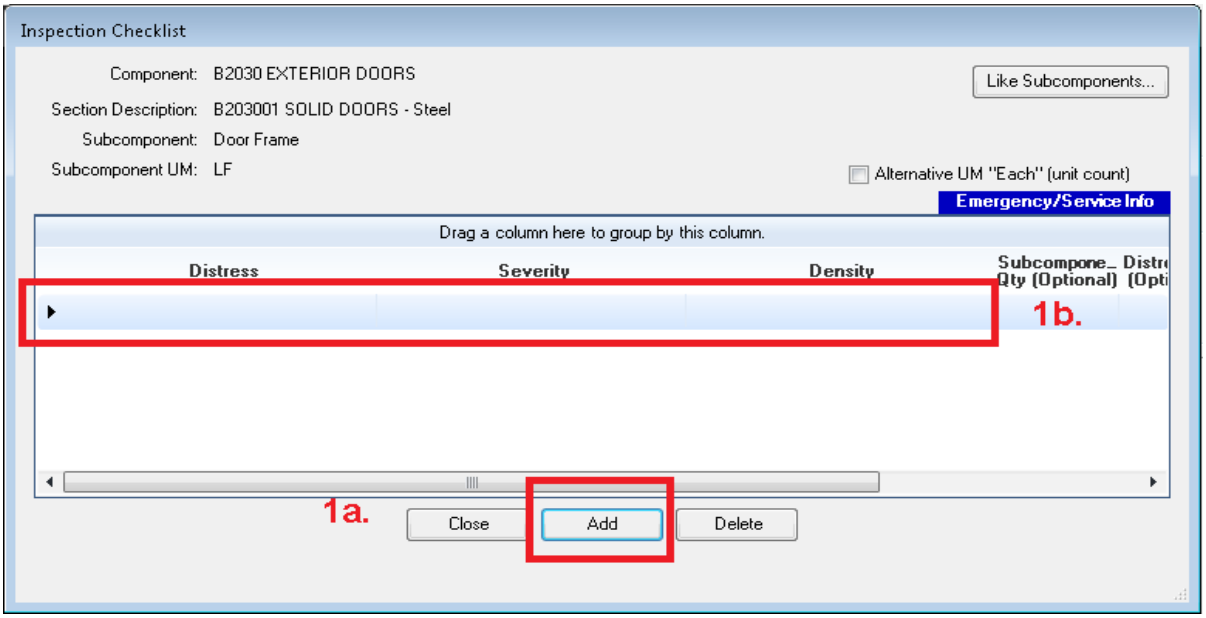


Add a Distress

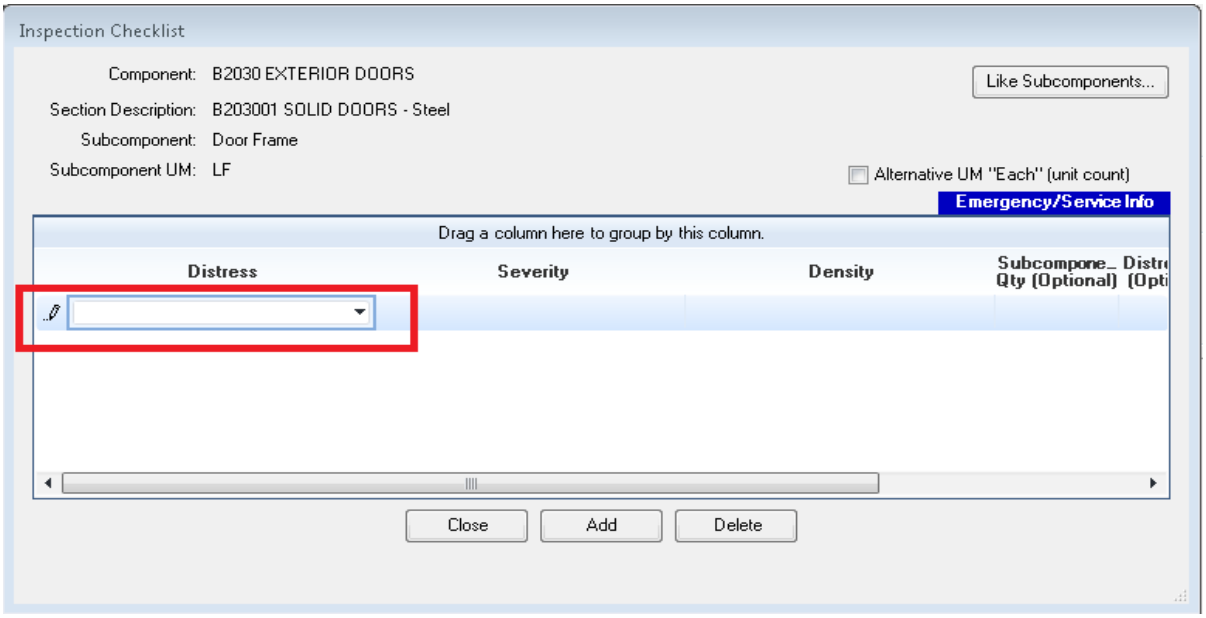
To add a distress to the subcomponent currently being inspected:

1. Activate the **Add** button in the "Inspection Checklist" window.

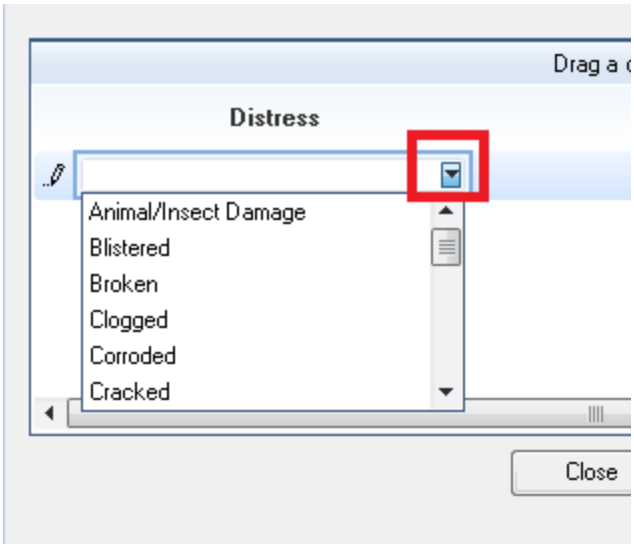
   A blank distress will appear:



2. Click on the blank distress, under one of the column headers, to make an entry field appear:



3. Click on the down arrow, then select from the dropdown list that appear. The dropdown list will differ depending on the column selected.



4. Record the distress information. The "Distress," "Severity," and "Density" fields are required before you will be allowed to close the window.

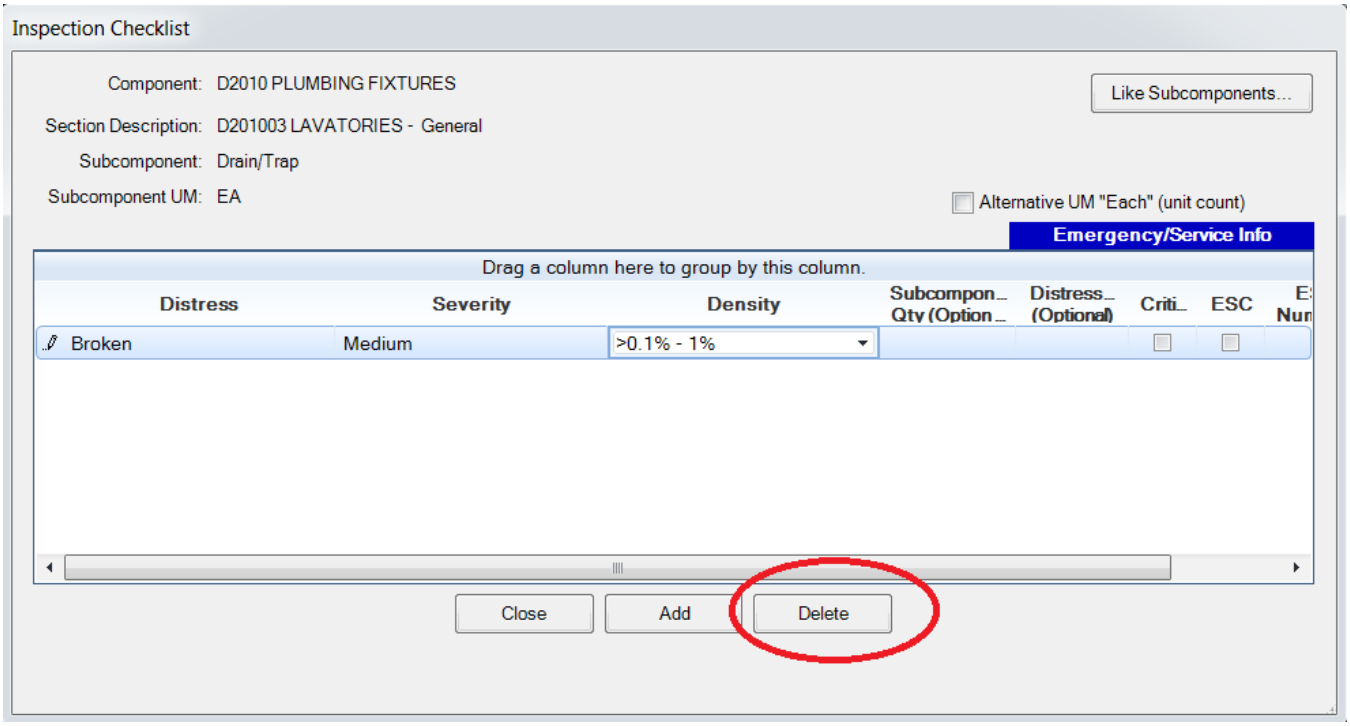
   Note: if you have added a new, blank field that you don't need, select it and activate the **Delete** button near the bottom of the popup window. Also, if you lack the time to complete the required fields, you can delete the distress using

the **Delete** button, close the window using the **Close** button, and return to complete entering the distress data later.

5. When finished recording a distress, you may follow steps 1-4 as many times as desired to add additional distresses.
6. When you have recorded all of the distresses desired, activate the **Close** button to close the window.

> **WARNING:** The distress(es) will not be saved until you activate the **Save** button on the BuilderRED toolbar, after closing the "Inspection Checklist" window.

Delete a Distress



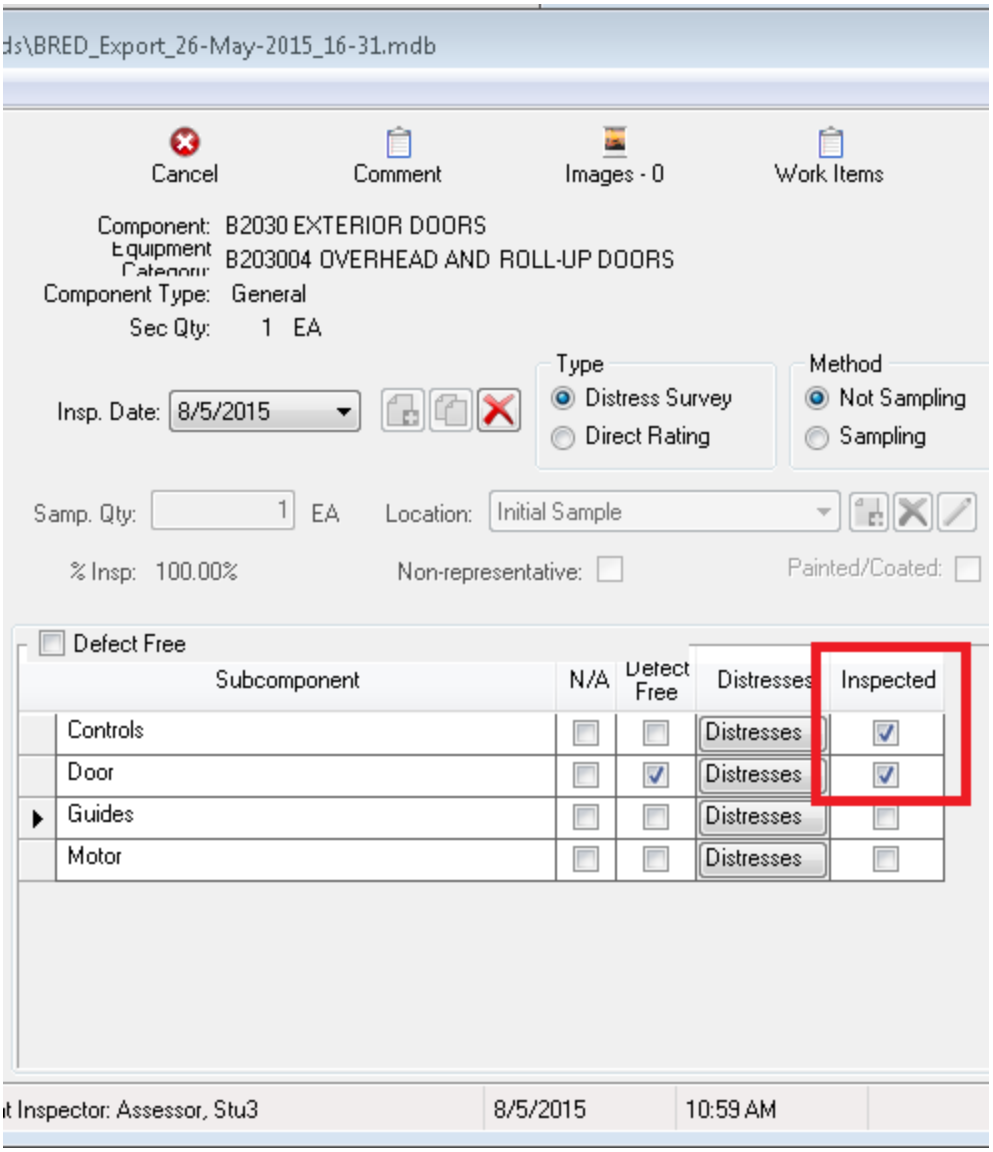
To delete a distress from a subcomponent currently being inspected:

1. Select the distress to delete by tapping or clicking on it.
2. Activate the **Delete** button.
3. Activate **Close** to close the window. Note that the distress will not be completely deleted from the database until you click the **Save** button on the BuilderRED toolbar.

"Inspected" Checkbox

The "Inspected" checkbox is not user-accessible. It will be automatically marked for a subcomponent when one of the following conditions is met:

a. The subcomponent has been marked as Defect Free (D/F), or
b. One or more distresses have been declared for the subcomponent.



Perform a Paint Rating - Distress Survey

Sections that are painted or coated are usually, but not always, evaluated separately from the Component-Section itself. Paints include the various items used to preserve the substrate and/or provide aesthetics, while coatings are intended to include such items as varnishes, stains, and water seals and serve the same purposes as paints.

Paint Rating Definitions

Paint/coating ratings are based on the direct condition rating approach. Ratings of "Green," "Amber," and "Red" are used along with (+) and (-).

> **Note:** *This direct approach is used with distress surveys as well as with direct condition types of condition assessments.*

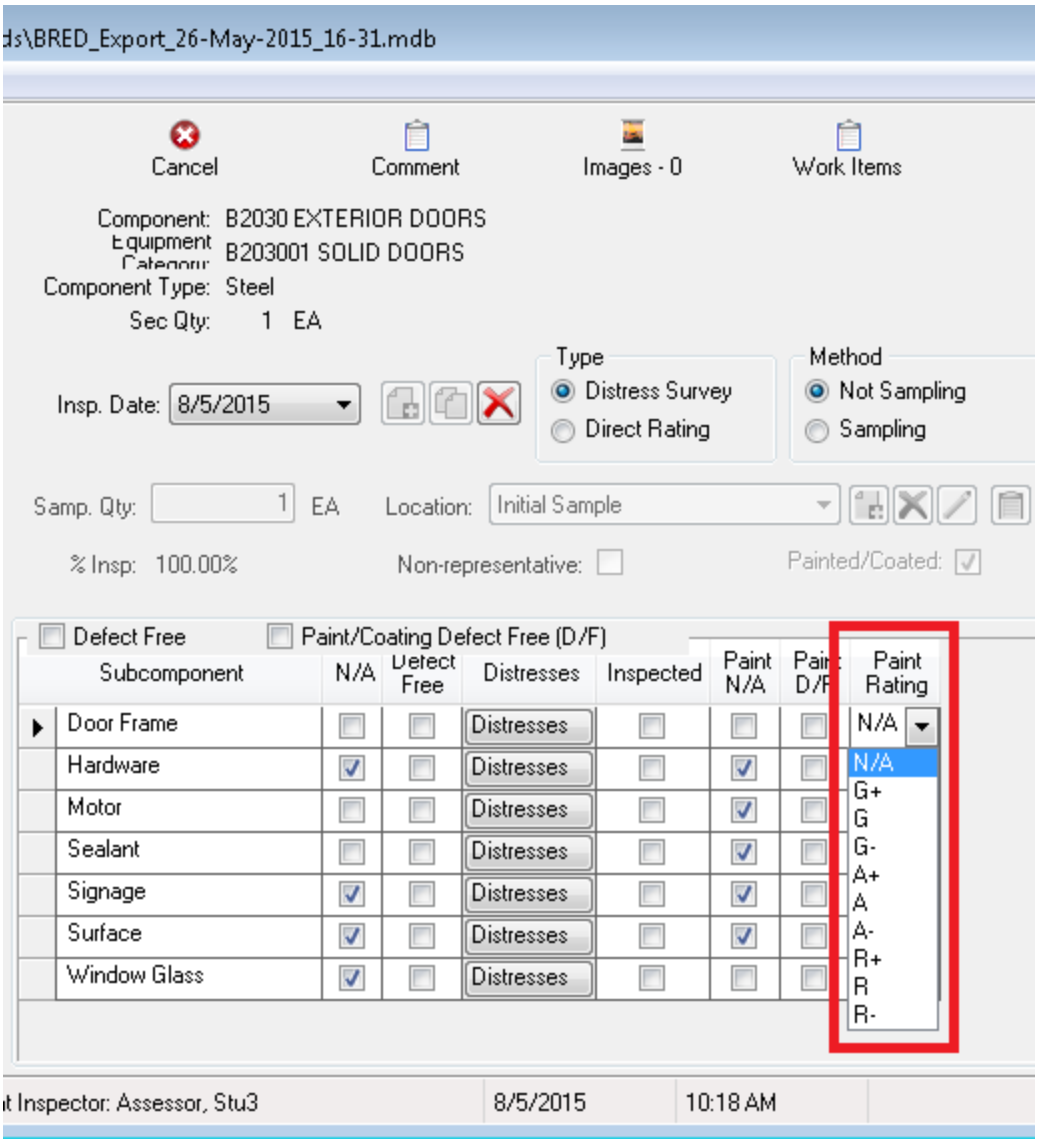
The paint rating definitions are based on the percent of paint/coating deteriorated shown in the figure below:

Rating	% Deteriorated	Relative Amount Deteriorated
Green (+)	0.00 – 0.03	Up to about 1"x 4" in a 8'x 10' area; 1/32" in a 10' length; or 3 in 10,000
Green	0.03 – 0.10	Between about 1"x 4" and 1"x 12" in a 8'x 10' area; 1/32" and ⅛" in a 10' length; or 3 and 10 in 10,000
Green (-)	0.10 – 0.30	Between 1"x 12" and 3"x 12" in a 8'x 10' area; ⅛" and ⅜" in a 10' length, or 1 and 3 in 1000
Amber (+)	0.30 – 1.00	Between 3"x 12" and 10"x 12" in a 8'x 10' area; ⅜" and 1¼" in a 10' length; or 3 and 10 in 1000
Amber	1.00 – 3.00	Between 10"x 12" and 18"x 18" in a 8'x 10' area; 1¼" and 3¾" in a 10' length; or 1 and 3 in 100
Amber (-)	3.00 – 10.0	Between 1'x 2½' and 1'x 8' in a 8'x 10' area; 3¾" and 12" in a 10' length; or 3 and 10 in 100
Red (+)	10.0 – 17.0	Between 1'x 8' and 1¾'x 8' in a 8'x 10' area; 1' and 1¾' in a 10' length; or 10 and 17 in 100
Red	17.0 – 33.0	Between 1¾'x 8' and 3⅓'x 8' in a 8'x 10' area; 1¾' and 3⅓' in a 10' length; or 17 and 33 in 100
Red (-)	33.0 - 100	Greater than 1/3 of area, length, or amount

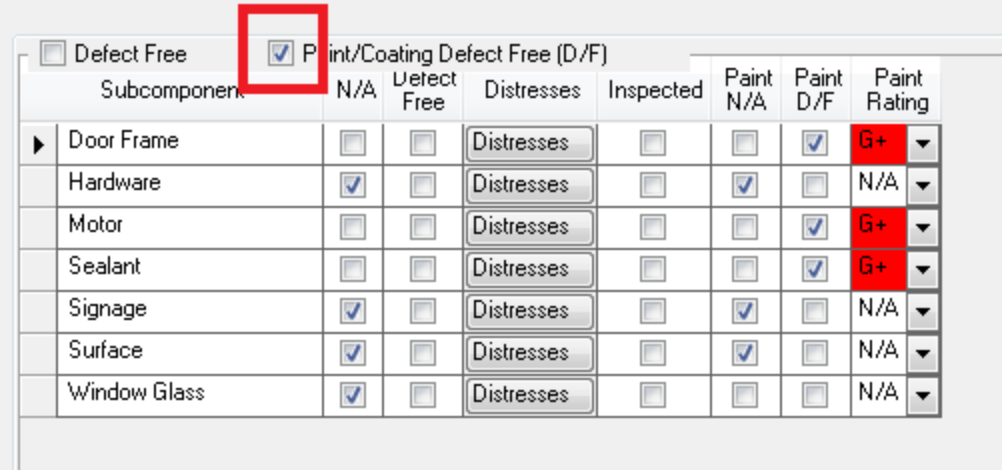
Paint Ratings for Distress Surveys

When performing a distress survey, each painted/coated subcomponent should be separately rated. To perform the paint rating:

1. For each inspected subcomponent:
    - Consulting the chart under "Paint Rating Definitions" above above, choose the correct paint rating from the "Paint Rating" dropdown list.



- Mark the "Paint D/F" (defect free) checkbox if there is no visible deterioration or damage of the subcomponent's paint/coating. If all painted subcomponents are defect free, you can use the checkbox above the table.



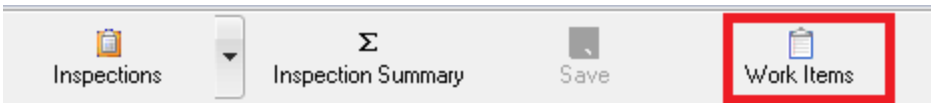
- Mark the "Paint **N/A**[1]" checkbox if the subcomponent is not painted.

2. For each subcomponent *not* inspected, make sure that its "Paint N/A" checkbox is marked.
3. Activate **Save** on the BuilderRED toolbar to save the paint/coating rating data for the Section to the database. Alternatively, if you wish to discard the paint/coating rating data without saving it to the database, activate **Cancel** instead.

Work Items

Work items are a subsection of the Knowledge-Based Inspections (**KBI**[2]) feature of BUILDER. Work items that have been generated in BUILDER are exported to BuilderRED along with their associated Component-Sections.

The **Work Items** button on the BuilderRED toolbar is available only in Inspections mode. It accesses work items generated by the Knowledge-Based Inspections feature in BUILDER that have been exported to BuilderRED.



KBI in BUILDER

In BUILDER, the KBI feature is designed to:

- Select, from your entire inventory, a subset of Component-Sections that should be considered for inclusion in the next round of condition assessments.
- Determine which type of condition assessments to perform.

---

[1]Not Applicable
[2]Knowledge-Based Inspection

For an explanation of the Knowledge-Based Inspection Principles, read "About Knowledge-Based Inspection Scheduling" on page 64.

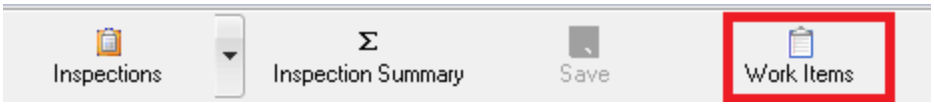
Prerequisites

To use the Work Items feature in BuilderRED,

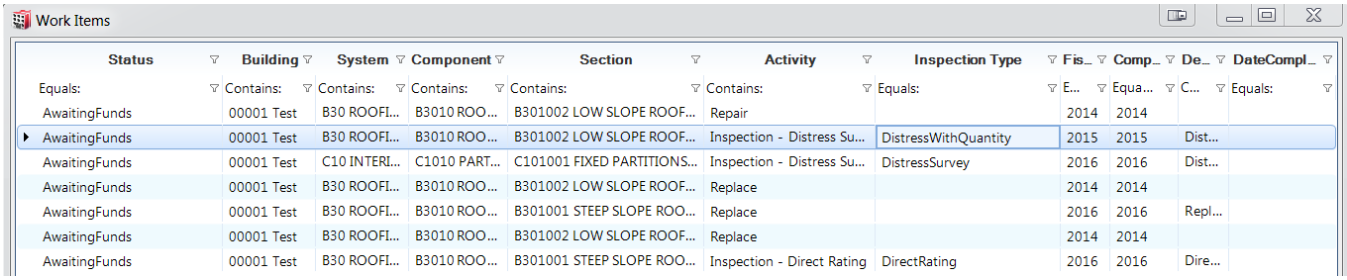
1. KBI work items must have already been generated in BUILDER for the desired Building (facility).
2. Work items must be related to the Building(s) or Component-Sections exported to BuilderRED.

View Work Items in BuilderRED

The **Work Items** button is available in BuilderRED's Inspections mode.



Here you can see the work items generated by KBI in BUILDER.



Status	Building	System	Component	Section	Activity	Inspection Type	Fis...	Comp...	De...	DateCompl...
Equals:	Contains:	Contains:	Contains:	Contains:	Contains:	Equals:	E...	Equa...	C...	Equals:
AwaitingFunds	00001 Test	B30 ROOFI...	B3010 ROO...	B301002 LOW SLOPE ROOF...	Repair		2014	2014		
AwaitingFunds	00001 Test	B30 ROOFI...	B3010 ROO...	B301002 LOW SLOPE ROOF...	Inspection - Distress Su...	DistressWithQuantity	2015	2015	Dist...	
AwaitingFunds	00001 Test	C10 INTERI...	C1010 PART...	C101001 FIXED PARTITIONS...	Inspection - Distress Su...	DistressSurvey	2016	2016	Dist...	
AwaitingFunds	00001 Test	B30 ROOFI...	B3010 ROO...	B301002 LOW SLOPE ROOF...	Replace		2014	2014		
AwaitingFunds	00001 Test	B30 ROOFI...	B3010 ROO...	B301001 STEEP SLOPE ROO...	Replace		2016	2016	Repl...	
AwaitingFunds	00001 Test	B30 ROOFI...	B3010 ROO...	B301002 LOW SLOPE ROOF...	Replace		2014	2014		
AwaitingFunds	00001 Test	B30 ROOFI...	B3010 ROO...	B301001 STEEP SLOPE ROO...	Inspection - Direct Rating	DirectRating	2016	2016	Dire...	

Work items at the Section level fall in three categories; the category is specified in the **Activity** column:

- Repair
- Replace
- Inspection

In BuilderRED, Repair and Replace work items are listed for informational purposes only. An example of when Repair or Replace information can be useful is when a Component-Section has been scheduled for inspection by BUILDER's KBI feature, but you see that this Section is due for replacement in six months. In this circumstance, you might choose to skip the inspection.

Using Filters

There are two levels of filters in the "Work Items" window, top row and second row, explained below:

Category Options

Clicking a filter icon in the top row shows you what options are available in each category. The category is designated by the column header. Use the checkboxes to select the desired options.

Search Filter

Clicking a filter icon in the second row gives you filtering options such as "Contains" or "Equals."

Initiate an Inspection from the Work Items Window

If desired, you can initiate an inspection on a particular Section from the "Work Items" window. To do so,

1. Select the row containing the desired "Inspection" in the Activity column.
2. Click the **Start Inspection** button, located in the bottom right corner of the window.

From here you can perform the customary inspection type such as Direct Inspection or Distress Survey, and save as usual.

Import Work Items to BUILDER

After completing all actions needed within BuilderRED, you can import the data back into BUILDER normally, and the updated inspections and other actions performed will be updated in BUILDER.

Chapter Six:

FUNCTIONALITY MODE

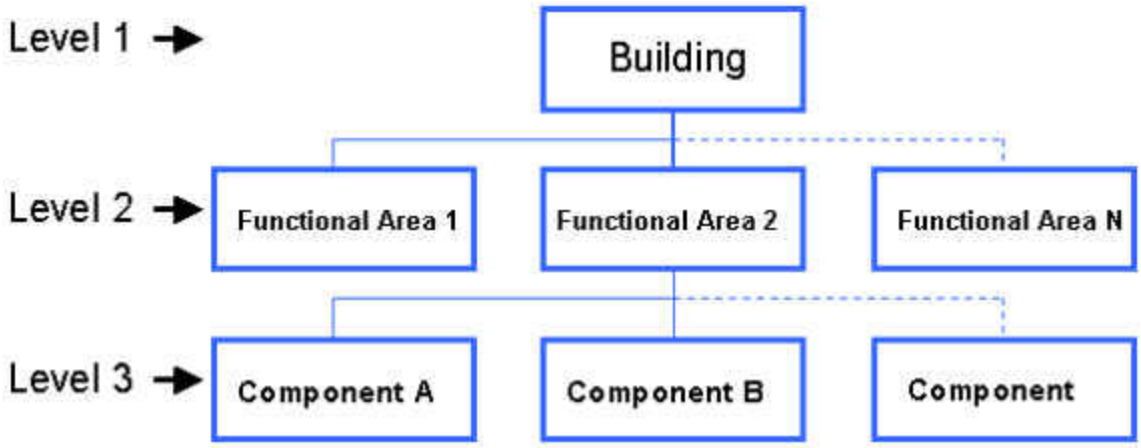
Functionality Assessment Overview

BuilderRED has the ability to perform functional assessments on Buildings to measure their "functionality" state. The functionality state relates to the building's suitability to function as intended and required for mission. The functionality state is distinct from, and determined independently from, the physical condition state.

Although the functionality assessment is not a detailed engineering assessment, it does satisfy the requirements necessary for routine building facility management activities, including long range budgeting and modernization planning. It also helps to quickly identify problem areas that need more detailed assessments. There may be times when detailed engineering assessments may be required to diagnose specific problems.

Functionality Assessment Tiers

Functional assessments are structured into a three-tiered, top-down approach that narrows the focus and is able to provide greater assessment detail to the identified problem issues. This approach saves effort, reduces cost, and focuses attention where needed. It also allows the process of identifying and developing modernization requirements to efficiently flow from a broad strategic planning phase to a detailed execution phase. The assessment approach encompasses the three levels shown below.



In BuilderRED 3.3, functionality assessments can be performed at the first and second tiers (Building and Functional Area levels). Later versions will include a third tier (Component-Section level) for functionality assessments.

First Tier (Building Level) Assessment: Overview

The first tier of the functionality assessment is a fast, scoping building level assessment. Using a limited set of questions (listed in First Tier Functionality Issues and Sub-Issues) that address general functionality issues throughout the building, the first tier provides a quick and accurate way to

1. Rule out from further assessment issues that are not a problem,
2. Identify issues that will require further assessment at the next tier level, and
3. Compute the Building Functionality Index (**BFI**[1]).

This level of assessment should be performed when an overall indication of the functionality of the building is desired and when areas that will require further assessment need to be identified.

Second Tier (Functional Area Level) Assessment: Overview

The second tier of the functionality assessment is a methodical building functional area assessment. This level of assessment produces more accurate results than the first tier but it is also more time consuming and expensive to perform, because it is performed multiple times due to multiple functional areas. In the second tier, a complete list of functionality questions (see "Second Tier Issues and Sub-Issues" on page 124) is used to

1. Identify the specific functionality deficiencies in each functional area,
2. Compute the Functional Area Functionality Index, and
3. Refine the BFI.

[1]Building Functionality Index - computed from the results of a functionality assessment.

This level of assessment should be used when the functionality deficiencies within functional areas need to be identified and when the results of the first tier need to be refined.

Functionality Assessment Sets

At any assessment tier level, when you create a new assessment, the BuilderRED Functionality module will ask which type of Assessment Set to create. Each Assessment Set created represents a snapshot of the facility's functionality state of a certain type at a point in time.

The following assessment sets are built in to BuilderRED Version 3.3:

1. **Functionality**. This is the baseline assessment set in BUILDER.
2. **Cultural Resources**.
3. **HPSB[1] Facility**. This assessment set, High Performance and Sustainable Building, examines the area of energy efficiency.

These assessment sets can be created and assessed at either of the Functionality tiers mentioned above.

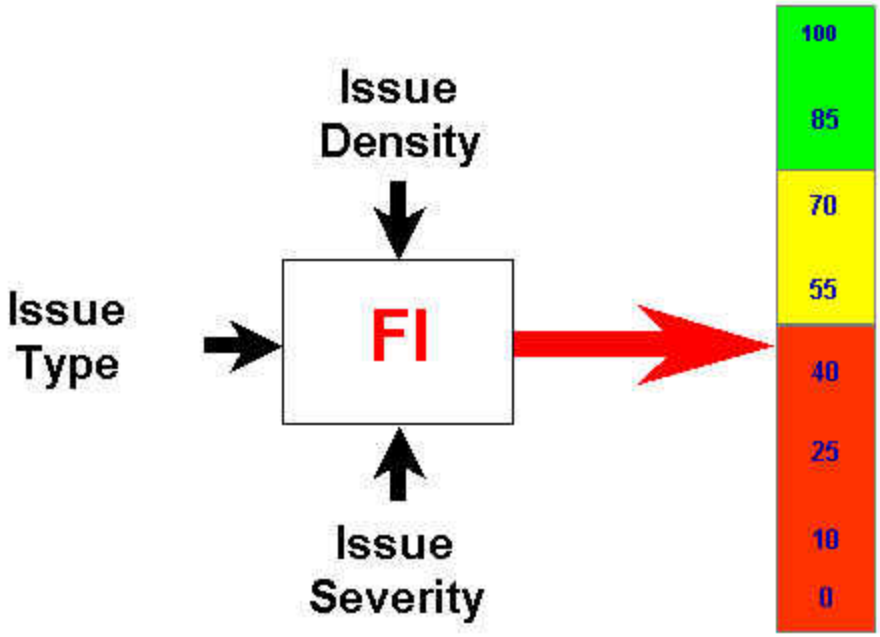
Functionality Index Computation: Overview

Functionality assessments directly support the computation of a functionality index (**FI**[2]) for a building as a whole, and for the functional areas within the building. These indices are known as the Building Functionality Index (BFI) and the Functional Area Functionality Index (**FAFI**[3]), respectively, and they were developed for assessing building functionality. Both the BFI and FAFI are general obsolescence metrics that address issues related to user requirements, technical obsolescence, and regulatory/code compliance at the building level and functional area level, respectively.

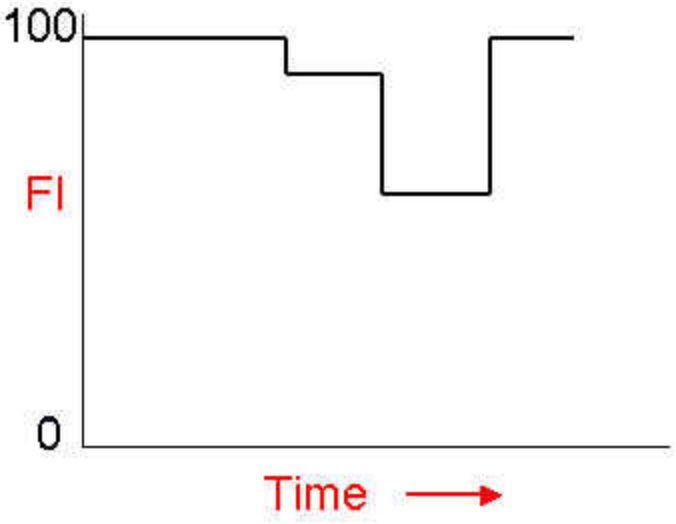
All FI metrics are based on a scale of 0-100, which matches the scale used in BUILDER for condition indices (**BCI**[4], **SCI**[5], **SCCI**[6], and **CSCI**[7]). BuilderRED contains the model algorithms that compute the FIs automatically once the functionality assessment data are entered. The algorithms use the data entered regarding the functionality issues present in the building, the severity of the issues, and the density of each issue to calculate the BFI. This process is illustrated by the figure below.

---

[1]High Performance and Sustainable Building
[2]Functionality Index
[3]Functional Area Functionality Index
[4]Building Condition Index - a condition rating for the overall building.
[5]System Condition Index - a condition rating for the building System.
[6]System Component Condition Index - a condition rating for the System component
[7]Component-Section Condition Index - a condition rating for the component section



It is important to note that the FI metrics are step functions over time, unlike the smooth, continuous functions seen in BUILDER's condition indices. This is because functionality, unlike condition, is not an ongoing process. The functionality of a building or of a functional area depends on user needs, technical obsolescence, and compliance with code or regulations. These factors do not change gradually, but rather at discrete points in time. These discrete changes are reflected in the "steps" in the FI over time. The figure below shows an example FI over time.



Basics of the Functionality Toolbar and Tree

The functionality assessment process allows viewing and entry of Functionality and/or Cultural Resources functional assessments using BuilderRED. From this data, a Functional Index can be computed, or it can be determined if a Building either is or contains a cultural resource.

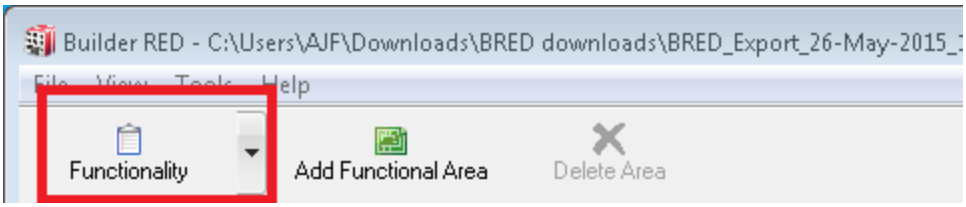
While in Functionality mode in BuilderRED, you can record a new functional assessment at either the Building level or the Functional Area level. Additionally, BuilderRED allows you to view previous functional assessment, to determine the change in functionality since the last evaluation.

Select Functionality Mode

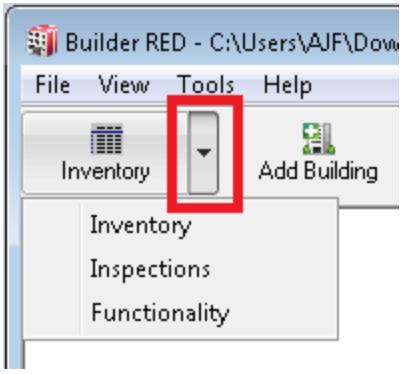
To operate in Functionality mode, choose one of the following methods:

a. Activate the leftmost button (Mode toggle) on the BuilderRED toolbar until the **Functionality** icon and label are displayed.

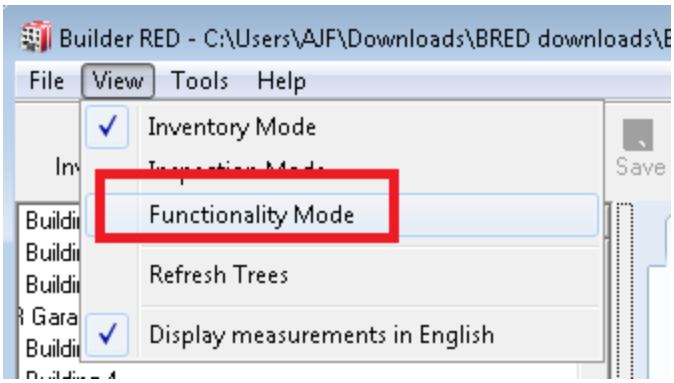
> **Note**: If you are seeing the **Functionality** icon and label on the button, it means that you are already in Functionality mode.



b. Activate the down arrow at the right edge of the Mode toggle button, then select "Functionality" from the dropdown list.

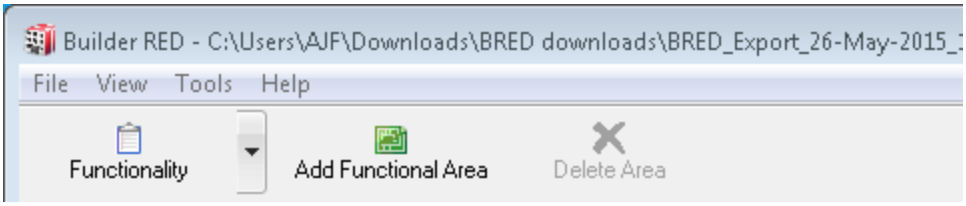


c. Alternatively, select **Functionality Mode** from the **View** menu.



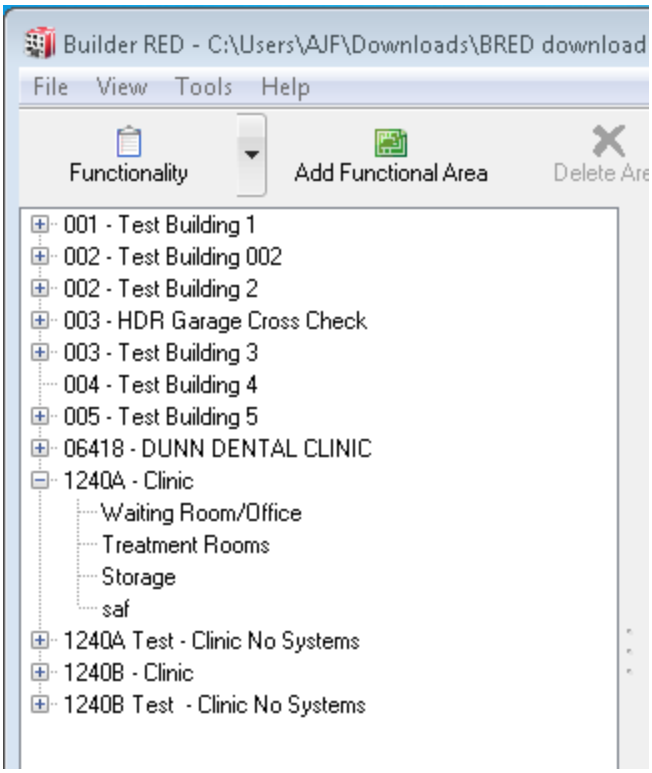
Functionality Toolbar

In Functionality mode the following toolbar, which varies according to level in the Functionality tree, will appear:



Functionality Tree

In the split window the left side displays the Functionality tree, which acts as a map of the functionality data in the database.



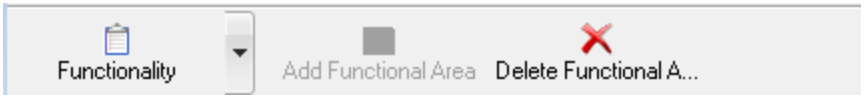
Here, the tree can be expanded by clicking on the "+" next to an inspection level or collapsed by clicking on the "-" next to an inspection level. To select a particular level, right-click on it. The information pertaining to that functionality level will be displayed in the right side of the split screen.

Functionality Toolbar Variations

The Functionality toolbar may appear in one two different ways, depending on your location in the inspection tree.

At the Building level:

At the Functional Area level:



Add a Functional Area

In BuilderRED 3.3, you can separate a Building into functional areas. This must be done before you "Perform a Second Tier Functionality Assessment" on page 118.

> **Note:** In BuilderRED, Functional Areas are visible only in the Functionality navigation tree.

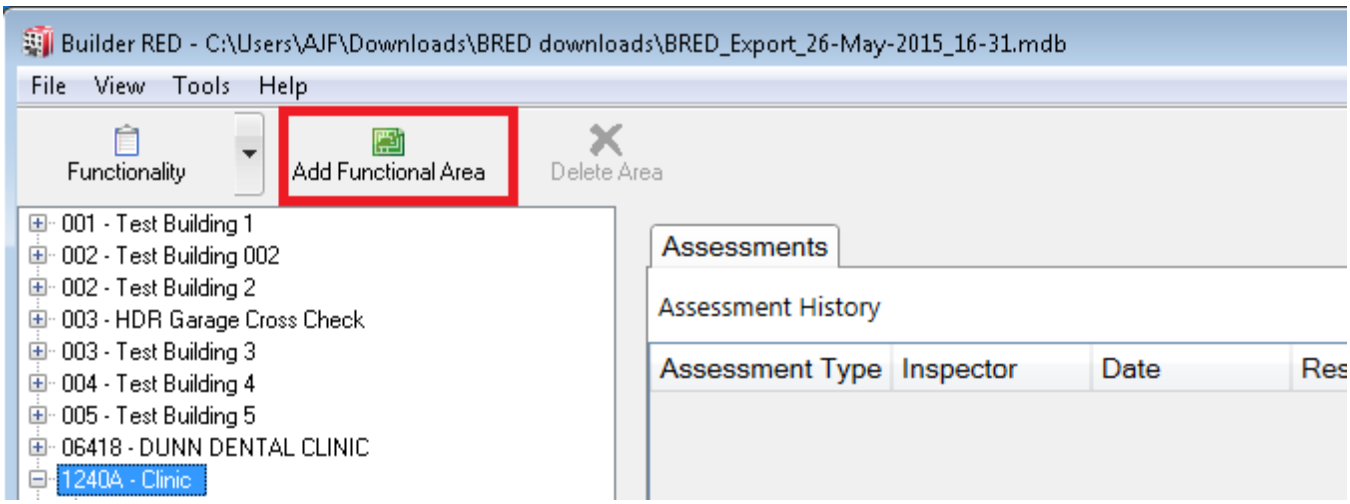
Prerequisite

Microsoft Silverlight 5 is required for using Functionality features.

Add a Functional Area Using BuilderRED

To add a functional area to a Building using the BUILDER Remote Entry Database (BuilderRED),

1. Enter Functionality mode, using either (a) the **View menu**, (b) the leftmost (Mode toggle) button on the BuilderRED toolbar, or (c) the arrow on the right edge of the Mode toggle button.
2. In the Functionality tree, navigate to the desired Building and select it.
3. Activate the **Add Functional Area** button on the toolbar:



4. In the "Add New Functional Area" popup box, do the following:
   a. Fill in the Area Name.
   b. Select Area Type from the dropdown list.
   c. Select Use Type from the dropdown list.
   d. Enter the Size, in square feet or square meters, depending on the unit of measure selected.
5. After completing the entries, activate the **OK** button to save the new functional area. Alternatively, activate **Cancel** to exit without saving the new functional area.

If saved, the new functional area should now be in the navigation tree.

> **Note:** In BuilderRED, Functional Areas are visible only in Functionality mode (and when the navigation tree is sufficiently expanded).

Functional Area Types

There are 26 different functional area types you can include in your Buildings:

- Administration Area
- Assembly Area
- Circulation
- Display Area
- Education Area
- Equipment Area
- Exterior Envelope
- Food Preparation Area
- High Hazard Area
- Laboratory Area
- Living Area
- Loading Dock/Bay
- Maintenance/Production Area
- Medical Treatment Area
- Operations Area
- Outdoor Circulation
- Recreation Area
- Research Area
- Restroom Area
- Security Area
- Site
- Storage Area
- Technical Equipment Area
- Training Area
- Transaction Area
- Vehicle Area

Add Inventory to a Functional Area

Adding BUILDER inventory to a Functional Area allows users to see how various portions of their facility are performing, both in the Functionality Index as well as the Condition Index. The Functionality interface allows you to add specific Component-Sections, specific Components, or even entire Systems to a Functional Area.

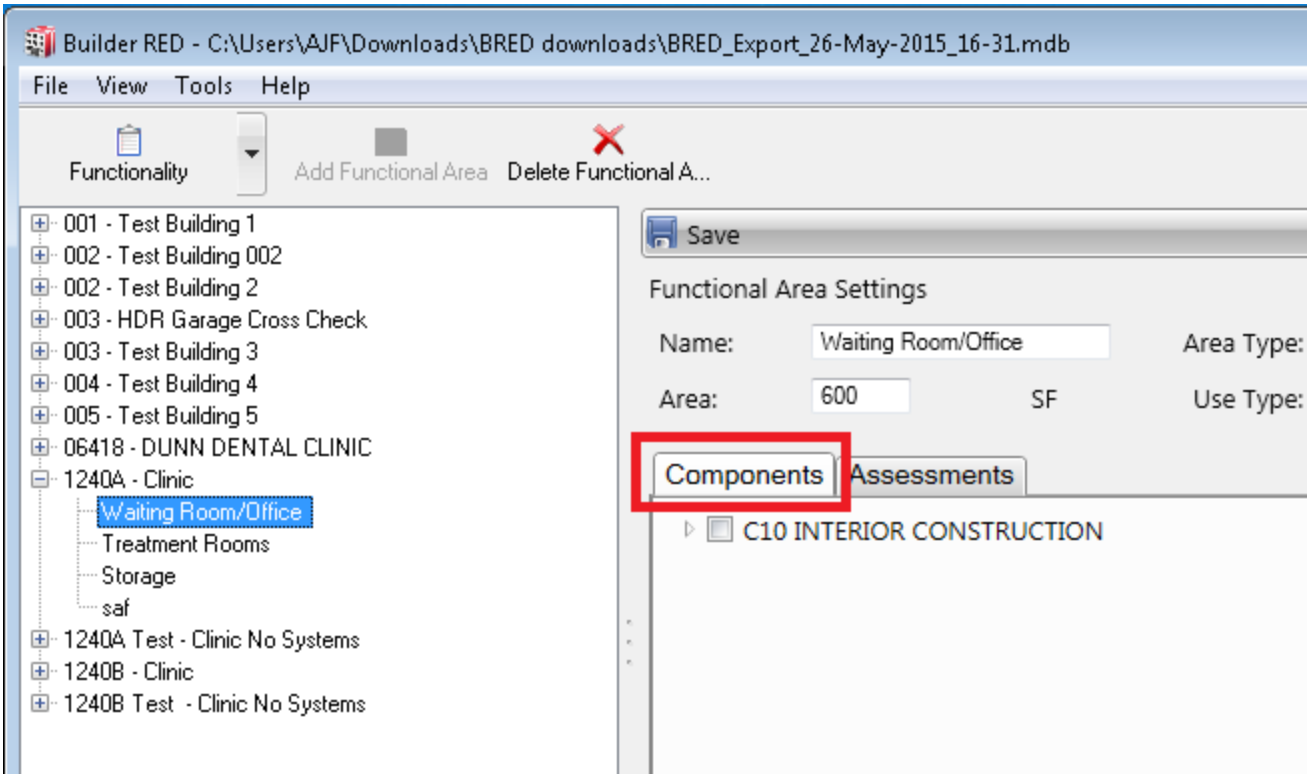
Prerequisite

Before inventory can be added to a Functional Area, the relevant part of the inventory tree must be filled in down to the Component-Section level.

Add Inventory to a Functional Area Using BuilderRED

To add Inventory items into a Functional Area,

1. Enter Functionality mode, using either (a) the **View menu**, (b) the leftmost button (Mode toggle) on the BuilderRED toolbar, or (c) the arrow on the right edge of the Mode toggle button.
2. Activate the "+" next to the Building containing the relevant Functional Area. (The "+" will change to a "-")
3. Select the Functional Area to highlight it. In the example below, the Functional Area is "Waiting Room/Office".
4. Make sure you are at the **Components** tab.



5. To add one or more System(s), mark the checkbox(es) next to each desired System(s). **If this is all you need, skip to the last step.**

6. To add one or more Component(s) not in a selected System, expand the list of Systems as needed to navigate to and select the desired Component(s). How?[1]
7. To add one or more Component Section(s) not in a selected Component, expand the list as needed to navigate to and select the desired Component Section(s). How?[2]
8. When your selections are complete, activate the **Save** button.

Perform a First Tier Functionality Assessment

First tier functionality assessments are associated with the Building as a whole.

Prerequisites

The following prerequisites are required before performing a functionality assessment:

1. Create the Building. This needs to be done in BuilderRED's Inventory mode. If you have not created the Building in Inventory mode with the proper data, you will not be able to enter functionality assessment data for it.
2. Be familiar with the concepts in the "Functionality Assessment Overview" on page 100 and the "First Tier Functionality Issues and Sub-Issues" on page 115.

> **Note:** With the addition of the Building Status property in BUILDER , it is possible to have functionality assessment records for non-current buildings. Performing assessments on non-current buildings is done in the same manner as performing them on current buildings.

Create a First Tier (Building) Functionality Assessment in BuilderRED

When you are ready to add or edit functionality assessment data for a Building,

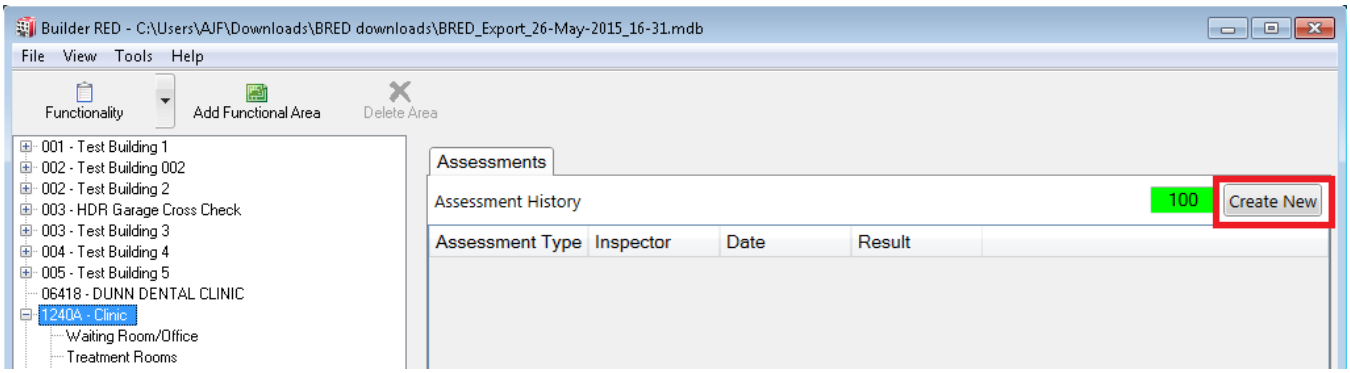
1. In BuilderRED Functionality mode, select the desired Building in the navigation tree.
2. Activate the **Create New** button at the right side of the window.

> **Problems?** If you do not see the **Create New** button, it might be because you only have read privileges for this location.

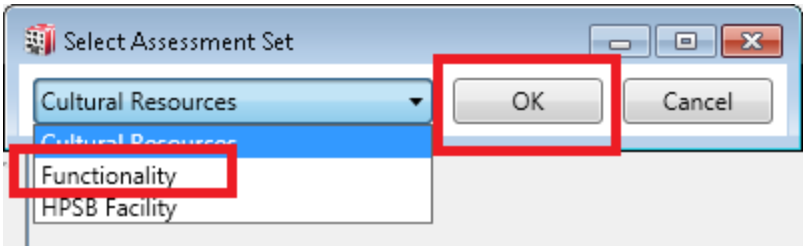
---

[1](1) Click the arrow left of a System's checkbox to reveal its Components.
(2) Click the checkbox(es) next to the desired Component(s).
(3) Repeat until all desired Components are selected.

[2](1) As needed, click the arrow left of a System's checkbox to reveal its Components.
(2) Click the arrow left of a Component's checkbox to reveal its Component Sections.
(3) Click the checkbox(es) next to the desired Component Section(s).
(4) Repeat until all desired Component Sections are selected.



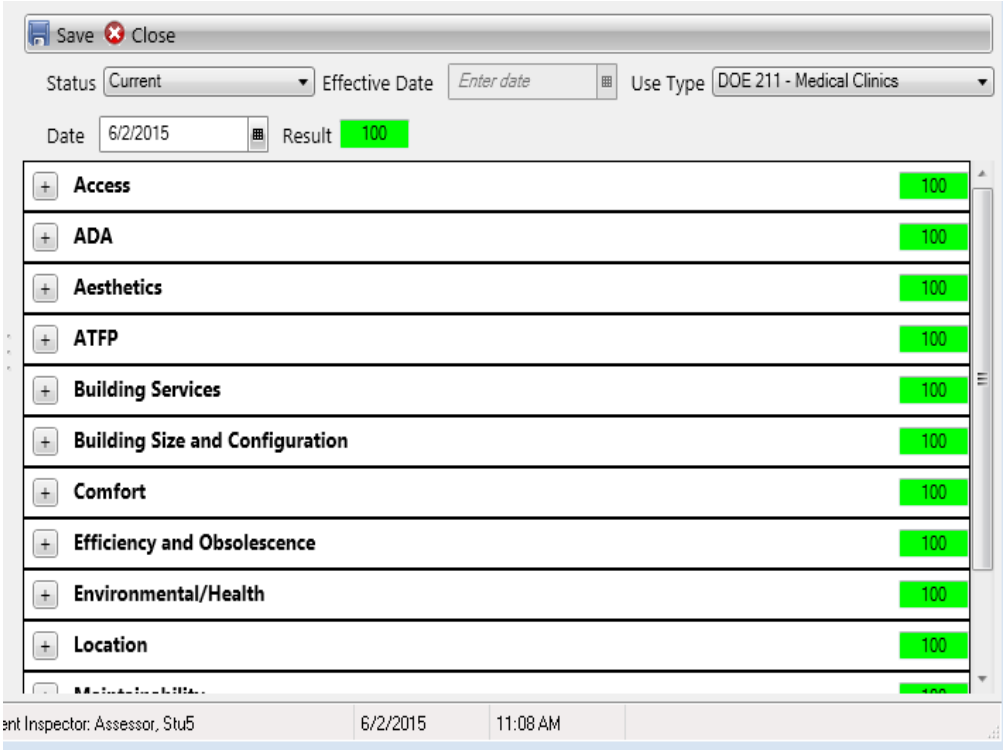
3. In the "Select Assessment Set" popup window, view the available options using the drop-down list. The baseline assessment set is called **Functionality**. There are also assessment sets for Cultural Resources and **HPSB**[1] Facility.



4. Select the **Functionality** assessment set and activate the **OK** button. Your right window pane should look similar to the image below.

5. For now, click **Save**, located above the + buttons of the list, in order to view general information available about the assessment ("Functionality Assessment Data Overview " on the next page below). Instructions continue with the section explaining how to "Fill In the Functionality Assessment" on page 113.

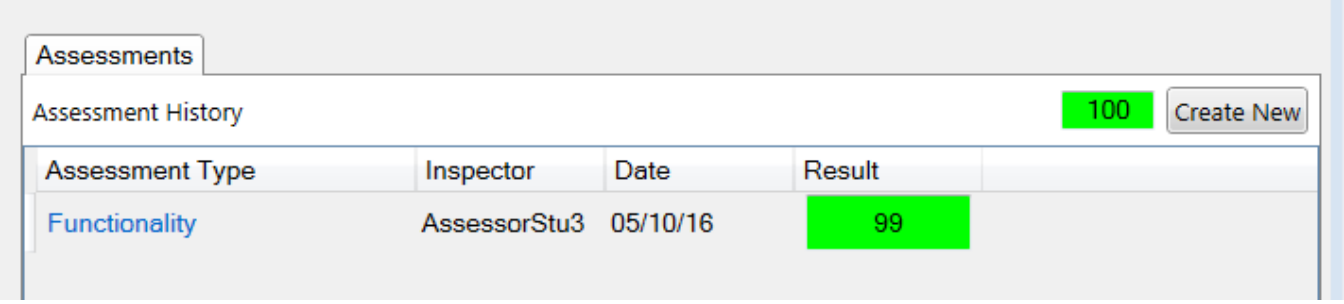
[1]High Performance and Sustainable Building



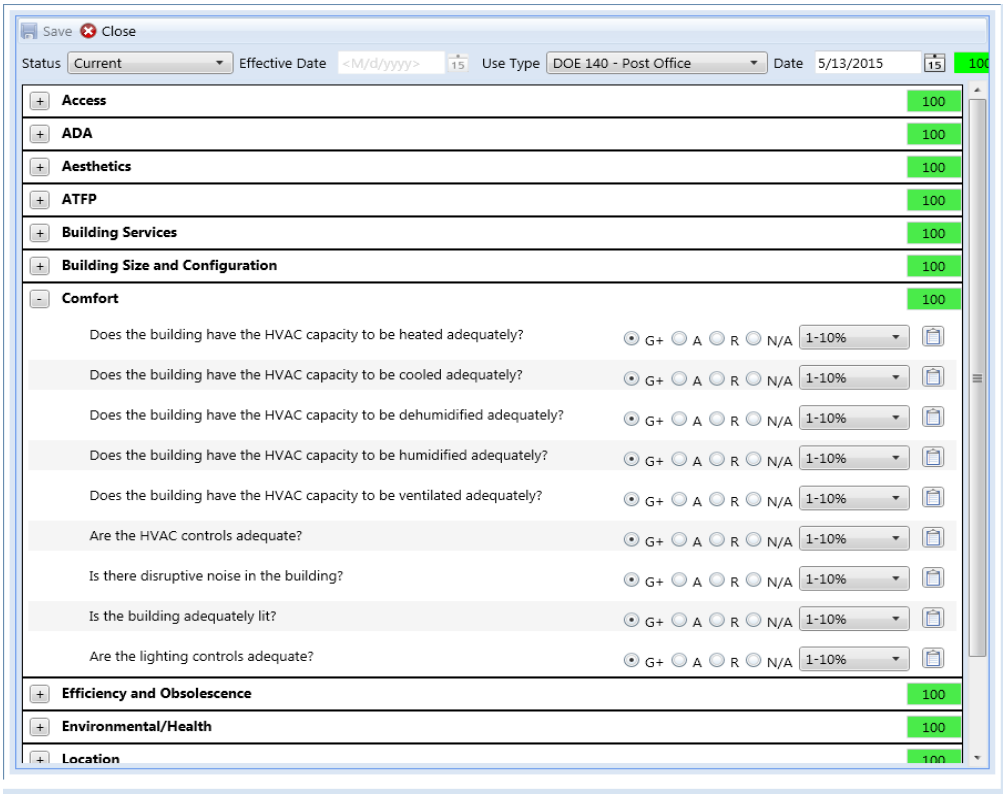
Functionality Assessment Data Overview

When a Building is selected in Functionality mode but no assessment is opened, the following will be shown at the Assessments tab:

- **Assessment Type** (Read-Only) - This will show the type of assessment(s) that have been performed on the Building: Functionality, Cultural Resources, and/or HPSB Facility.
- **Inspector** (Read-Only) - This will show the name of the Inspector who has created previous assessments.
- **Date** (Read-Only) - This is the date of the assessment.
- **Result** (Read-Only) - This is the Functionality Index of the assessment. Before assessment questions are answered, this will be 100.



Once you open a functionality assessment, the following additional data are available:

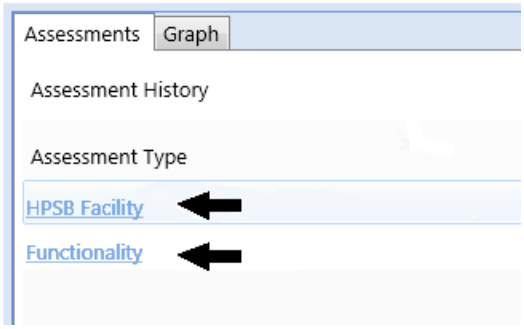


- **Issue** (Read-Only) - Displays the list of the first tier functionality issues included in BuilderRED 3.3. Expand the issues to show its sub-issues by using the "+" next to the issue. If the sub-issues are expanded, they can be collapsed by clicking the "-" next to the issue.
- **Rating** (Read-Only) - Displays the **FI**[1] rating for each issue, computed from the ratings of its sub-issues.
- **Sub-Issues** (Read-Only) - If the issue has been expanded, its sub-issues will be shown below it.
- **Sub-Issue Rating.** Enter the applicable rating data for the functionality sub-issues in the Building. The rating for each sub-issue consists of a severity color rating, along with a density range for some sub-issues. The hyperlinked text for each sub-issue provides a link to the definition and rating guidelines of the sub-issue. See also "Fill In the Functionality Assessment" below below.

Fill In the Functionality Assessment

To open an existing assessment, select it from the list of functionality assessments given at the **Assessments** tab:

[1]Functionality Index



To complete the assessment, expand issues as you go along to reveal the associated sub-issues. Click or tap a radio button to answer each sub-issue question.

> **Best Practice:** Saving your work periodically as you work through the issues and sub-issues is a good idea.

Rating Sub-Issues with Wizards

For some sub-issues, a wizard is provided to help you perform the rating for that sub-issue. To launch a wizard, click or tap the **Wizard...** link included in the sub-issue row. The wizard for that sub-issue will appear in a new window. Follow the instructions in the wizard to complete the rating. Note that you are not able to directly enter the severity color rating and density from the sub-issue grid for the sub-issues that use a wizard.

Adding or Editing Comments

By clicking or tapping the  Comment icon, you can create or edit comments for most of the sub-issue questions in the functionality assessment. A checkmark on the Comment icon indicates the presence of a comment.

Adding Images to the Assessment

Wherever you see the  Images icon, you may attach an image that supports understanding of the sub-issue and/or its assessment. A checkmark on the Images icon indicates that one or more images are already associated with the assessment.

> **Note**: The image you attach must be in one of the following formats: .png, .bmp, or .jpg/.jpeg

To attach an image,

1. Click or tap the Images icon.
2. In the "Image Attachments" popup box, click or tap the **Add Images...** button.
3. Browse to the location(s) where you have images you want to attach to the assessment.

4. Select the desired image, either with double-click, or by clicking/tapping it, then clicking/tapping **Open** in the file browser. BuilderRED will insert the image and close the file browser window.
5. Repeat steps 2 to 4 as desired. You can use the small left and right arrows to scroll through the images.
6. When finished adding image attachments, click or tap **OK**. Alternatively, click or tap **Cancel** if you don't want to add the selected image attachments.

When You Are Finished

When you are finished filling in the functionality assessment, click or tap **Save**. The program will save the assessment and close it.

First Tier Functionality Issues and Sub-Issues

As stated in the "Functionality Assessment Overview" on page 100, the first tier of the functionality assessment presents a limited set of questions that address general functionality issues throughout the Building. These questions are divided into functionality issues (italicized headings), which are further divided into sub-issues. The sub-issues are rated when "Perform a First Tier Functionality Assessment" on page 110.

The first tier of assessment addresses a total of 15 functionality issues, each with a varying number of sub-issues. Each issue and its corresponding sub-issues is listed below.

Functionality Assessment Set

The issues and sub-issues below are in the Functionality assessment set. Click on any sub-issue to see its definition.

1. *Access*
    - Entry
    - Signage
    - Egress

2. *American with Disabilities Act (ADA) Compliance*
    - Non-Grandfathered
    - Grandfathered

3. *Aesthetics*
    - Exterior Aesthetics
    - Interior Aesthetics

4. *Anti-Terrorism/Force Protection (ATFP) Compliance*
    - Requirements and Recommendations

5. *Building Services*
    - Internal Power Supply
    - Uninterruptible Power Supply (UPS)
    - Water Supply
    - Hot Water Supply
    - Specialty Water Supply
    - Plumbing Fixtures
    - Stand-Alone Wastewater Removal
    - Industrial Wastewater Removal
    - Information Technology (IT) System
    - Fuel Distribution System
    - Compressed Air System
    - Oxygen (or other gas) System
    - Security System
    - Telephone System
    - Electrical Distribution
    - Electrical Grounding
    - Electrical Outlets

6. *Building Size and Configuration*
    - Occupant Interaction
    - Overcrowding
    - Configuration

7. *Comfort*
    - Heating
    - Cooling
    - Dehumidifying
    - Humidifying
    - Ventilation
    - HVAC Controls
    - Disruptive Noise
    - Lighting
    - Lighting Controls

8. *Efficiency and Obsolescence*
    - Equipment
    - HVAC Zones
    - Lighting Fixtures
    - Lighting Controls
    - Water Conservation Mechanisms
    - Windows and Doors
    - Insulation

9. *Environmental and Health*
    - Lightning Protection
    - Asbestos
    - Indoor Air Quality (IAQ)
    - Lead Paint
    - Lead in Water
    - Polychlorinated Biphenyls (PCBs)
    - Radon
    - Fire and Smoke Warning/Detection System
    - Flammable and Combustible Material Storage
    - Fire Suppression Equipment

10. *Location*
    - Floodplain
    - Airfield Safety Clearance
    - Explosive Arc Distance
    - Excessive Noise
    - Mission Support

11. *Maintainability*
    - Design and Placement of Equipment

12. *Missing or Improper Components*
    - Needed and/or Desired Components
    - Incorrect Component Types

13. *Structural Adequacy*
    - Seismic Conditions
    - Loading Conditions

For how to perform a first tier functionality assessment, see "Perform a First Tier Functionality Assessment" on page 110.

Cultural Resources Assessment Set

The issue and sub-issues below are in the Cultural Resources assessment set. Click on any sub-issue to see its definition.

14. *Cultural Resources (Cultural Resources Assessment Set only)*
    - Programmatic Agreement/MOA/MOU
    - National Register Eligibility
    - Contributing Resource
    - Near a Historic Property

- Archeological Site
- NAGPRA Sacred Site

For how to perform a first tier functionality assessment, see "Perform a First Tier Functionality Assessment" on page 110.

HPSB Assessment Set

The following functionality issue and sub-issues are assessed at the first tier level only:

15. *High Performance and Sustainable Building Facility (**HPSB**[1] Assessment Set only)*
    - Integrated Assessment, Operation, and Management Principles
    - Energy Performance
    - Water Conservation
    - Indoor Environmental Quality

For how to perform a first tier functionality assessment, see "Perform a First Tier Functionality Assessment" on page 110.

Perform a Second Tier Functionality Assessment

Second tier functionality assessments are performed on the individual functional areas in the Building.

Prerequisites

If you have not yet taken time to "Add a Functional Area" on page 107 with the proper data, you will **not be** able to enter functionality assessment data for it.

Additionally, you should be familiar with the concepts in the "Functionality Assessment Overview" on page 100 and the "Second Tier Issues and Sub-Issues" on page 124 before performing a second tier functionality assessment.

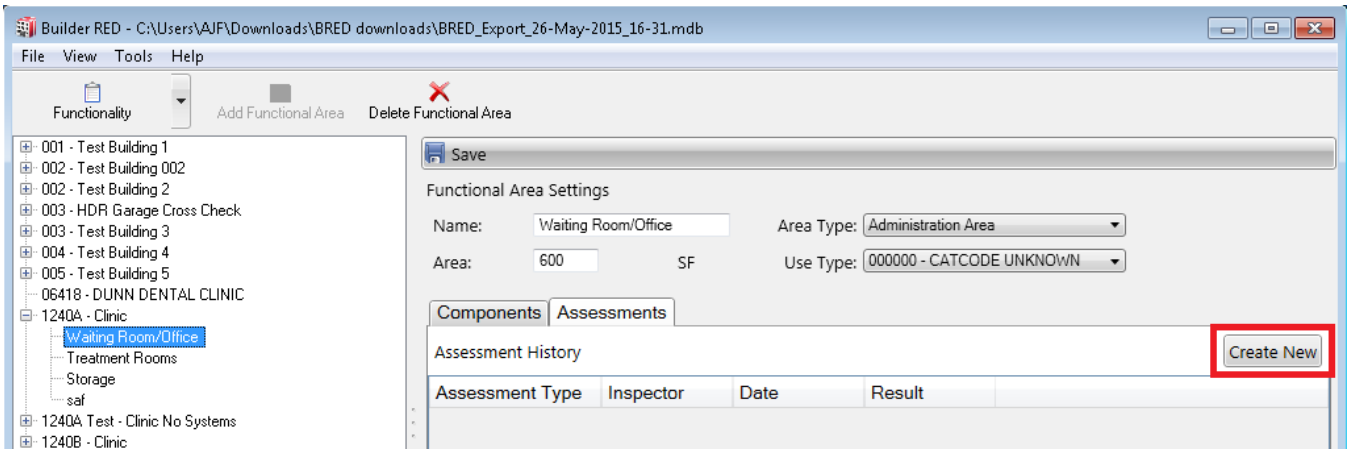
Create a Second Tier Functionality Assessment in BuilderRED

When you are ready to add or edit functionality assessment data for a functional area,

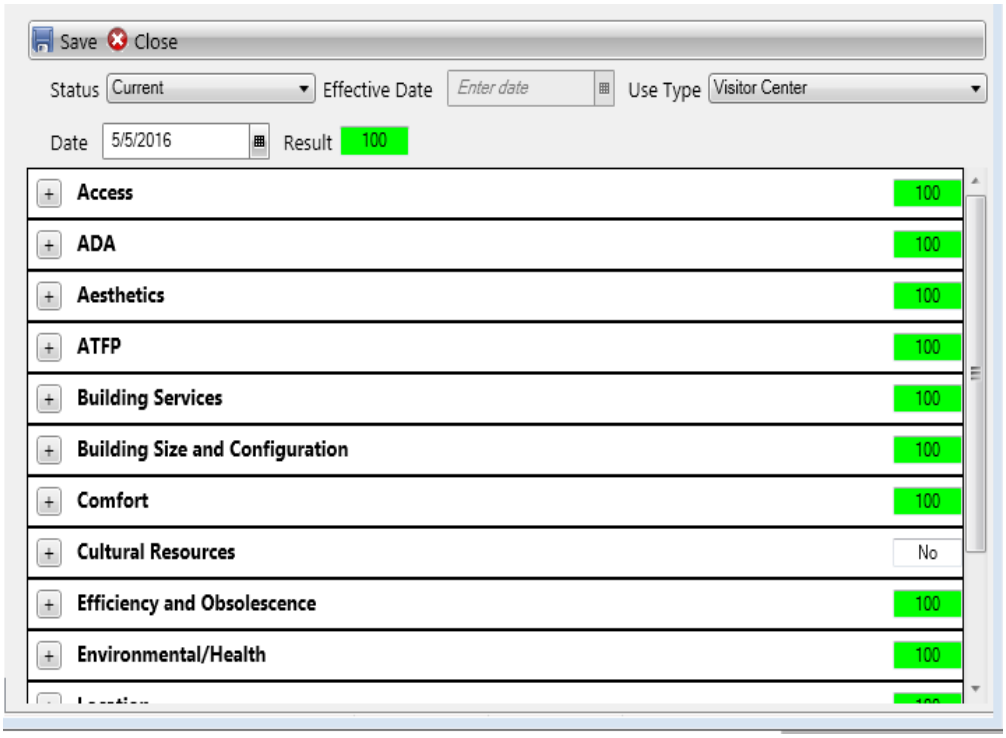
1. In BuilderRED Functionality mode, select the desired functional area in the navigation tree.
2. Activate the **Assessments** tab.
3. Activate the **Create New** button at the right side of the window.

> **Problems?** If you do not see the **Create New** button, the cause might be that you only have read privileges for this location.

[1] High Performance and Sustainable Building



4. In the "Select Assessment Set" popup window, view the available options using the drop-down list. The baseline assessment set called **Functionality**.
5. Select the **Functionality** assessment set and click **OK**. Your right window pane should look similar to the image below.



Note: At the functional area level, Cultural Resources is added as an issue in the list of Functionality issues.

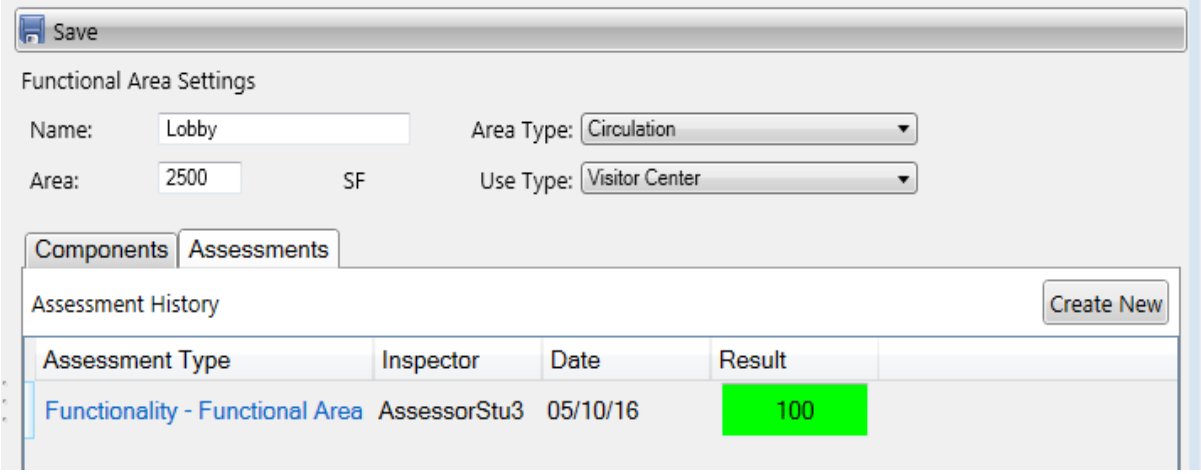
6. For now, click **Save**, located above the [+] buttons of the list, in order to view the general information about the assessment described in "Functionality Assessment Data" on the next page"Perform a Second Tier Functionality Assessment" on the previous page. Instructions

continue with the section explaining how to "Fill In the Functionality Assessment" on page 122.

Functionality Assessment Data

After a Functional Area is selected, the general data that was input when creating the Functional Area will be shown at the top of the screen:

- **Name** (Optional) - The name or a brief description of the Functional Area.
- **Area** - Size in the selected units of measurement (SF or SM)
- **Area Type (Functional Use)** (Required) - Select the functional use from the dropdown list that most closely matches the Functional Area. BuilderRED allows you to choose from 26 different Functional Area types. This field is helpful when a Functional Area is being assessed against many functional uses to determine its optimal functional use.
- **Use Type** (Required) - Select the use type from the dropdown list that most closely matches the Functional Area. If you are a Department of Defense activity, BuilderRED should display familiar category codes for your service. This filed is helpful when a Functional Area is being assessed against many use types to determine its optimal use type.



Below this data, at the **Assessments** tab, are additional data associated with functional assessments of the Functional Area:

- **Assessment Type** (Read-Only) - This will show the type of assessment(s) that have been performed on the Building: Functionality, Cultural Resources, and/or **HPSB**[1] Facility.
- **Inspector** (Read-Only) - This will show the name of the Inspector who has created previous assessments.
- **Date** (Read-Only) - This is the date of the assessment.
- **Result** (Read-Only) - This is the Functionality Index of the assessment. Before assessment questions are answered, this will be 100 .

[1]High Performance and Sustainable Building

To inspect further data, select from the list of assessments the functionality assessment you wish to see data for, and click on the link showing the assessment type. All functionality assessments that have been previously recorded will be accessible from this list, and for each of them, the inspector name and date of the inspection is provided. If you have created a new functionality assessment, the current date will be shown in the Date field.

Inside the functional assessment, the following data are repeated in the header above the list of assessment issues:

- **Status** (Required) - Select the status of the current assessment from the dropdown list. The status options available for a functionality assessment in BuilderRED 3.3 are:
  - **Current** - Sets the current functional assessment to active and is used to compute the current **FAFI**[1].
  - **Past** - Sets the current functional assessment to a past assessment. This assessment data is not used when computing the current FAFI.
  - **To Take Effect** - Sets the current functional assessment to a future year when user requirements, codes, or obsolescence are expected to change and affect the functionality of the area. These assessments are particularly useful to use when running Scenarios.

- **Effective Date** (Conditional) - Enter the year the status of the assessment will become active, or effective in the Functional Area. This field will be operational only if the **Status** is set to **To Take Effect**. Enter the date in the field provided, or else click on the calendar to select a date from the calendar.
- **Use Type** (Required) - Select the use type from the dropdown list that most closely matches the Functional Area. If you are a Department of Defense activity, BuilderRED should display familiar category codes for your service. This filed is helpful when a Functional Area is being assessed against many use types to determine its optimal use type.
- **Date** (Required) - Shows the date the assessment was created. Changes may be made to the assessment only within a 30-day window from this date.

  Note: the 30-day deadline is something that an Administrator can change based on local policy. It may be that your change window is shorter.

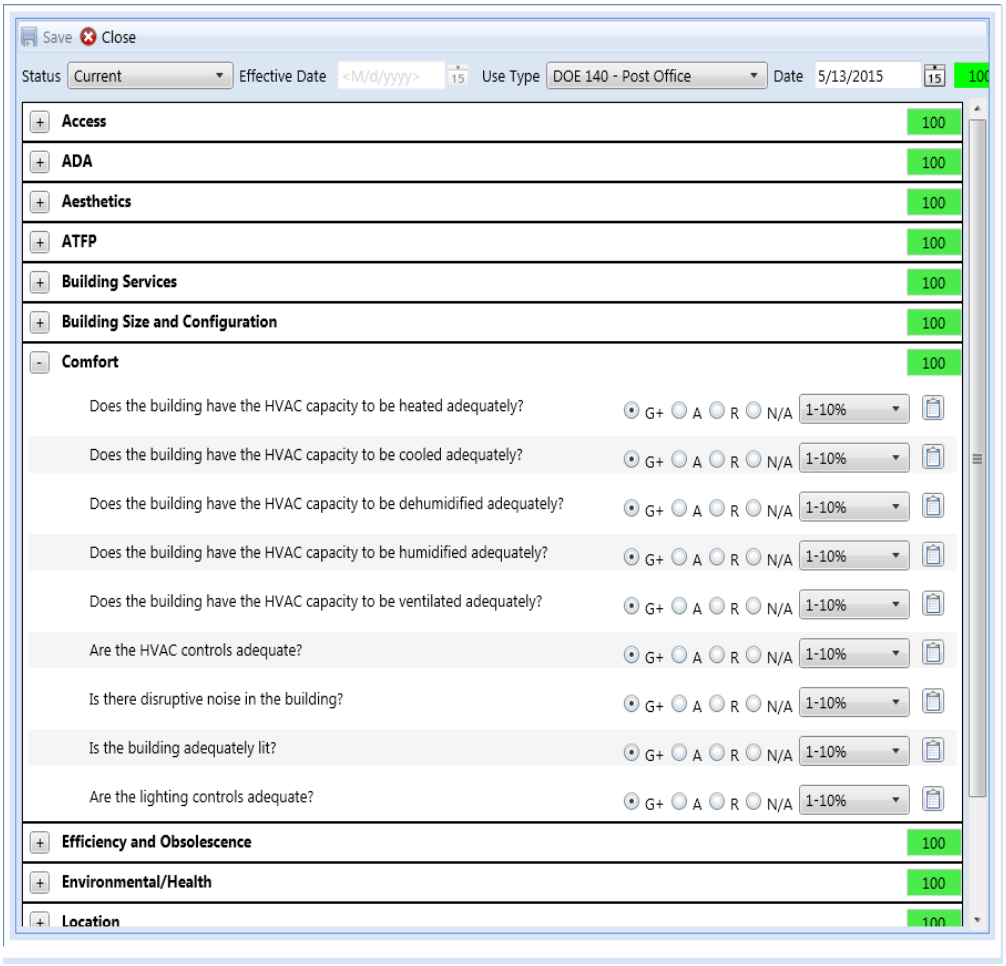
- **Assessment FAFI** (Read-Only) - Displays the **FAFI**[2], computed based on the data recorded for the assessment currently selected. Before assessment questions are answered, this will be 100 .

The actual assessment data is displayed and recorded in the grid in the lower portion of the screen and includes:

---

[1]Functional Area Functionality Index
[2]Functional Area Functionality Index

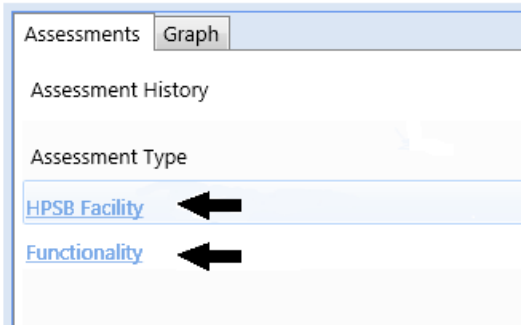
- **Issue/Sub-issues** (Read-Only) - Displays the 13 second tier functionality issues included in the assessment. Expand an issue to show its sub-issues by clicking or tapping the "+" next to the issue. If the sub-issues are expanded, they can be collapsed by clicking or tapping the "-" next to the issue.
- **Rating** (Read-Only) - Displays the **FI**[1] rating for the issue computed from the ratings of its sub-issues.



Fill In the Functionality Assessment

To open an existing assessment, select it from the list of functionality assessments given at the **Assessments** tab:

[1]Functionality Index



To complete the assessment, expand issues as you go along to reveal the associated sub-issues. Click or tap a radio button to answer each sub-issue question.

> **Best Practice:** Saving your work periodically as you work through the issues and sub-issues is a good idea.

Rating Sub-Issues with Wizards

For some sub-issues, a wizard is provided to help you perform the rating for that sub-issue. To launch a wizard, click or tap the **Wizard...** link included in the sub-issue row. The wizard for that sub-issue will appear in a new window. Follow the instructions in the wizard to complete the rating. Note that you are not able to directly enter the severity color rating and density from the sub-issue grid for the sub-issues that use a wizard.

Adding or Editing Comments

By clicking or tapping the  Comment icon, you can create or edit comments for most of the sub-issue questions in the functionality assessment. A checkmark on the Comment icon indicates the presence of a comment.

Adding Images to the Assessment

Wherever you see the  Images icon, you may attach an image that supports understanding of the sub-issue and/or its assessment. A checkmark on the Images icon indicates that one or more images are already associated with the assessment.

> **Note**: The image you attach must be in one of the following formats: .png, .bmp, or .jpg/.jpeg

To attach an image,

1. Click or tap the Images icon.
2. In the "Image Attachments" popup box, click or tap the **Add Images...** button.
3. Browse to the location(s) where you have images you want to attach to the assessment.

4. Select the desired image, either with double-click, or by clicking/tapping it, then clicking/tapping **Open** in the file browser. BuilderRED will insert the image and close the file browser window.
5. Repeat steps 2 to 4 as desired. You can use the small left and right arrows to scroll through the images.
6. When finished adding image attachments, click or tap **OK**. Alternatively, click or tap **Cancel** if you don't want to add the selected image attachments.

When You Are Finished

When you are finished filling in the functionality assessment, click or tap **Save**. The program will save the assessment and close it.

Second Tier Issues and Sub-Issues

As stated in the "Functionality Assessment Overview" on page 100, the second tier of functionality assessment is a methodical assessment of a Building's functional areas. As in the first tier of assessment, questions are divided into functionality issues (*italicized headings*), which are further divided into sub-issues. The sub-issues are rated when you "Perform a Second Tier Functionality Assessment" on page 118.

The second tier of assessment addresses 14 functionality issues (In comparison the list of functionality issues at the first tier, Building level, Cultural Resources has been added as an issue within the Functionality functionality set at the functional area level), each with a varying number of sub-issues. Each issue and its associated sub-issues is listed below.

Click on any sub-issue to see its definition.

1. *Access*

- Entry
- Signage
- Exit (Egress)

2. *American with Disabilities Act (ADA) Compliance*

- Non-Grandfathered
- Grandfathered

3. *Aesthetics*

- Aesthetics

4. *Anti-Terrorism/Force Protection (ATFP) Compliance*

- Requirements and Recommendations

5. *Building Services*

- Internal Power Supply
- Uninterruptible Power Supply (UPS)
- Water Supply
- Hot Water Supply
- Specialty Water Supply
- Plumbing Fixtures
- Stand-Alone Wastewater Removal
- Industrial Wastewater Removal
- Information Technology (IT) System
- Fuel Distribution System
- Oxygen (or other gas) System
- Compressed Air System
- Security System
- Telephone System
- Electrical Distribution
- Electrical Grounding
- Electrical Outlets

6. *Building Size and Configuration*

- Occupant Interaction
- Overcrowding
- Configuration

7. *Comfort*

- Heating
- Cooling
- Dehumidifying
- Humidifying
- Ventilation
- HVAC Controls
- Disruptive Noise
- Lighting
- Lighting Controls

8. *Cultural Resources*

- Programmatic Agreement/MOA/MOU
- National Register Eligibility
- Contributing Resource
- Near a Historic Property
- Archeological Site
- NAGPRA Sacred Site

9. *Efficiency and Obsolescence*

- Equipment
- HVAC Zones
- Lighting Fixtures
- Lighting Controls
- Water Conservation Mechanisms
- Windows and Doors
- Insulation

10. *Environmental and Health*

- Lightning Protection
- Asbestos
- Indoor Air Quality (IAQ)
- Lead Paint
- Lead in Water
- Polychlorinated Biphenyls (PCBs)
- Radon
- Fire and Smoke Warning/Detection System
- Flammable and Combustible Material Storage
- Fire Suppression Equipment

11. *Location*

- Mission Support

12. *Maintainability*

- Design and Placement of Equipment

13. *Missing or Improper Components*

- Needed and/or Desired Components
- Incorrect Component Types

14. *Structural Adequacy*

- Loading Conditions
- Seismic Conditions

For how to perform a second tier functionality assessment, see "Perform a Second Tier Functionality Assessment" on page 118.

Sub-Issue Definitions

For a description of each functionality sub-issue, consult the Appendixes. In Appendix H, sub-issues are listed alphabetically by issue first, then sub-issue.

Functionality Assessment Wizards Overview

For some of the more complex issues in the Functionality issues, "wizards" have been created to assist with entering the functionality assessment. All of the wizards are available for functionality assessments performed at the Building level; some are also available for functionality assessments performed at the functional area level.

Building-Level Wizards

The Wizards that are currently operational at the Building level appear in various functionality sets:

Cultural Resources Functionality Set

- Cultural Resources Wizard for the **Cultural Resources** functionality set

HPSB Functionality Set

- **HPSB**[1] (High Performance Sustainable Building) Wizard

Functionality Functionality Set

- "Americans with Disabilities Act (ADA) Compliance Wizard" on the next page
- "Anti-Terrorism/Force Protection (ATFP) Wizard" on page 131.

  Note: The ATFP Wizard steps through questions one at a time, and the assortment of questions will depend on the yes/no answers given during the process of completing the Wizard.

- "Equipment Efficiency Wizard" on page 137 (a sub-issue of Efficiency and Obsolescence)

  Note: The pop-up window for this Wizard will appear blank if there is no pertinent equipment entered in the Building's inventory.

- "Maintainability Wizard" on page 146

  Note: The pop-up window for this Wizard will appear blank if there are no pertinent Sections entered in the Building's inventory.

- "Missing Components Wizard" on page 148 (sub-issue of Missing or Improper Component Types). In the listing of functionality sub-issues provided in the Appendixes, the title is "Needed or Desired Components."

[1] High Performance and Sustainable Building

Functional Area-Level Wizards

In BuilderRED, the only functionality set that is aimed at the level of the functional area is the Functionality functionality set. However, Cultural Resources can also be evaluated at the functional area level as an additional issue contained in the Functionality functionality set.

Nonfunctioning Wizards

The following Wizards in the **Functionality** functionality set are currently not functioning, either at the Building or the functional area level:

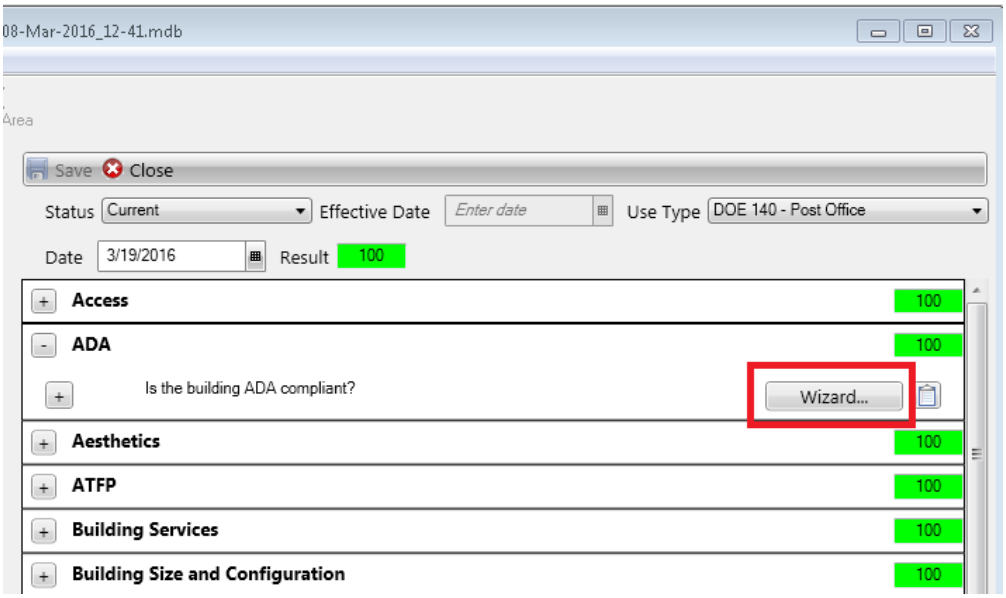
- "Egress Wizard" on page 139 (a sub-issue of Access)
- "Incorrect Component Wizard" on page 143 (sub-issue of Missing or Improper Component Types).
- "Seismic Wizard" on page 150 (sub-issue of Structural Adequacy).

Americans with Disabilities Act (ADA) Compliance Wizard

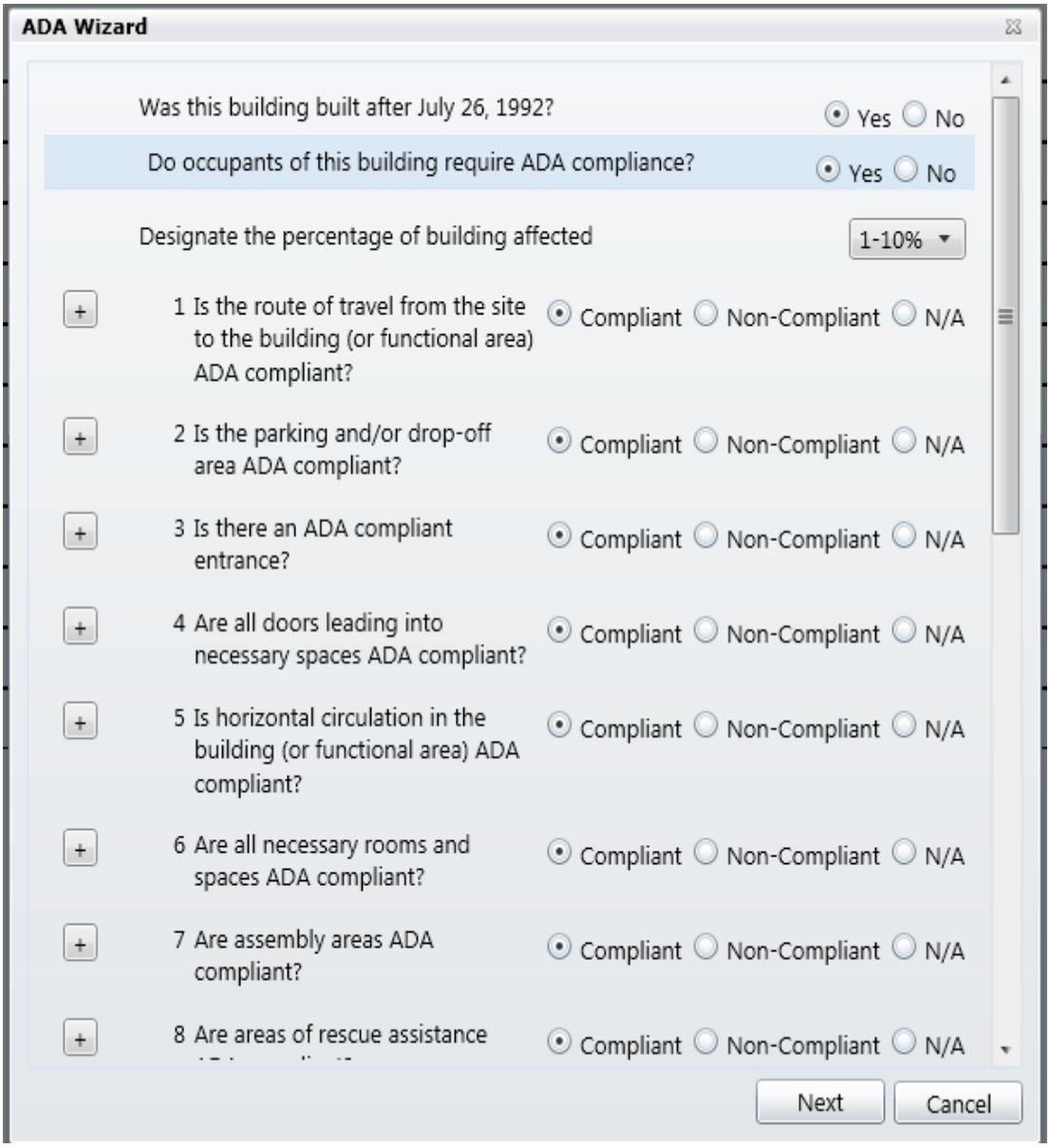
When performing a first tier or second tier functionality assessment, some of the issues or sub-issues employ a wizard to determine the rating. ADA Compliance is such an issue.

To open the ADA Wizard,

1. Activate the "+" button next to **ADA** in the list of functionality issues. This will expand the issue to reveal the **Wizard...** button.
2. Activate the **Wizard...** button.



The ADA Wizard will appear in a new window.



In the wizard, you will answer questions regarding the ADA compliance required in your Building or functional area. Answering these questions will determine whether your building or functional area is grandfathered from ADA compliance or not.

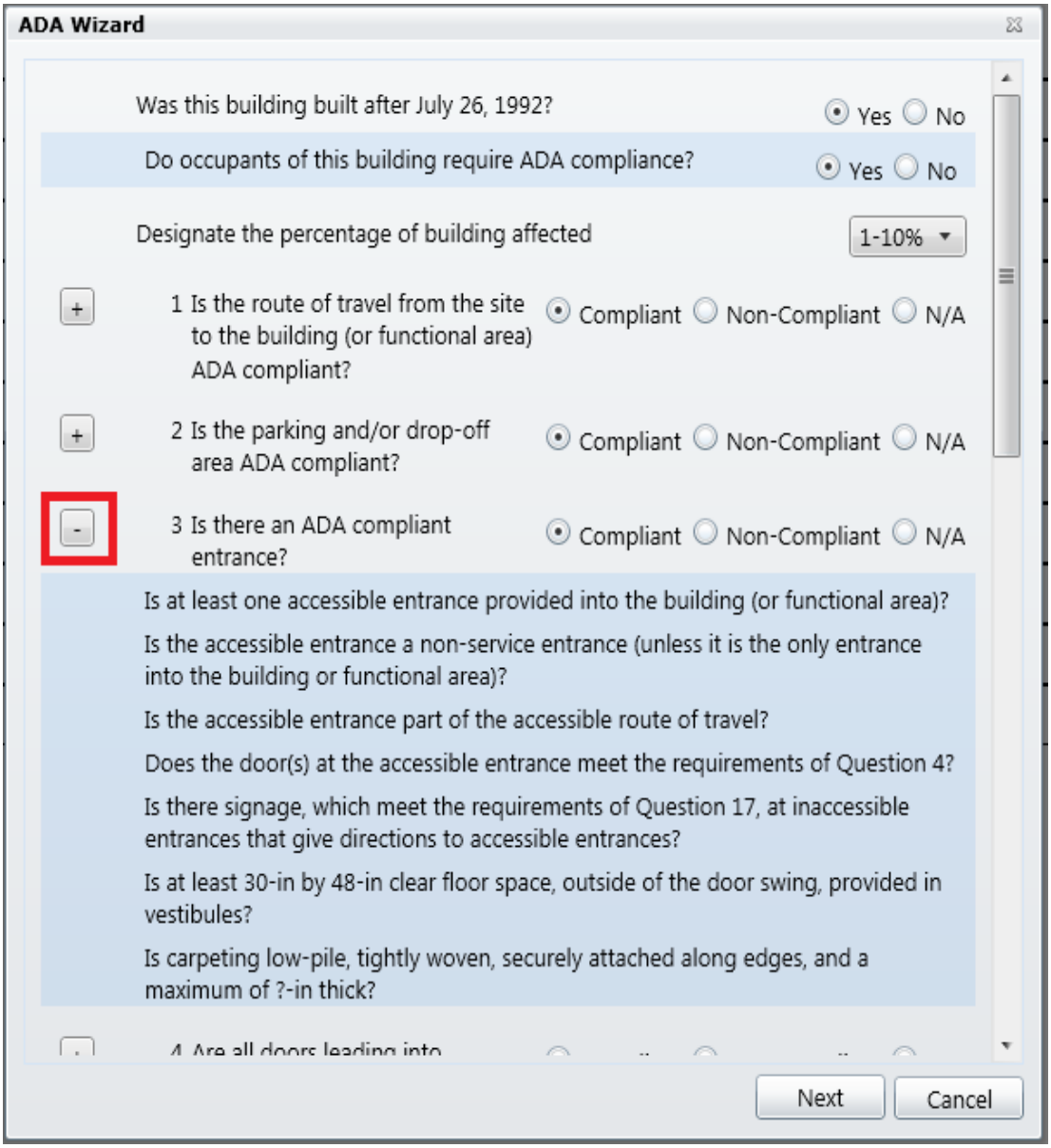
Note: You have the option to enter a comment regarding any of the questions listed.

The questions in the first group, starting with "Was this building built after July 26, 1992?", are unnumbered.

For the numbered questions that follow, answer as either "Compliant", "Non-Compliant", or "**N/A**[1]".

If you need help determining whether your building meets an individual (numbered) requirement listed, do one of the following:

a. Activate the "+" button to the left of the question you are having difficulty answering. and further information will be provided in greater detail.
b. Alternatively, consult the "Appendix I: Americans with Disabilities Act (ADA) Checklist" on page 307, which lists all the details for all of the numbered questions in one place.



[1]Not Applicable

After completing the ADA Wizard questions, activate the **Next** button at the bottom of the popup window to proceed. A score page will appear, showing a color rating based on the data entered.

If, after activating the **Next** button, you wish to change any of the data you recorded, then do the following:

1. Activate the **Previous** button at the bottom of the score page in the popup window.
2. Change the necessary data on the page of questions.
3. Activate **Next** when finished.

To save the results of the Wizard, activate the **OK** button.

Alternatively, activate the **Cancel** button at the bottom of the popup window if you wish to (1) discard the results without saving and (2) exit the wizard.

> **Note:** When you have completed all of the questions for the full assessment set, be sure to also activate **Save** on the content area toolbar.

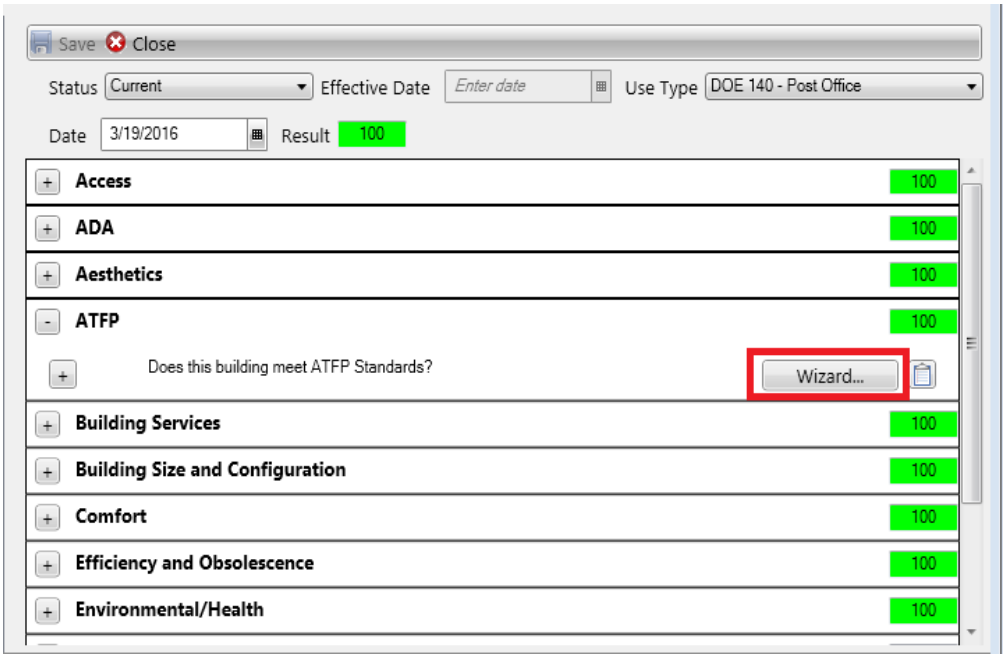
Anti-Terrorism/Force Protection (ATFP) Wizard

When performing a first tier or second tier functionality assessment, some of the issues or sub-issues employ a wizard to determine the rating. The ATFP requirements and recommendations, a sub-issue of Anti-Terrorism/Force Protection (ATFP) Compliance, is one of those sub-issues.

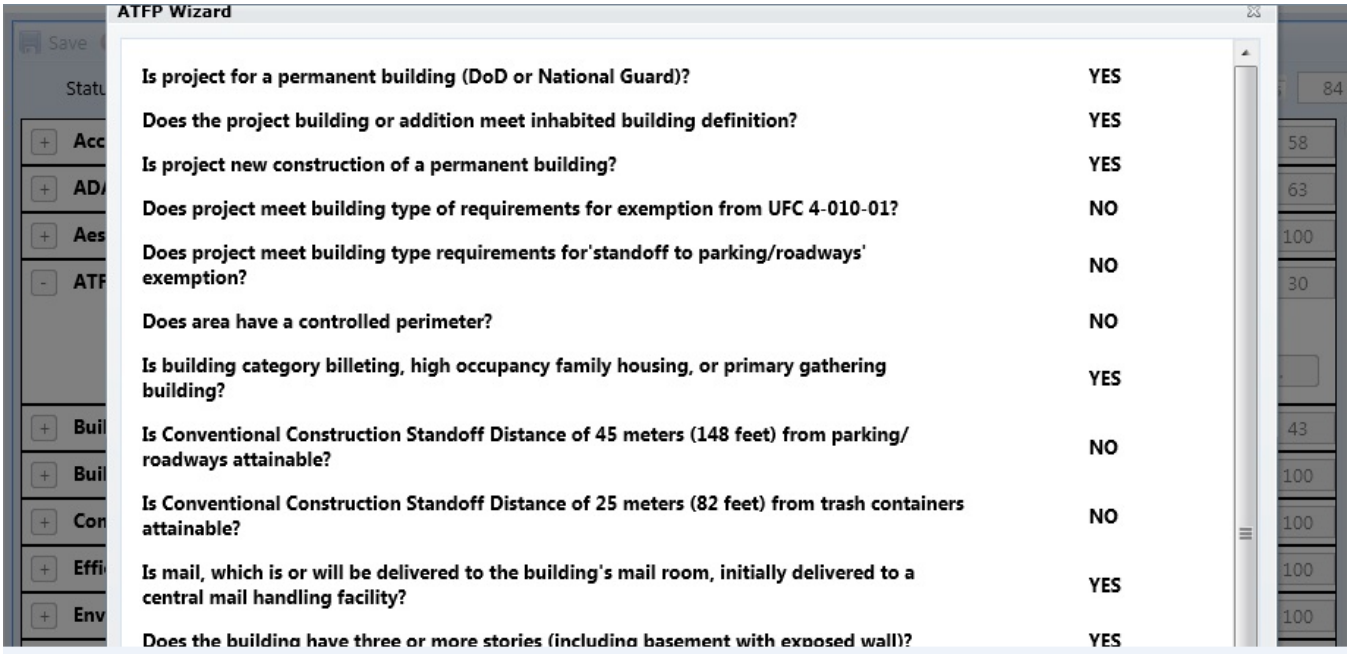
> **Note:** This overview is intended to be used as reference, not as the governing document, when comparing a building against the standards. The ATFP requirements and recommendations are based on the DoD Minimum Antiterrorism Standards for Buildings (UFC 4-010-01). For the complete version of the UFC 4-010-01 document, see https://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf. Some of this information is listed in "ATFP Appendix B " on page 316, "ATFP Appendix C " on page 324, "ATFP Appendix D" on page 327, and "FA ATFP Notes" on page 329.

To open the ATFP Wizard,

1. Activate the "+" button next to **ATFP** in the list of functionality issues. This will expand the issue to reveal the **Wizard...** button.
2. Activate the **Wizard...** button.



The ATFP Wizard will appear in a new window.



The first step in the wizard is to answer all of the applicable questions regarding the ATFP requirements for your Building or functional area. Answering these questions will determine which standards apply to your Building, which standards are requirements, and which standards are recommendations.

If you wish to change any of the data while you are still on the page of questions, activate the **Reset** button.

To record the results of the wizard, activate the **Next** button at the bottom of the popup window to proceed. A score page will appear, showing a color rating based on the data entered.

If, after activating the **Next** button, you wish to change any of the data you recorded, then do the following:

1. Activate the **Previous** (**Back**) button at the bottom of the score page in the popup window.
2. Change the necessary data on the page of questions.
3. Activate **Next** when finished.

To save the results of the Wizard, activate the **OK** button.

Alternatively, activate the **Cancel** button at the bottom of the popup window if you wish to (1) discard the results without saving and (2) exit the wizard.

> **Note:** When you have completed all of the questions for the full assessment set, be sure to also activate **Save** on the content area toolbar.

Cultural Resources Wizard

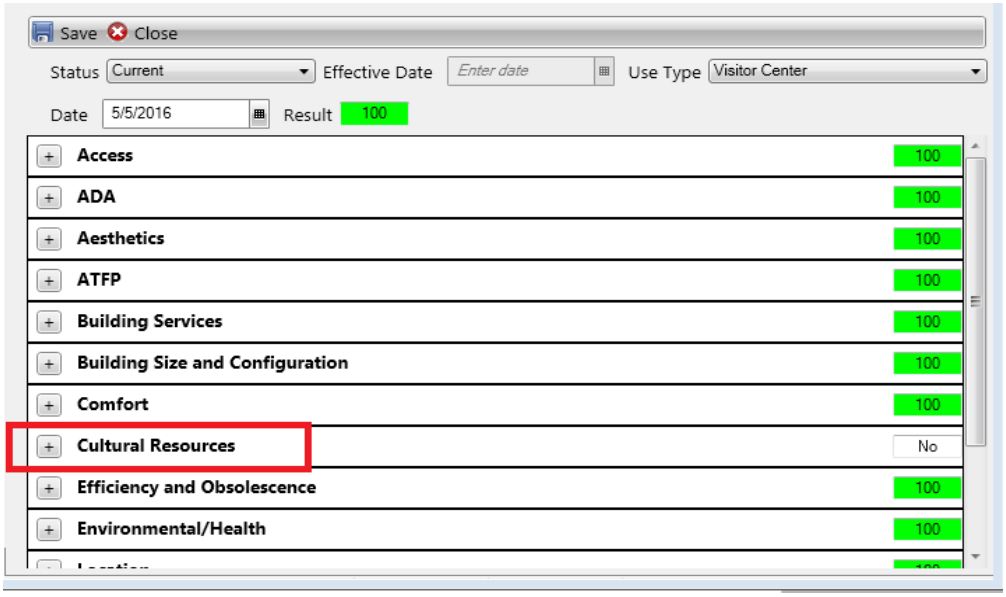
When performing a functionality assessment, some of the issues or sub-issues employ a wizard to determine the rating. At the functional area level, the cultural resources/historical aspects sub-issue, which is a sub-issue of the Cultural Resources issue, is one of those sub-issues. At the Building level, Cultural Resources is a stand-alone assessment set.

Open the Cultural Resources Wizard

In a Second Tier Assessment

To open the Cultural Resources wizard while at the functional area level, as an issue in the Functionality functionality assessment set,

1. Activate the "+" button next to **Cultural Resources** in the list of functionality issues. This will expand the issue to reveal the **Wizard...** button.

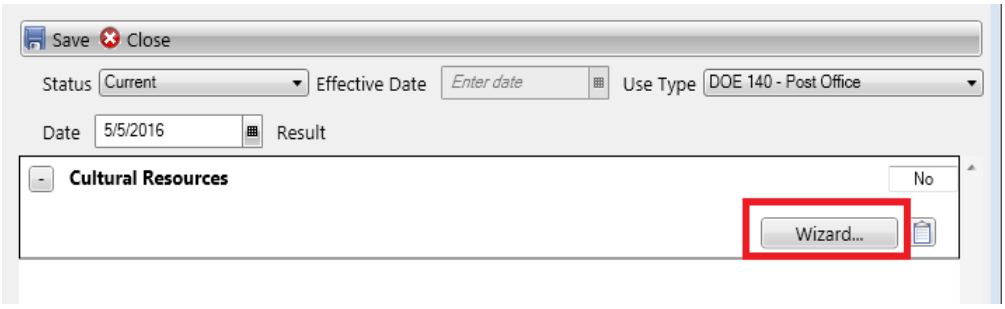


2. Activate the **Wizard...** button.

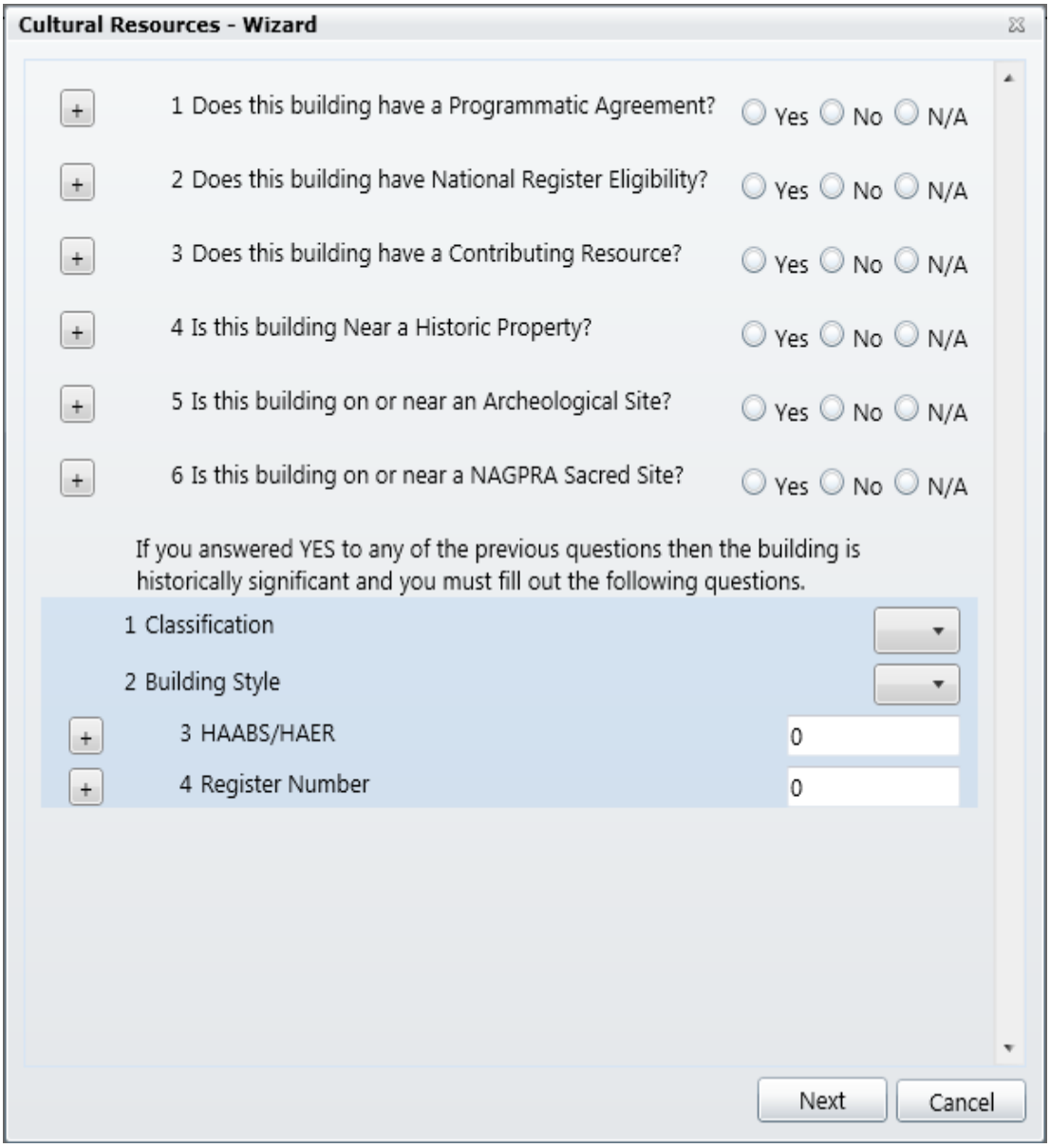
As a First Tier Assessment Set

Alternatively, to open the Cultural Resources wizard at the Building level, where Cultural Resources is a stand-alone assessment set,

1. In Functionality mode, navigate to the desired Building and select it.
2. At the **Assessments** tab in the right-hand pane, activate the **Create New** button. The "Select Assessment Set" popup will appear.
3. Select "Cultural Resources" from the dropdown list and activate the **OK** button.
4. The **Cultural Resources** issue should appear in expanded position, with the **Wizard...** button showing. If not expanded, activate the "+" next to **Cultural Resources**. This will expand the issue to reveal the **Wizard...** button.
5. Activate the **Wizard...** button.

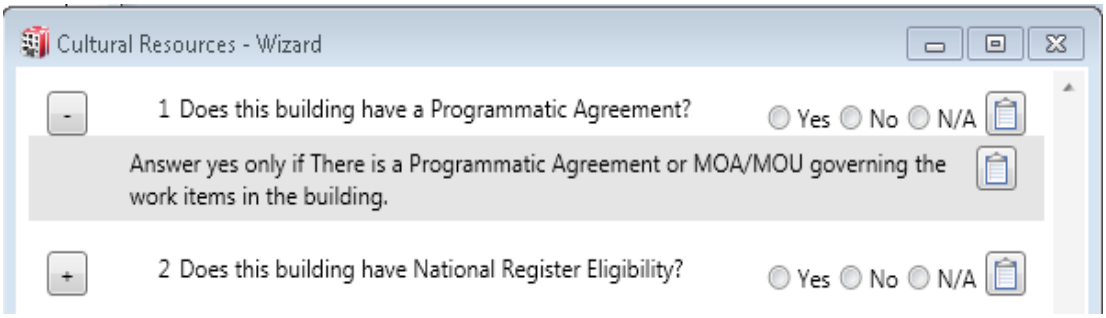


The Cultural Resources Wizard will appear in a new window.



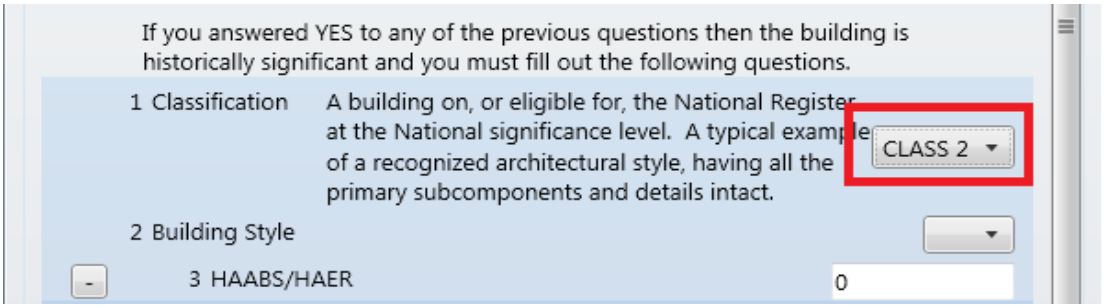
Complete the Cultural Resources Wizard

The wizard will present a series of questions to determine whether the Building is a cultural resource. If you are unsure about the meaning of a question, you can click or tap the "+" button to the left of the question to get further explanation:



If any of the bullet items in the list of questions are marked "Yes" were marked in the checklist, the following data must be recorded:

1. **Classification.** Select the historic classification of the Building from the dropdown list. When you select a classification (CLASS), an explanation will appear; thus you may browse the list of classifications to help you select the correct one.



2. **Building Style.** Select the building style from the dropdown list.
3. **HABS/HAER.** If HABS/HAER documentation has been submitted for this Building, note identification/registration numbers here. Click the "+" button for more detail.
4. **Register Number.** If the Building is listed on the National Register, enter its register number.

The Cultural Resources Score

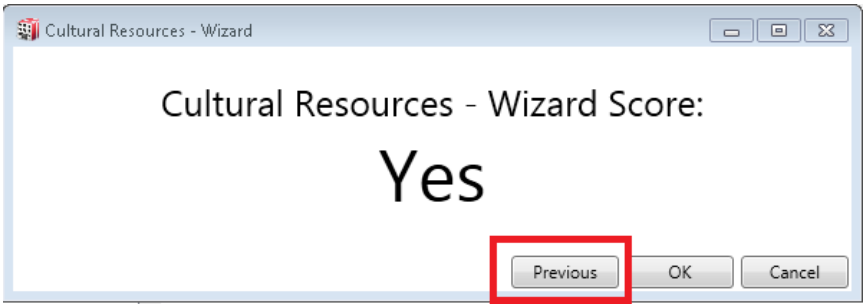
After completing the wizard questions, activate the **Next** button at the bottom of the popup window to proceed. A score page will appear, showing a score of "Yes", "No", or "**N/A**[1]".

How to Make Changes to the Data

If, after activating the **Next** button, you wish to change any of the data you recorded, then do the following:

[1]Not Applicable

1. Activate the **Previous** button at the bottom of the score page in the popup window.



2. Change the necessary data on the page of questions.
3. Activate **Next** when finished.

Save the Results

To save the results of the Wizard, activate the **OK** button.

> **Note:** When you have completed all of the questions for the full assessment set, be sure to also activate **Save** on the content area toolbar:

Exit Without Saving

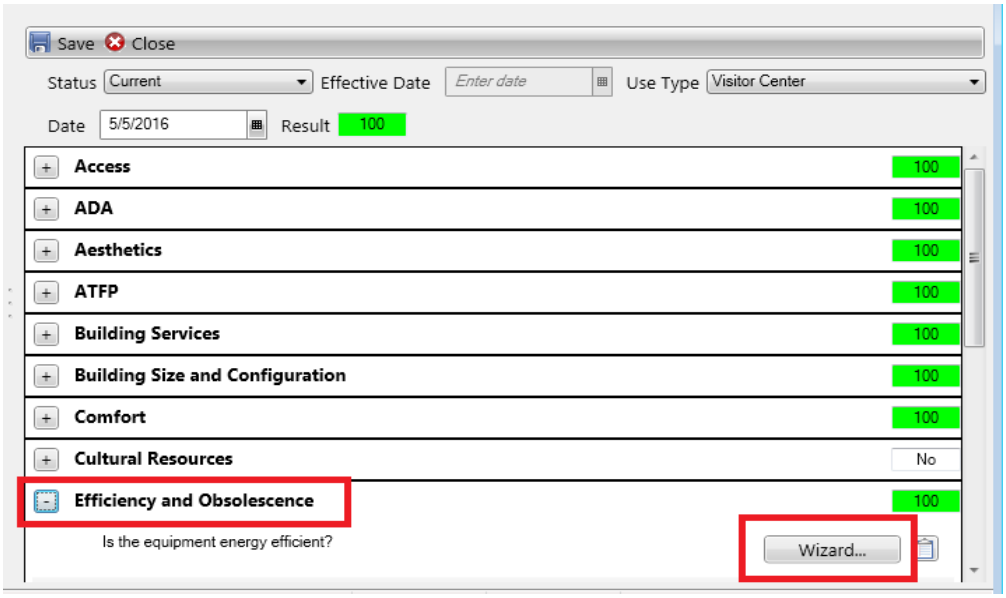
Alternatively, activate the **Cancel** button at the bottom of the popup window if you wish to (1) discard the results without saving and (2) exit the wizard.

Equipment Efficiency Wizard

When performing a first tier or second tier functionality assessment, some of the issues or sub-issues employ a wizard to determine the rating. The equipment efficiency sub-issue, which is a sub-issue of the Efficiency and Obsolescence functionality issue, is one of those sub-issues.

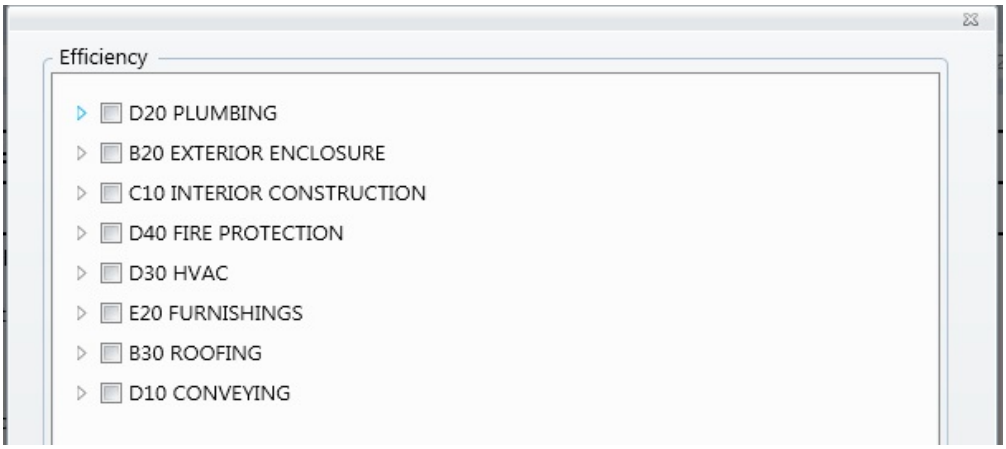
To open the Efficiency Wizard,

1. Activate the "+" button next to **Efficiency and Obsolescence** in the list of functionality issues. This will expand the issue to reveal the sub-issues.
2. Activate the **Wizard...** button next to the sub-issue question "Is the equipment energy efficient?"



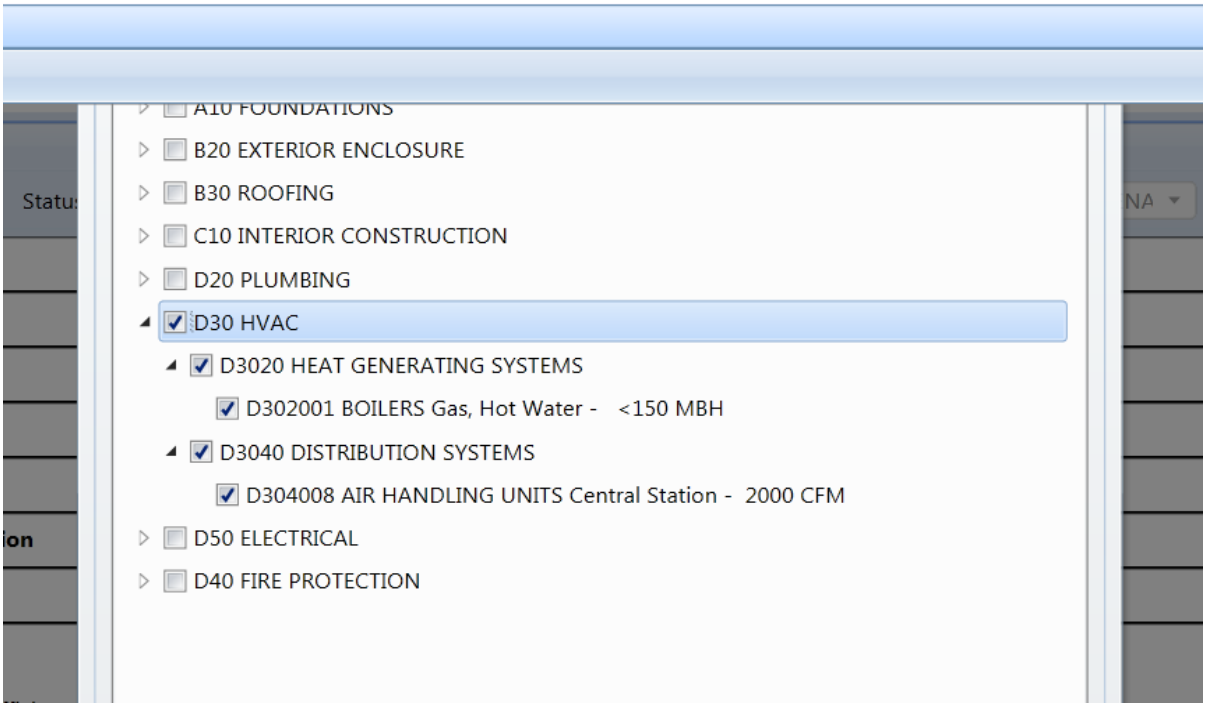
The Efficiency Wizard will appear in a new window. It will show all of the equipment inventory in the Building in a tree that can be expanded down to the Section level.

> **IMPORTANT:** If you have no Systems entered in your inventory, the "Efficiency - Wizard" popup will be blank.



To complete the Efficiency Wizard, do the following:

On the tree, mark the check boxes next to the inventoried equipment that is inefficient. The equipment can be marked at the System, Component, or Section level. That is, if the entire HVAC System is inefficient, simply mark the checkbox next to the HVAC System on the tree; all of the Components and Sections in the HVAC System will be marked as inefficient. Similarly, if a Component is marked as inefficient, all of its Sections will be marked as inefficient.



After all of the inefficient equipment has been marked in the tree, activate the **Next** button at the bottom of the popup window to proceed. A score page will appear, showing a color rating based on the data entered.

If, after activating the **Next** button, you wish to change any of the data you recorded, then do the following:

1. Activate the **Previous** button at the bottom of the score page in the popup window.
2. Change the necessary data in the tree.
3. Activate **Next** when finished.

To save the results of the Wizard, activate the **OK** button.

Alternatively, activate the **Cancel** button at the bottom of the popup window if you wish to (1) discard the results without saving and (2)exit the wizard.

> **Note:** When you have completed all of the questions for the full assessment set, be sure to also activate **Save** on the content area toolbar.

Egress Wizard

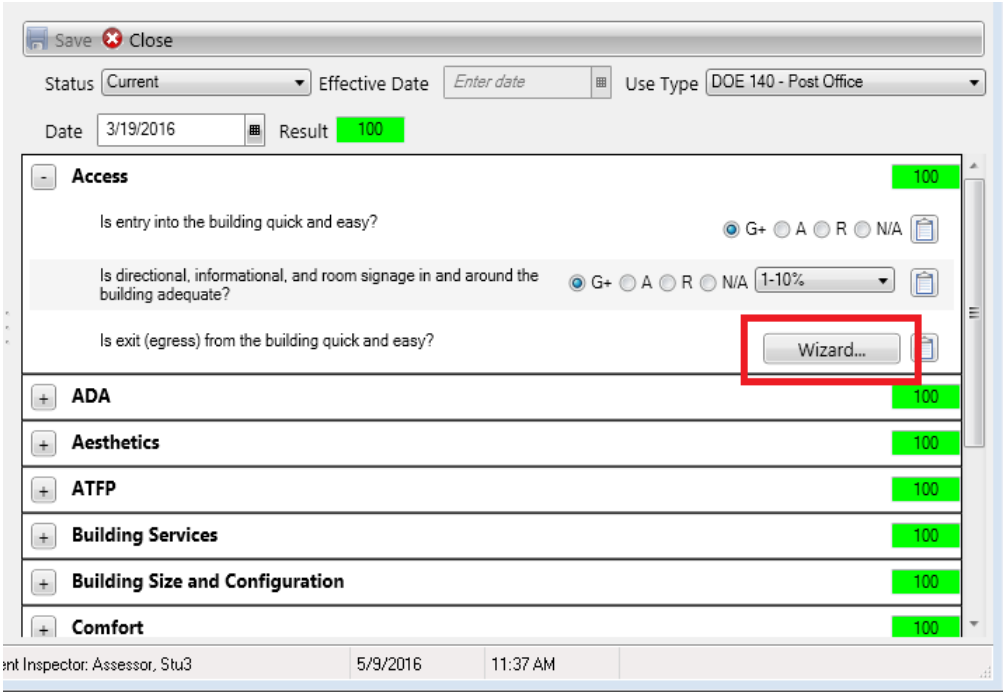
***** This Wizard is not currently functional *****

When performing a first tier or second tier functionality assessment, some of the issues or sub-issues employ a wizard to determine the rating. The egress sub-issue, which is a sub-issue of the

Access issue, is one of those sub-issues.

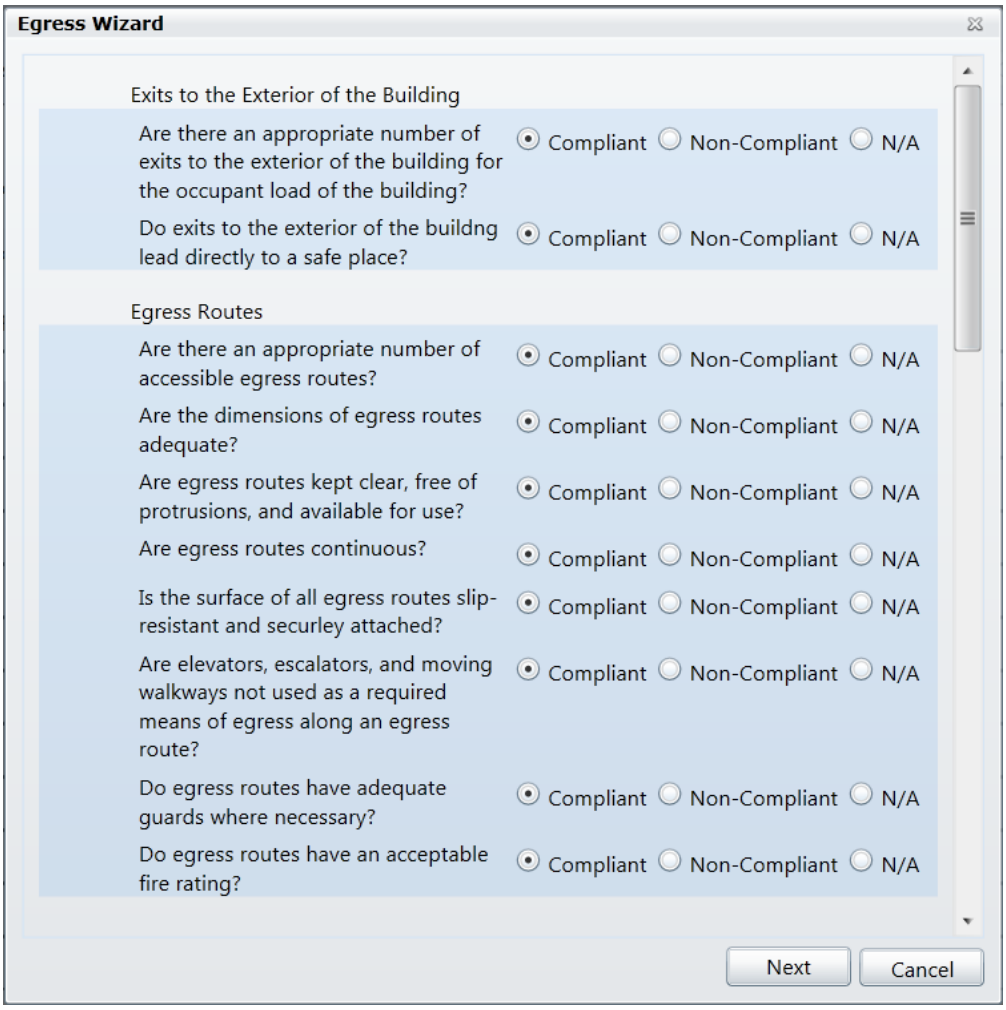
To open the Egress Wizard,

1. Activate the "+" button next to **Access** in the list of functionality issues. This will expand the issue to reveal the sub-issues.
2. Activate the **Wizard...** button next to the sub-issue question "Is exit (egress) from the building quick and easy?"
3. If the **Wizard...** button is not showing, look for a "+" button to the left of the sub-issue question "Is exit (egress) from the building quick and easy?"



The Egress Wizard will appear in a new window.

Alternatively, the questions mingt be presented in a series that is progressively unpacked using "+" buttons. At the lowest level, a "+" button will show further detail instead of a sub-question.



The Egress Wizard consists of 5 pages of checklists to determine if egress from the building (or functional area) is adequate. The 5 checklist categories are:

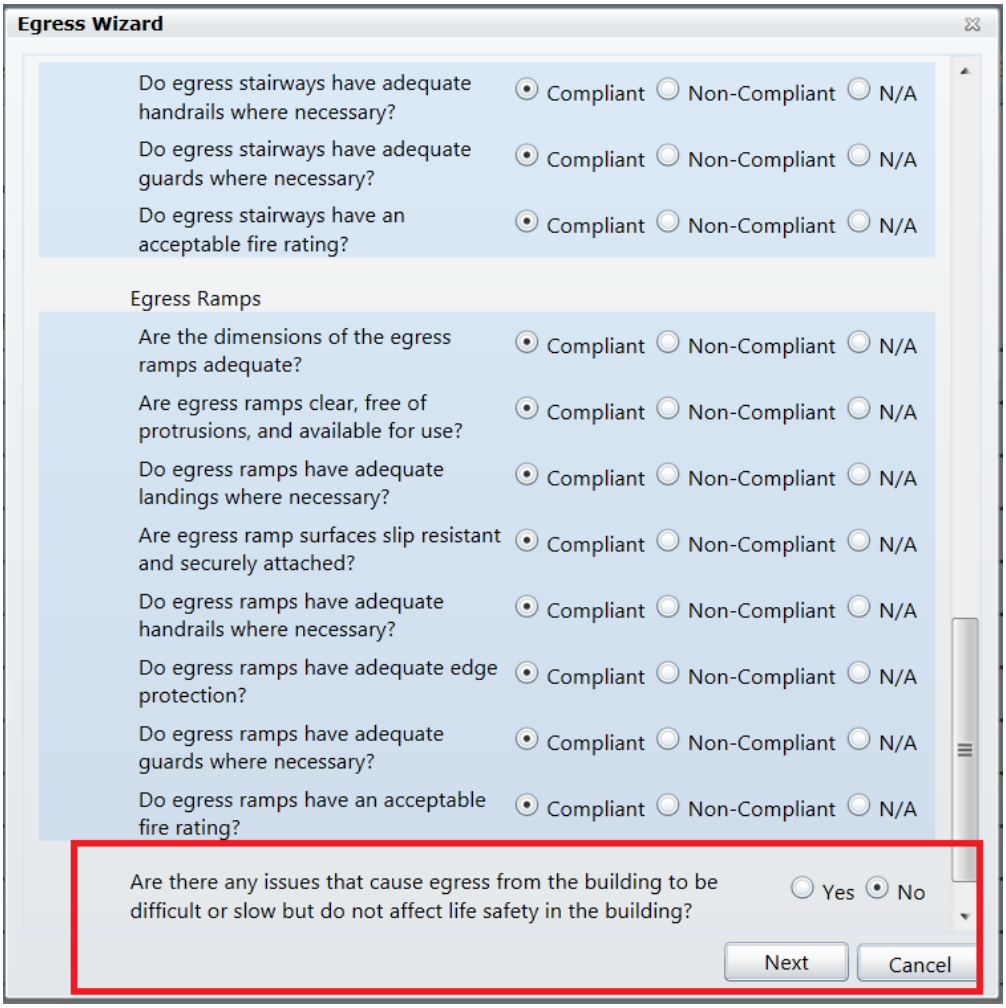
- Exits to the Exterior of the Building
- Egress Routes
- Egress Doors
- Egress Stairways
- Egress Ramps

Each checklist has a varying number of items that must be marked "Compliant," "Non-Compliant," or "**N/A**[1]." If all of the requirements of an item is met, mark the **Compliant** radio button. If all of the requirements of an item are not met, mark the **Non-Compliant** radio button. If the item is not applicable to the building (or functional area), mark the **N/A** radio button. The requirements for each item on the checklist can be viewed by clicking on its hyperlink text. The requirements are

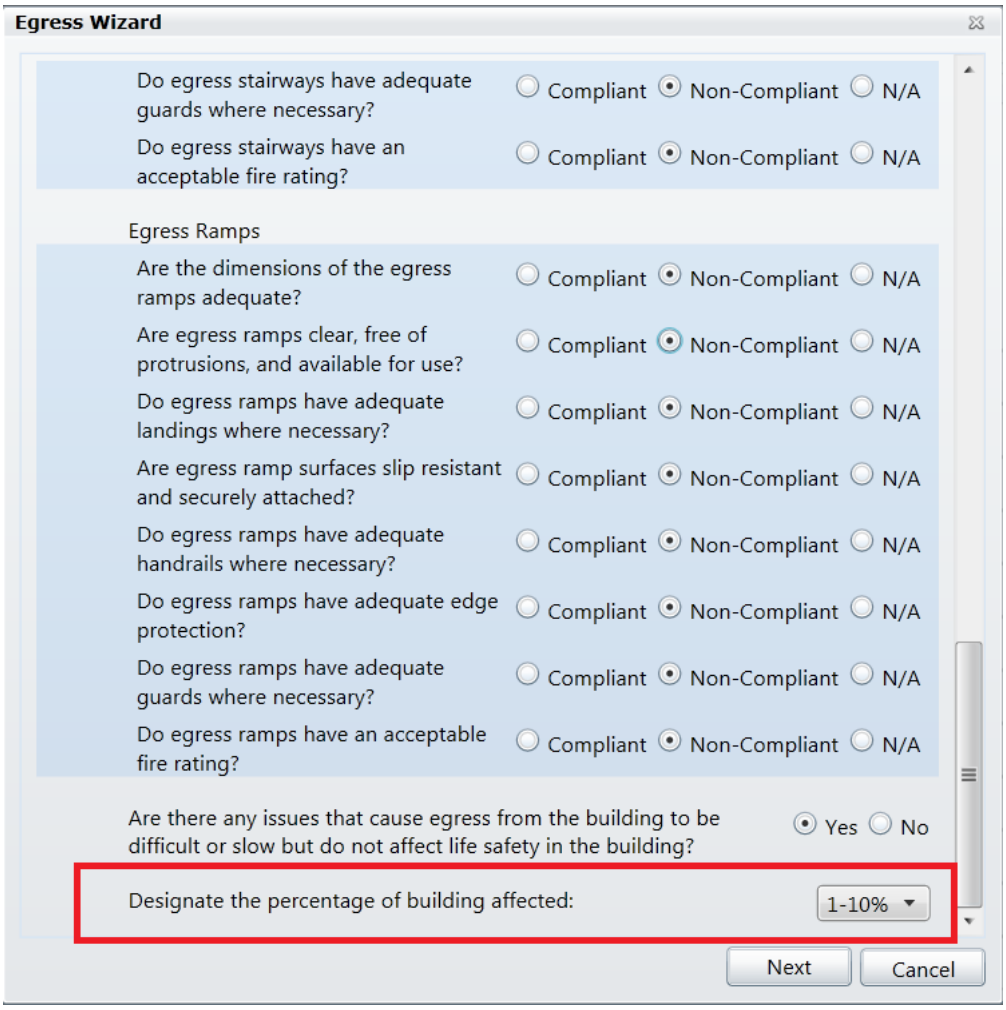
[1]Not Applicable

from the International Building Code, and are detailed in the "Appendix K: Egress Checklist" on page 330.

After the checklists, the wizard presents a final egress question. The checklists are used to determine if there are any life-safety issues regarding egress from the Building or functional area. The additional question is intended to determine if there are non-life-safety egress issues present in the Building or functional area. If there are non-life-safety issues, select the **Yes** radio button; if not, select the **No** radio button.



After the final egress question, click the **Next** button to proceed. The results of the wizard will be displayed. If an Amber or Red rating is given in the Building, select the appropriate density level of the ADA deficiencies in the Building or functional area.



To record these results, click the **Finish** button in the toolbar. If you wish to change any of the data you recorded, click the **Back** button in the toolbar, and change the necessary data. If you wish to discard the results without saving and exit the wizard, click the **Cancel** button on the toolbar.

Incorrect Component Wizard

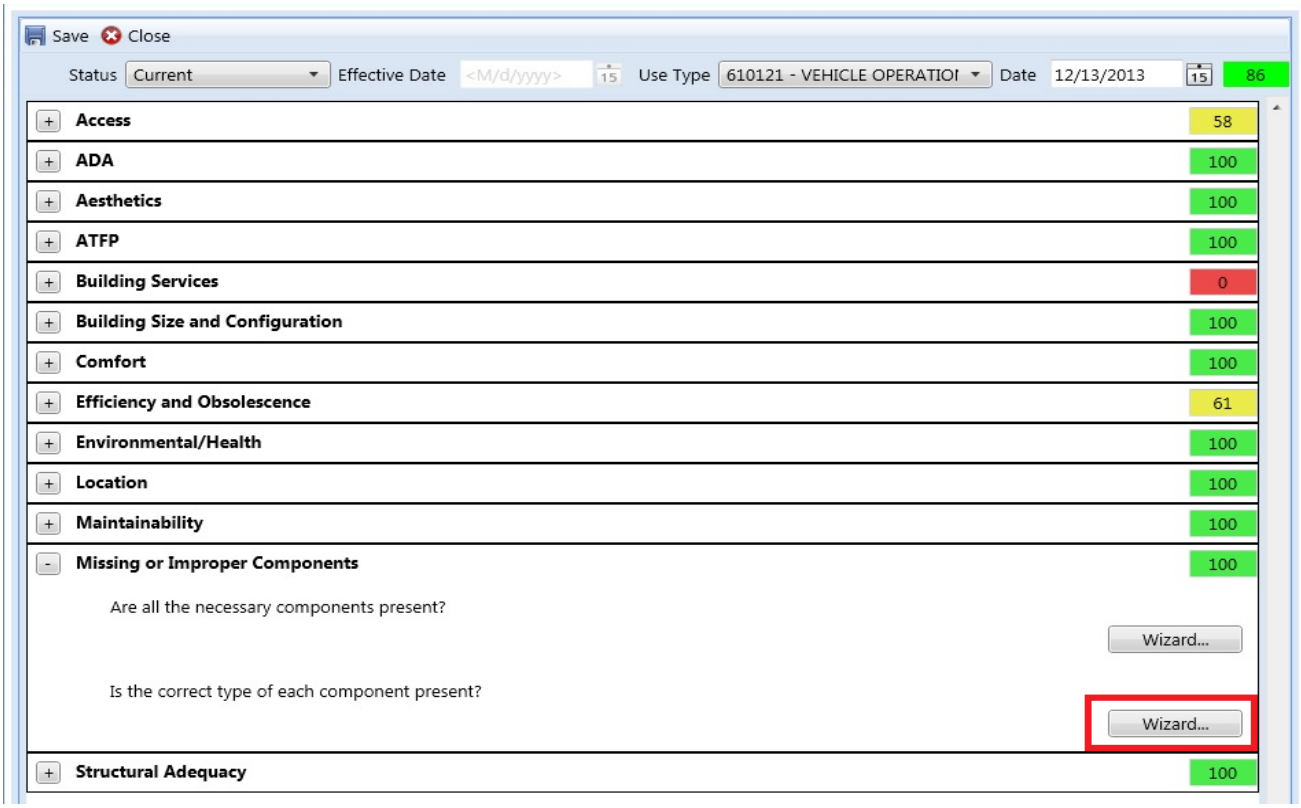
***** This Wizard is not currently functional *****

When performing a first tier or second tier functionality assessment, some of the issues or sub-issues use a wizard to determine the rating. The incorrect component sub-issue, which is a sub-issue of the Missing or Improper Components issue, is one of those sub-issues.

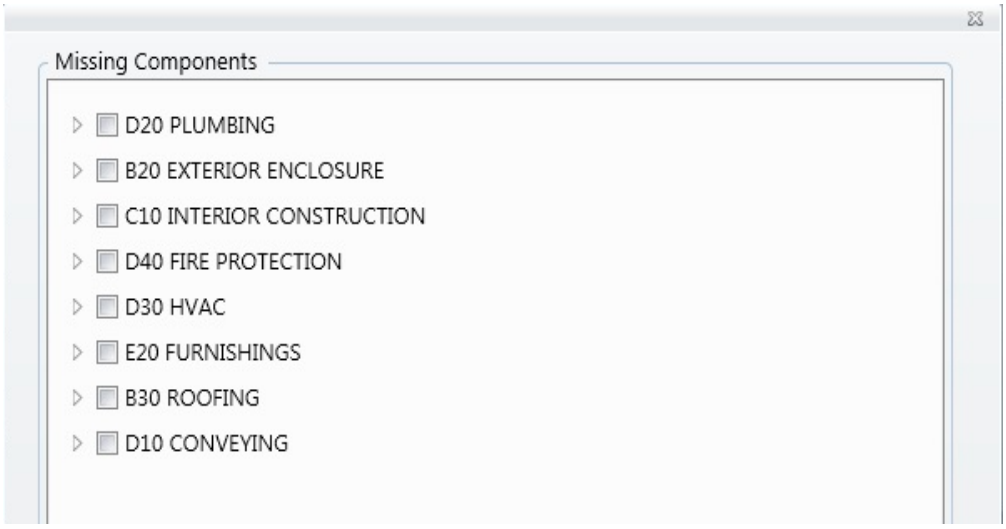
To open the Incorrect Components Wizard,

1. Activate the "+" button next to **Missing or Improper Components** in the list of functionality issues. This will expand the issue to reveal the sub-issues.

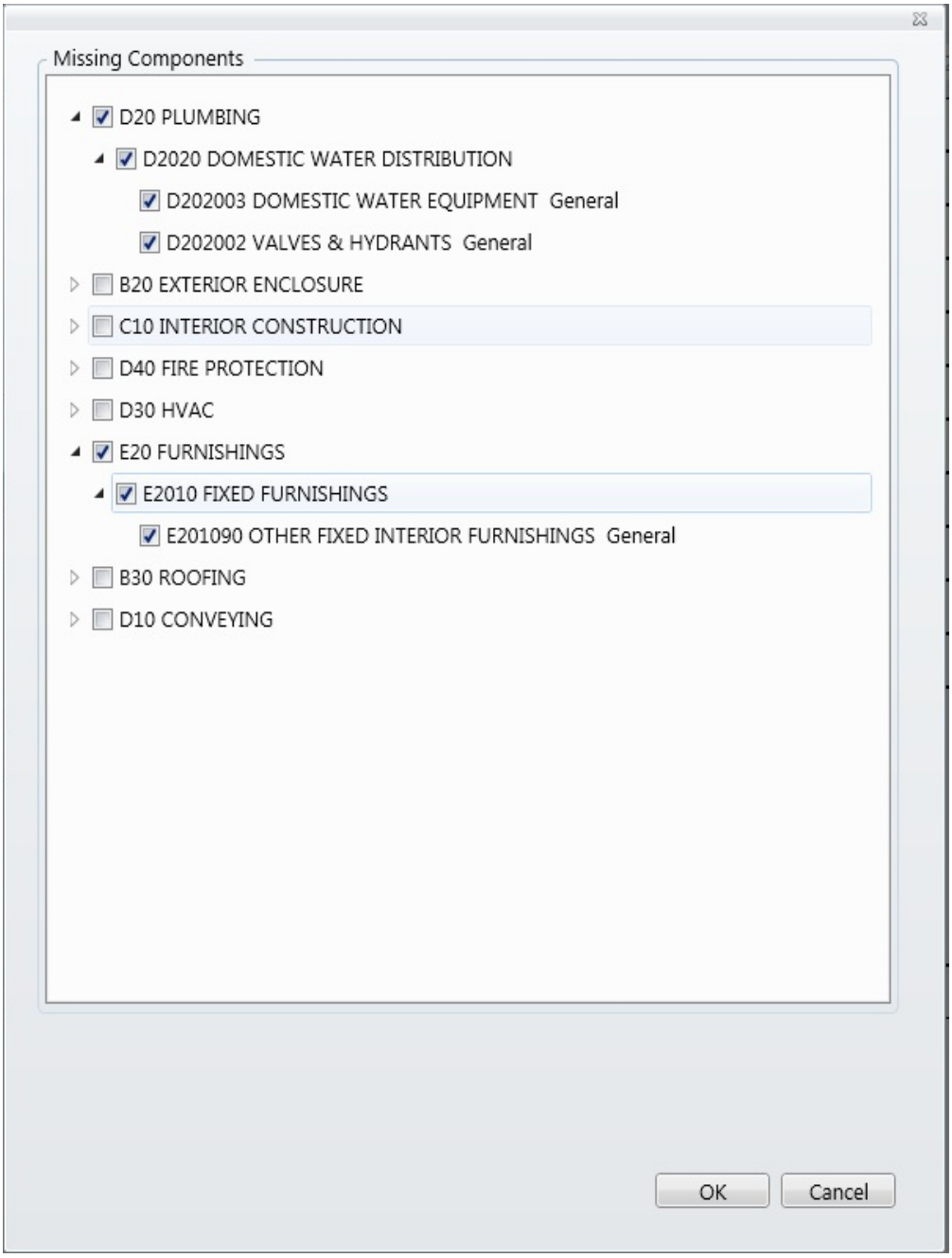
2. Activate the **Wizard...** button next to the sub-issue question: "Is the correct type of each component present?"



The Incorrect Components Wizard will appear in a new window.



The wizard will show all of the current inventory in a Building or functional area in a tree that can be expanded down to the section level. Expand the tree down the Section(s) that is/are the incorrect type in your Building and mark the checkbox next to it in the tree.



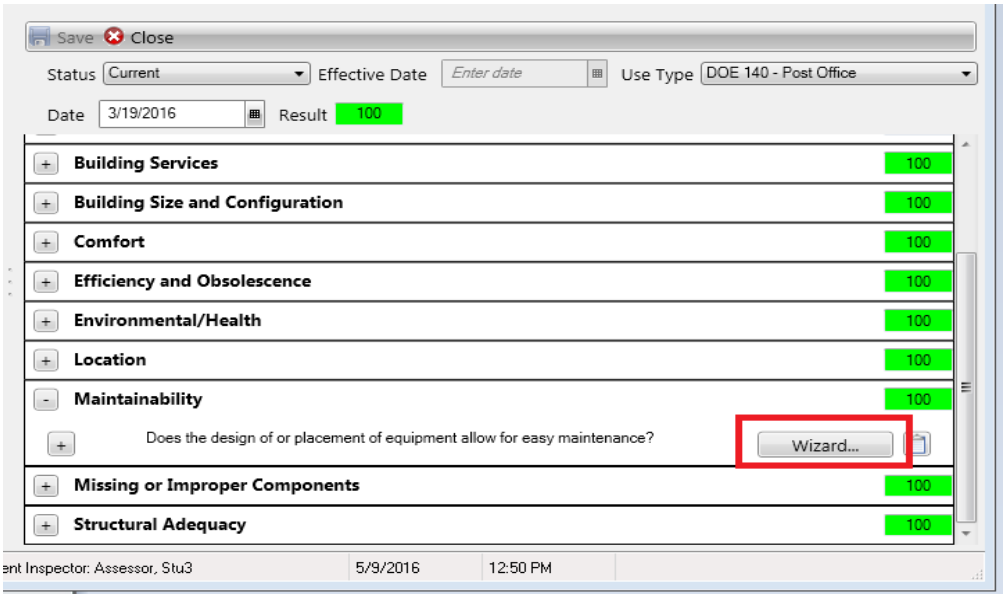
After all of the incorrect sections have been marked in the tree, activate the **OK** button in the tool-bar to proceed. The results of the wizard will be shown.

Maintainability Wizard

When performing a first tier or second tier functionality assessment, some of the issue or sub-issues employ a wizard to determine the rating. The equipment maintainability sub-issue, which is a sub-issue of the Maintainability issue, is one of those sub-issues.

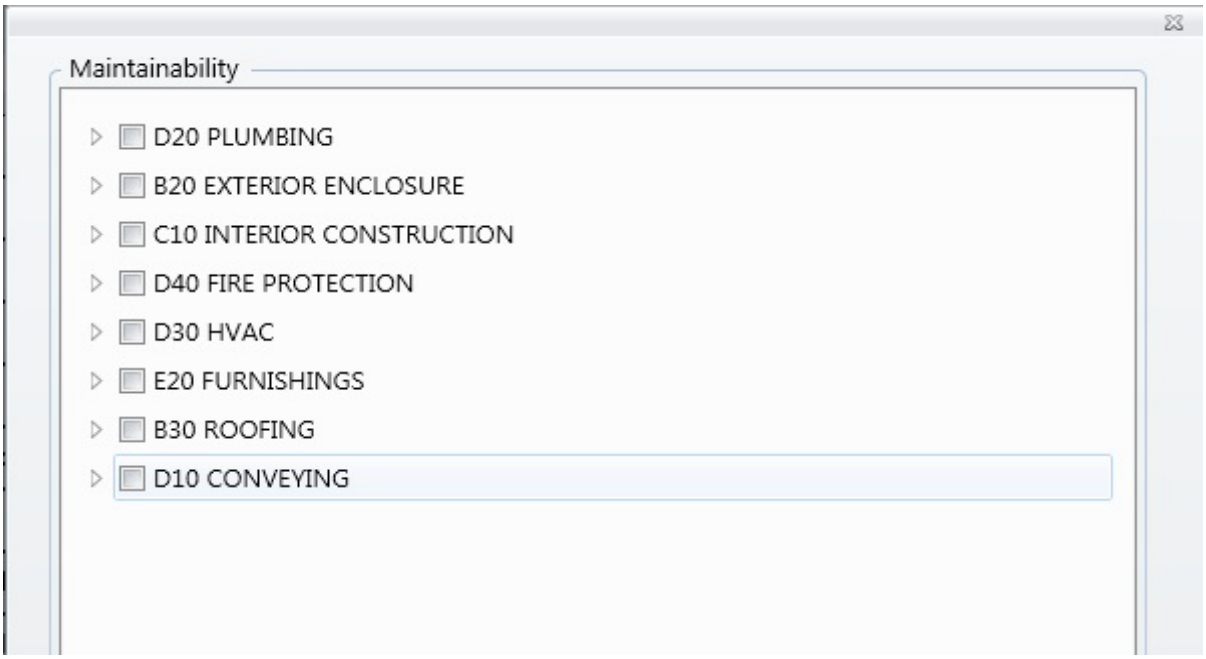
To open the Maintainability Wizard,

1. Activate the "+" button next to **Maintainability** in the list of functionality issues. This will expand the issue to reveal the **Wizard...** button.
2. Activate the **Wizard...** button.



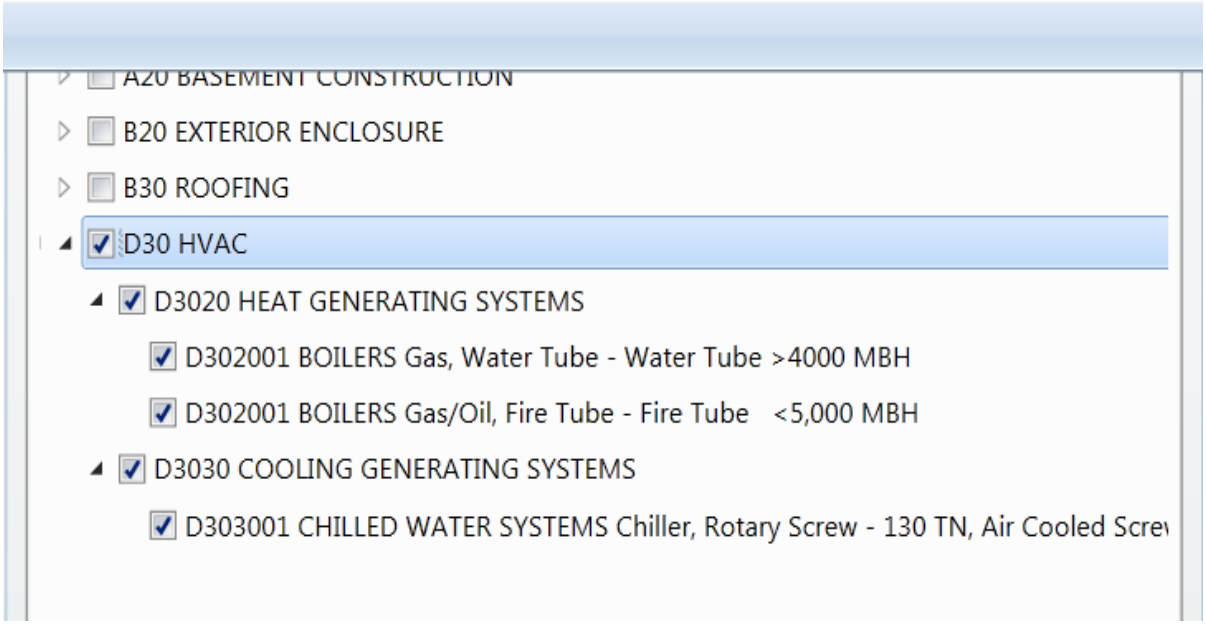
The Maintainability Wizard will appear in a new window. It will show all of the equipment inventory in the Building in a tree that can be expanded down to the Section level.

> **IMPORTANT:** If you have no Systems entered in your inventory, the "Maintainability - Wizard" popup will be blank.



To complete the Maintainability Wizard, do the following:

On the tree, mark the checkboxes next to the inventoried equipment that is difficult to maintain. The equipment can be marked at the System, Component, or Section level. That is, if the entire HVAC System is difficult to maintain, simply mark the checkbox next to the HVAC System on the tree; all of the Components and Sections in the HVAC System will be marked as difficult to maintain. Similarly, if a Component is marked as difficult to maintain, all of its Sections will be marked as difficult to maintain also.



After all of the difficult to maintain equipment has been marked, activate the **Next** button at the bottom of the popup window to proceed. A score page will appear, showing a color rating based on the data entered.

If, after activating the **Next** button, you wish to change any of the data you recorded, then do the following:

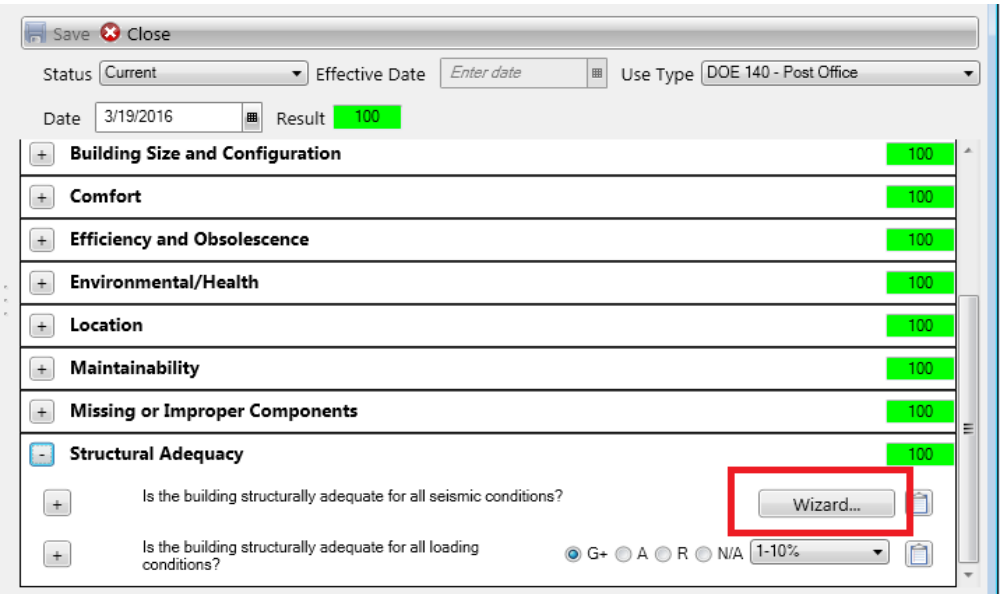
1. Activate the **Previous** button at the bottom of the score page in the popup window.
2. Change the necessary data in the tree.
3. Activate **Next** when finished.

To save the results of the Wizard, activate the **OK** button.

Alternatively, activate the **Cancel** button at the bottom of the popup window if you wish to (1) discard the results without saving and (2)exit the wizard.

> **Note:** When you have completed all of the questions for the full assessment set, be sure to also activate **Save** on the content area toolbar.

Missing Components Wizard



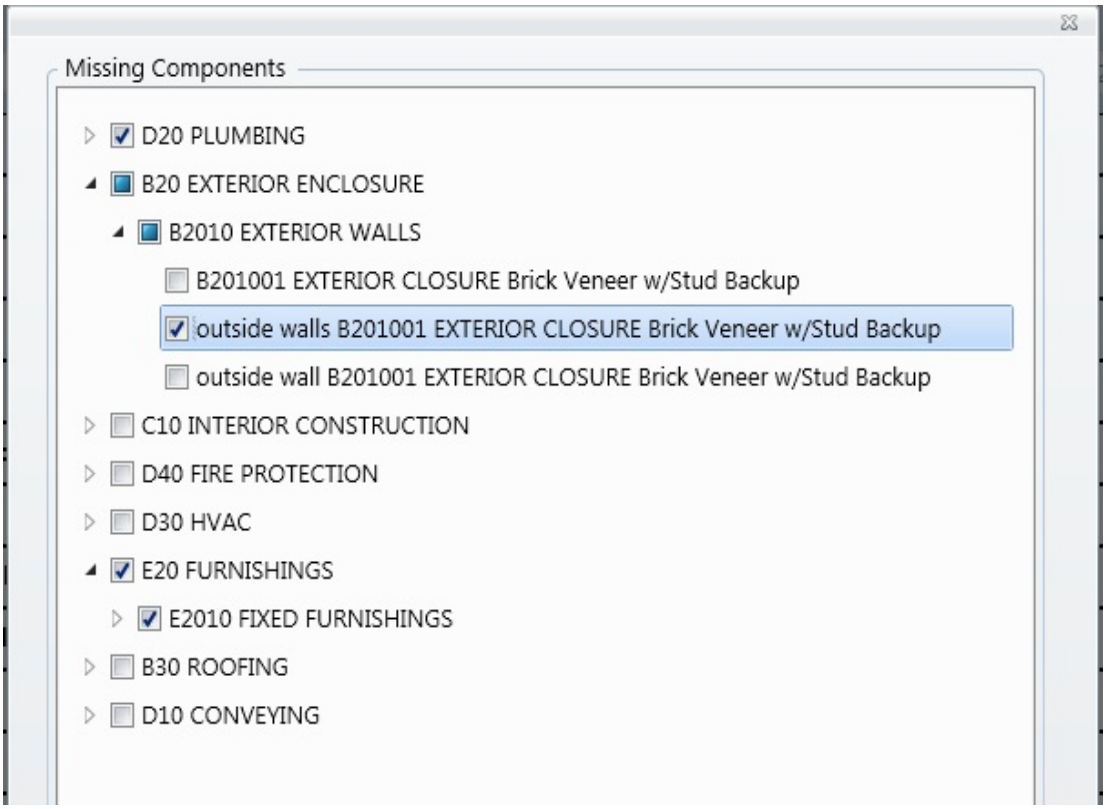
When performing a first tier or second tier functionality assessment, some of the issues or sub-issues employ a wizard to determine the rating. The missing components sub-issue, which is a sub-issue of the Missing or Improper Components issue, is one of those sub-issues.

To open the Missing Components Wizard,

1. Activate the "+" button next to **Missing or Improper Components** in the list of functionality issues. This will expand the issue to reveal the sub-issues.
2. Activate the **Wizard...** button next to the sub-issue question: "Are all the necessary components present?" (See image above.)

The Missing Components Wizard will appear in a new window. The wizard will show all of the possible inventory in a Building in a tree that can be expanded down to the Section level.

Note: It may take quite a bit of time for all of this data to load.



To complete the Missing Components Wizard, do the following:

Expand the tree down the Section(s) that is/are missing in your Building, and mark the checkbox next to it in the tree. At the bottom of the wizard, enter the quantity of the section that is required in your building, and mark the "Mission Critical" checkbox if the missing Component-Section is mission critical. Additionally, comments regarding the missing Component-Section can be entered in the comments field.

After all of the missing components have been marked in the tree, activate the **Next** button at the bottom of the popup window to proceed. A score page will appear, showing a color rating based on the data entered.

If, after activating the **Next** button, you wish to change any of the data you recorded, then do the following:

1. Activate the **Previous** or **Back** button at the bottom of the score page in the popup window.
2. Change the necessary data in the tree.
3. Activate **Next** when finished.

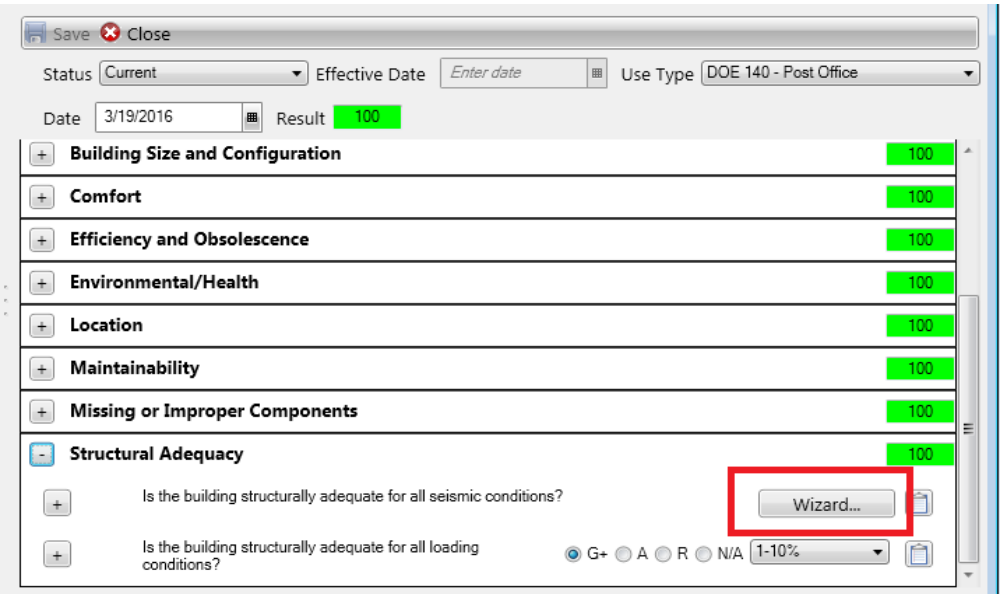
To save the results of the Wizard, activate the **OK** button.

Alternatively, activate the **Cancel** button at the bottom of the popup window if you wish to (1) discard the results without saving and (2) exit the wizard.

> **Note:** When you have completed all of the questions for the full assessment set, be sure to also activate **Save** on the content area toolbar.

Seismic Wizard

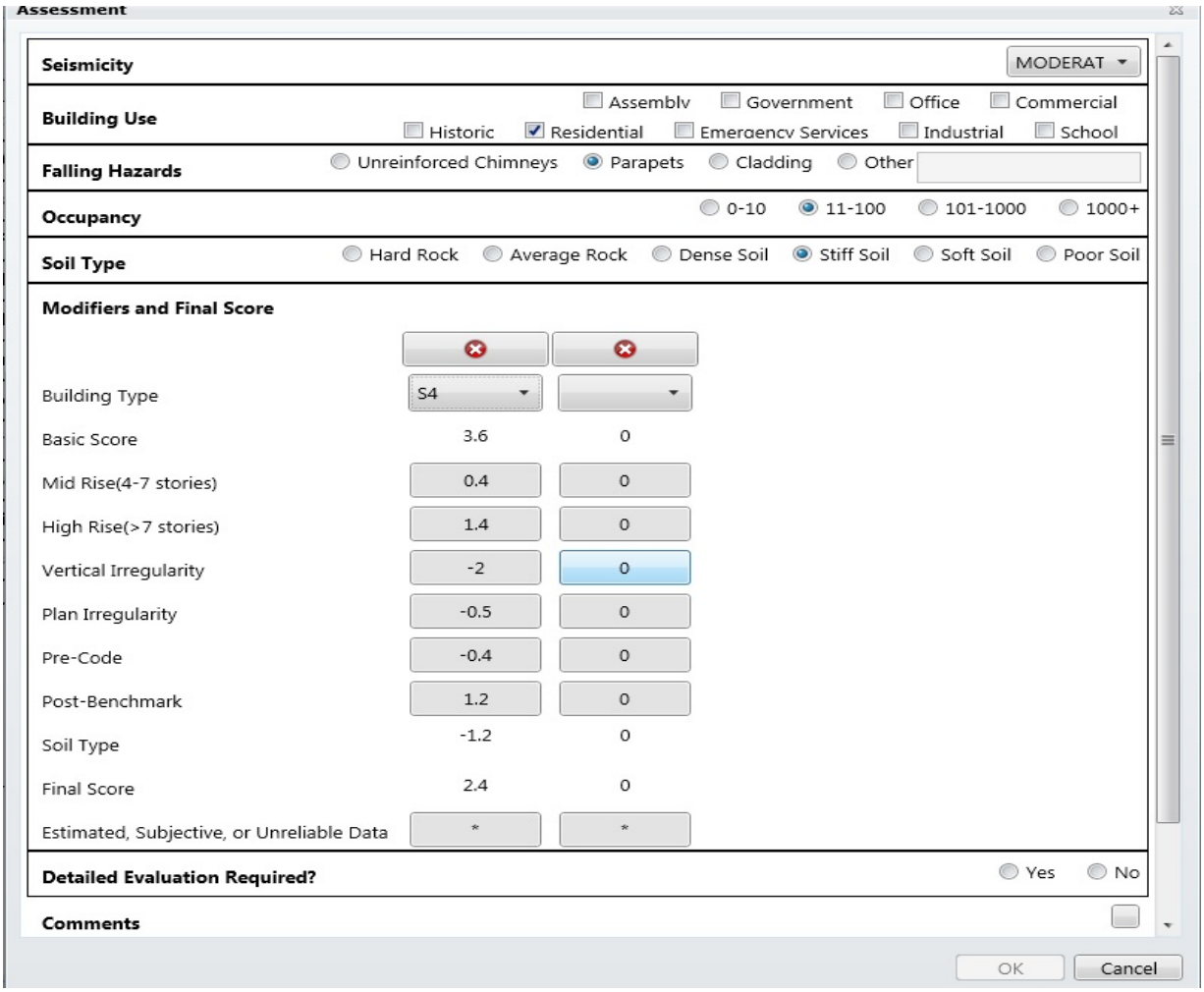
***** This Wizard is not currently functional *****



When performing a first tier functionality assessment, some of the sub-issues use a wizard to determine the rating. The seismic loading conditions sub-issue, which is a sub-issue of the Structural Adequacy issue, is one of those sub-issues.

To open the Seismic Wizard, expand the Structural Adequacy issue in the functionality assessment screen (click the "+" next to the issue) to see the sub-issues and click the **Wizard...** button in the seismic loading condition sub-issue row in the grid. (See image above.)

The Seismic Wizard will appear in a new window.



The data collected in the Seismic Wizard in BuilderRED is formatted to match the data used by the Federal Emergency Management Agency's (FEMA) seismic survey methodology. BuilderRED currently only provides a mechanism for recording an off-line seismic evaluation. The data entered here is simply recorded without any built-in analysis to determine the evaluation, i.e., you must select the Outcome of Evaluation or the Exempt category from the dropdown lists.

The Seismic color-coded box on the general building inventory screen will be red if the seismic survey indicates the building is seismically deficient, yellow if the building is exempt, and green if the building if OK.

After all of the data have been entered, click the **OK** button in the toolbar to proceed. The results of the wizard will be shown in the grid. If you wish to change any of the data entered in the wizard, click the **Wizard...** button again and the Seismic Wizard will reappear and can be edited.

Chapter Seven:

IMAGE LINKING

Image Linking in BuilderRED (BRED)

The Image Linking tool introduced in BuilderRED 3.2 allows inspectors to directly link images with specific Sections of Buildings.

How To Add Images In BuilderRED

To add images in BuilderRED, you can choose between using

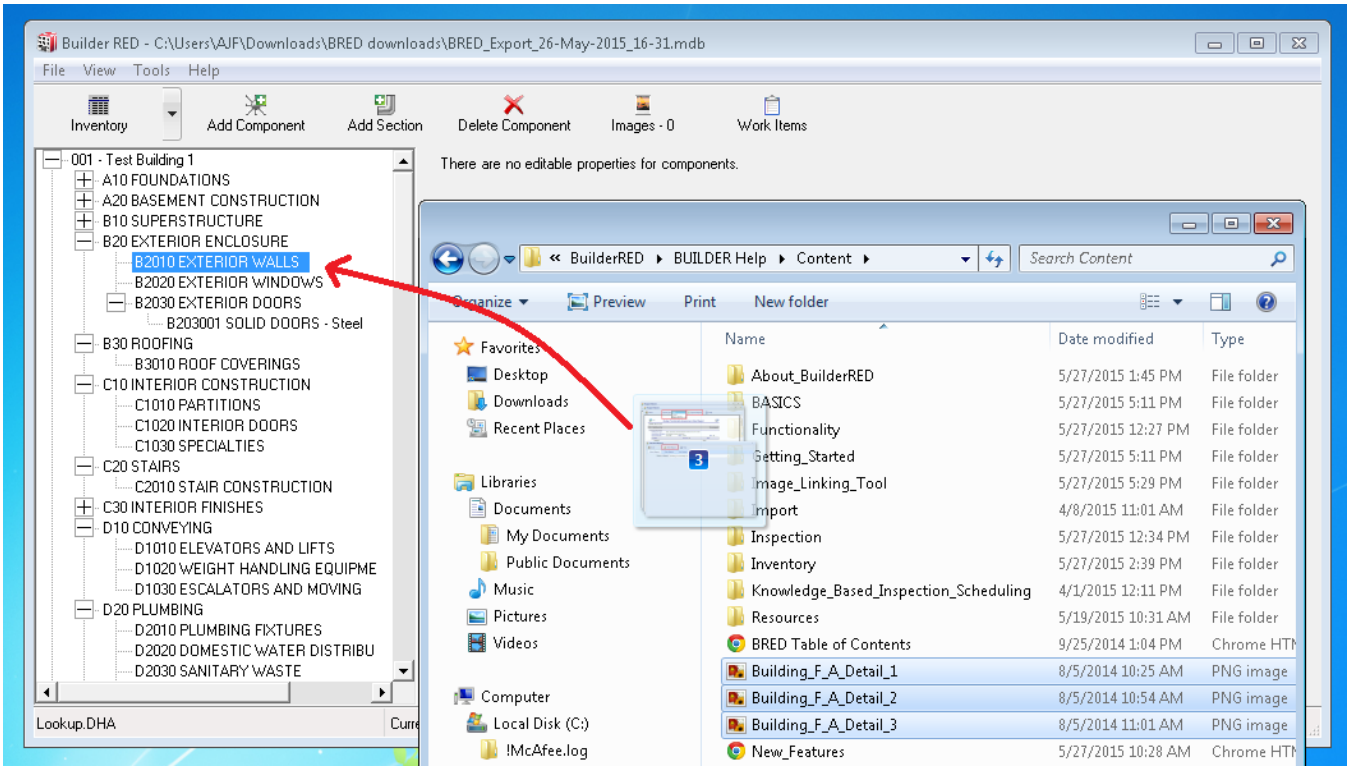
a. Drag and drop method, or
b. Manual selection.

Each of these is described below.

Add Images to BRED Using Drag and Drop

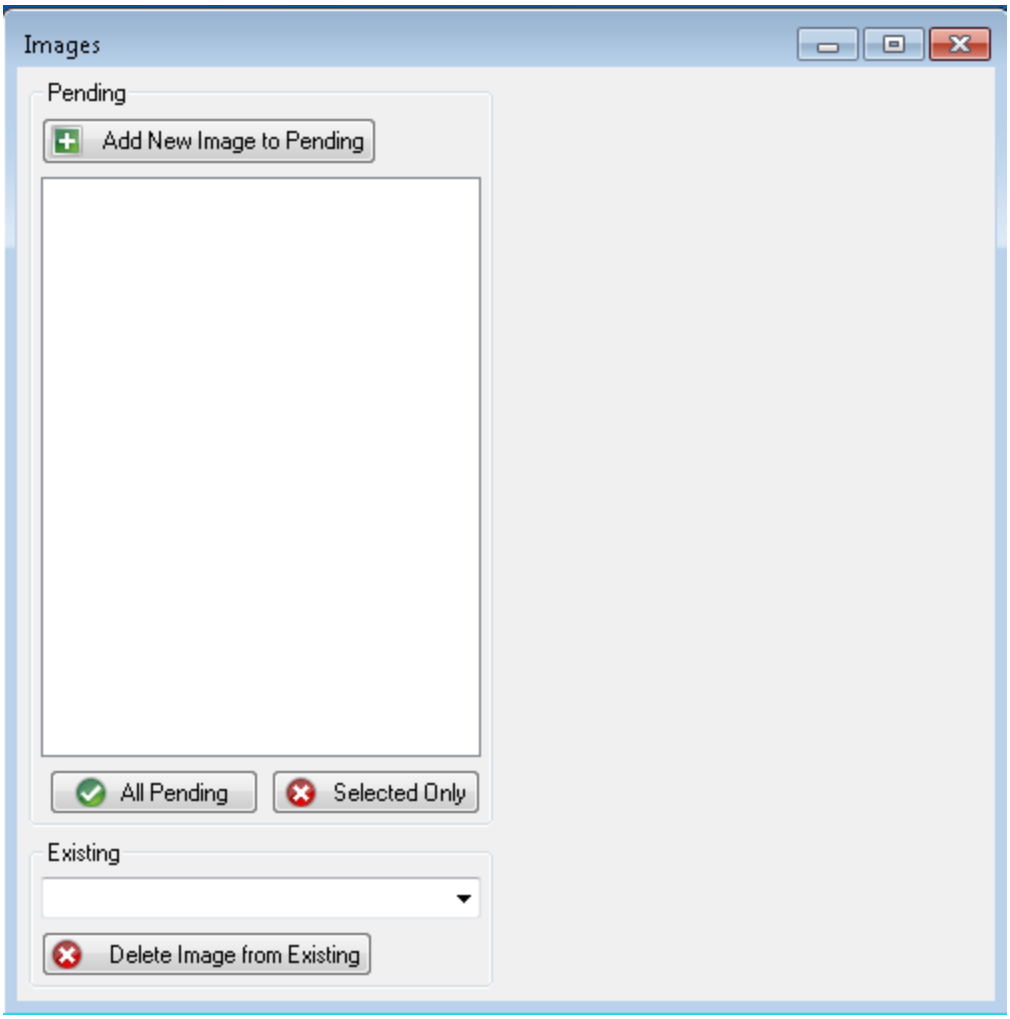
To use the drag and drop method,

1. Be sure to select the correct node on the navigation tree that you would like to add images to.
2. After the correct node is highlighted, select the images you would like to add and then drag them onto the BuilderRED window:



After you drop the images into BuilderRED, the "Images" window will pop up. Here, you have a variety of options:

a. If you activate the **All Pending** button that has a green checkmark icon on it, all images in the "Pending" list will be added.
b. If you activate the **Selected Only** button that has a red "x" icon on it, any selected image(s) will be cleared from the "Pending" list.

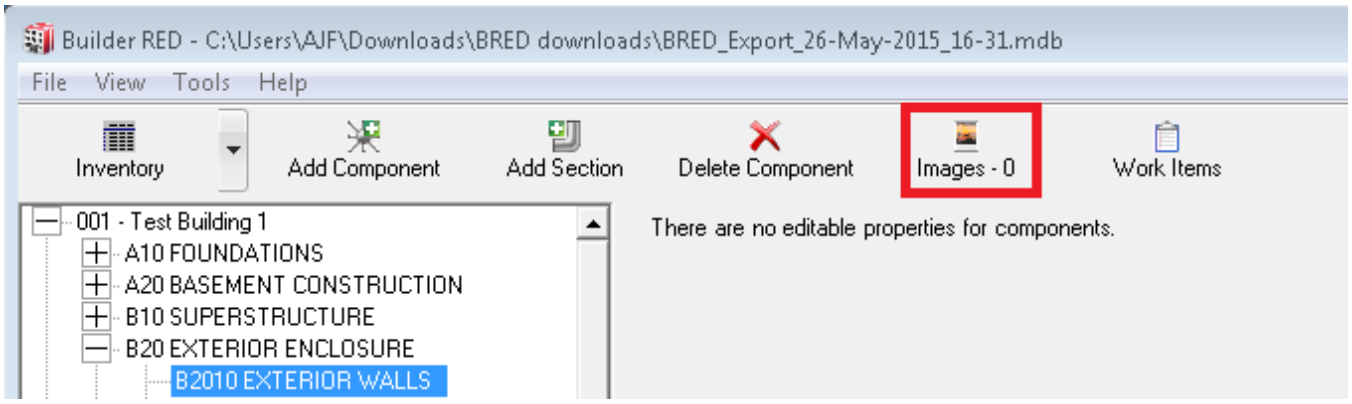


At the right-hand side of the "Images" window, you can choose to do any of the following:

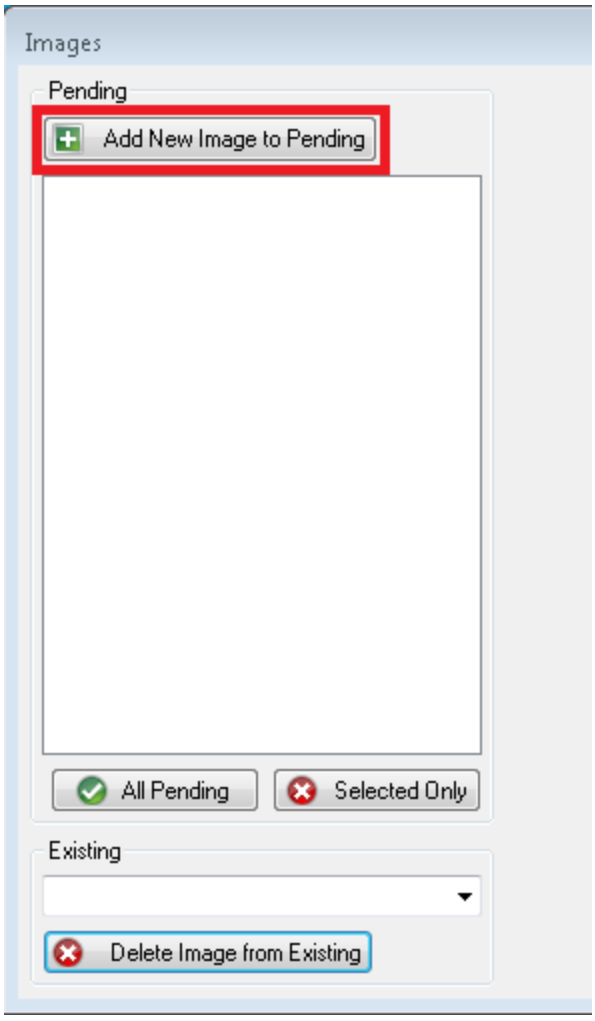
1. Preview an image in the "Details" section.
2. Edit the image title in the "Title" section. (The default Title is the image's file name.)
3. Add or edit the "Description" of the image. (The default Description is "Added On" plus the date.)

Add Images to BRED Using Manual Selection

1. Navigate to the desired node on the navigation tree and select it.
2. Activate **Images** on the main toolbar.

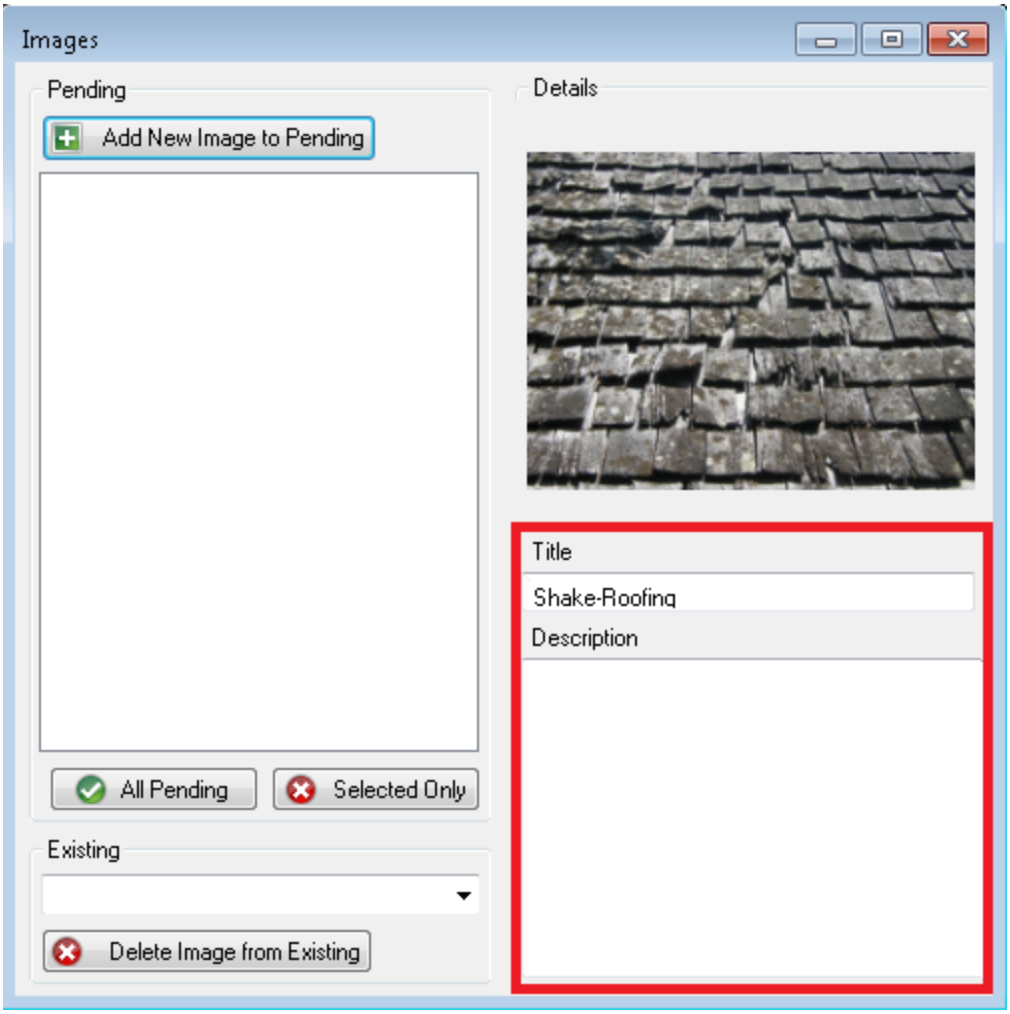


3. The Images window will appear. For each new image you want to associate with the selected node, activate **Add New Image to Pending** and manually browse for the image:

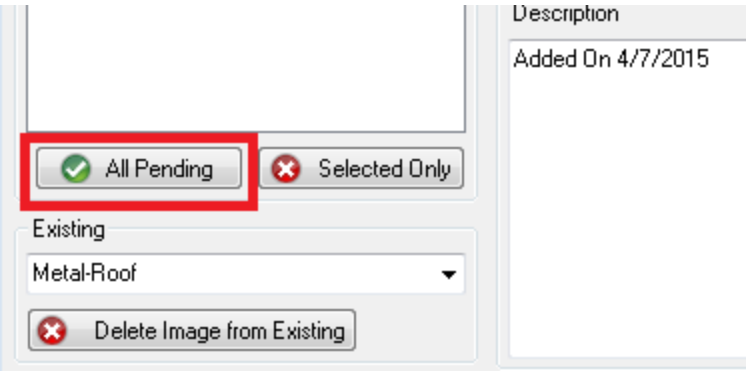


4. After you browse to the desired image and select it, the following information will be displayed in the right hand column of the Images window:

- "Details": The image is displayed here.
- "Title": The file name will be displayed as the default image title; you can edit this title.
- "Description": You can also enter a description. The default is simply a record of the date on which the image was added.



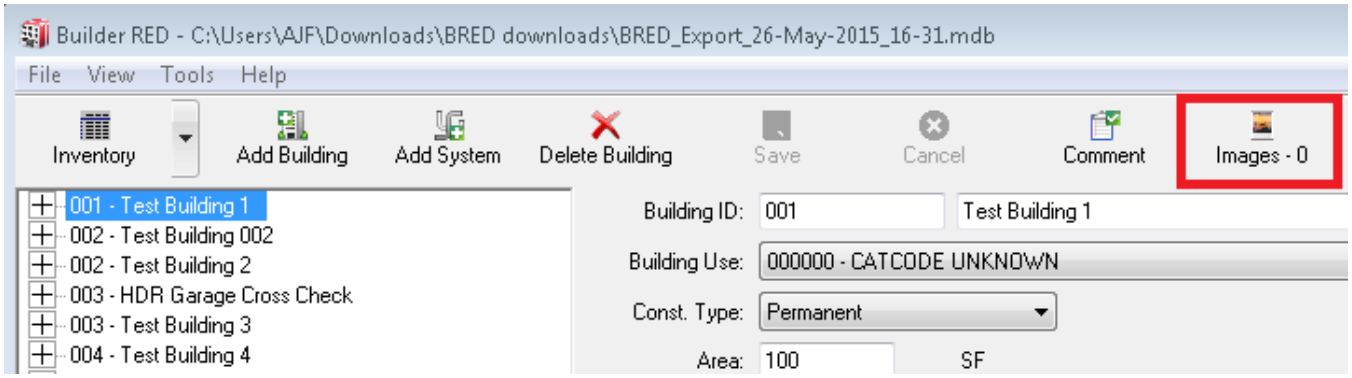
5. To accept the image, activate the button with the white checkmark in a green circle.



6. When finished adding images, close the "Images" window:

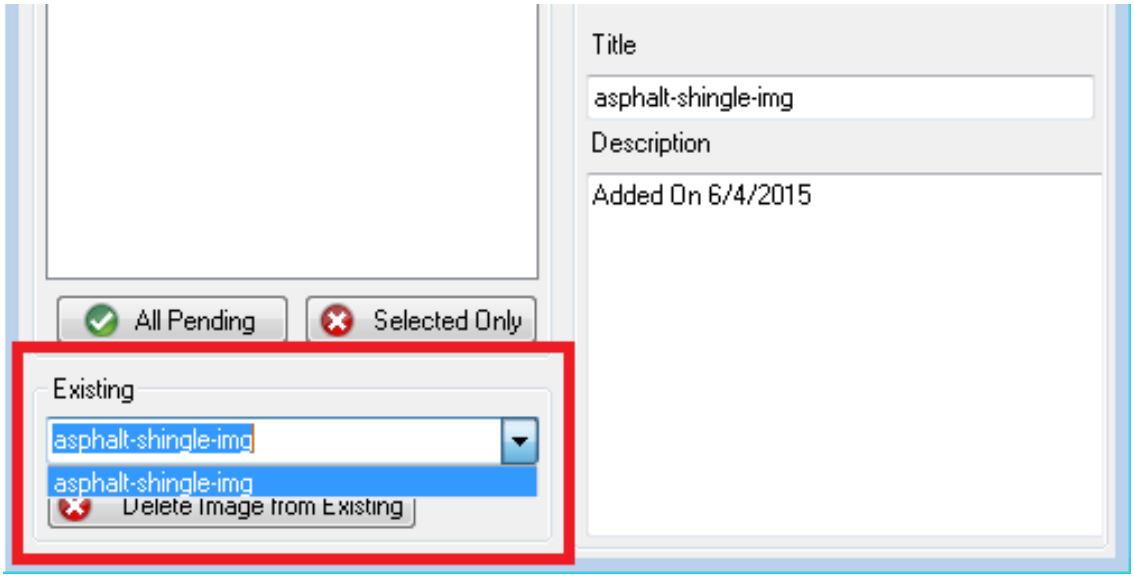
How To View Images in BuilderRED

In the main BuilderRED window, the **Images** button on toolbar will display the total image count for the selected node in the navigation tree.



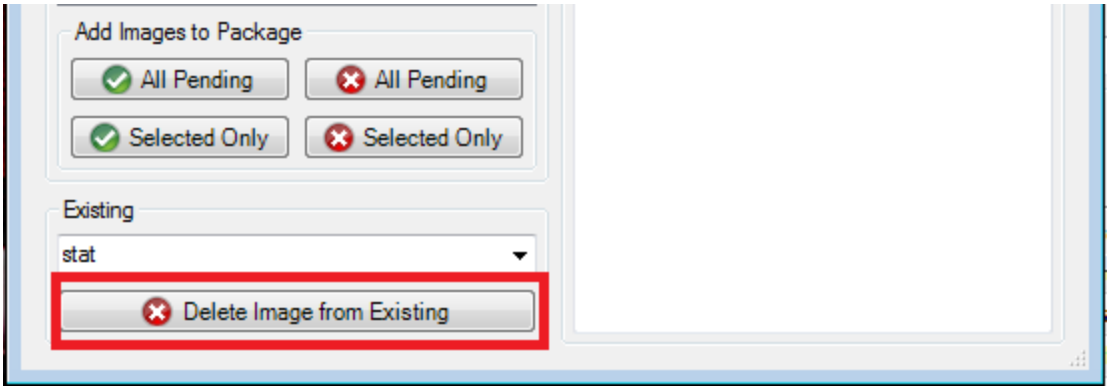
To view individual images,

1. Activate **Images** on the BuilderRED toolbar to open the "Images" popup window.
2. Open the dropdown list under the label "Existing" to view all linked images for the selected node.
3. You can select from the dropdown list to view an image.



How To Delete Images from BuilderRED

1. First, follow the instructions above in "How To View Images in BuilderRED" on the previous page.
2. After selecting an image from the dropdown list, activate **Delete Image from Existing** to erase the image from the **BRED**[1] file:



WARNING: Even if an image file name is not highlighted, the file showing in the white bar above the **Delete Image from Existing** button will be deleted when you activate that button.

[1]BUILDER Remote Entry Database (BuilderRED)

How To Import a BRED file with Images Back into BUILDER

For instructions, refer to "Importing Data from BuilderRED to BUILDER" on the next page

Chapter Eight:

IMPORTING DATA BACK INTO BUILDER

Importing Data from BuilderRED to BUILDER

If you added new images during Inventory or Inspections, then importing your information back into BUILDER will be done in two steps: (1) importing the **BRED**[1] database into BUILDER, and (2) importing the image archive file.

These two steps may be followed by an optional third step: (3) performing a rollup. This step is optional because the BUILDER system performs automated rollups nightly.

If you have no images to import, then you can go straight from importing the BRED database information into BUILDER to performing a rollup.

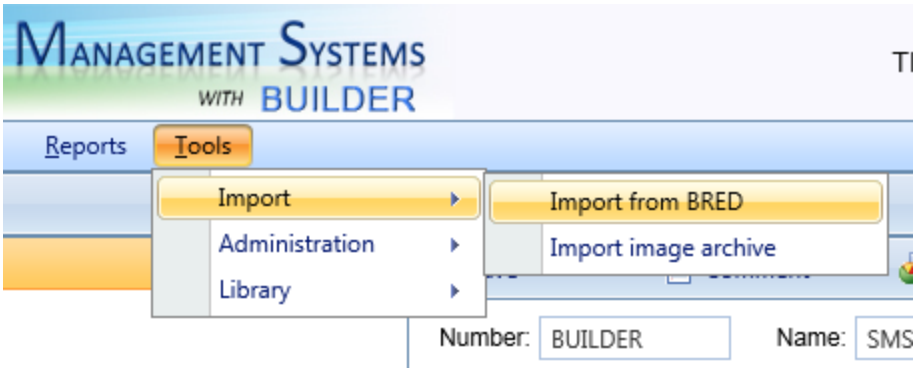
How To Import Database Information

After you have finished adding, editing, and deleting Inventory and/or Inspections data, the updated database must be imported back into BUILDER, to assess the condition of the installation and to plan maintenance and repair.

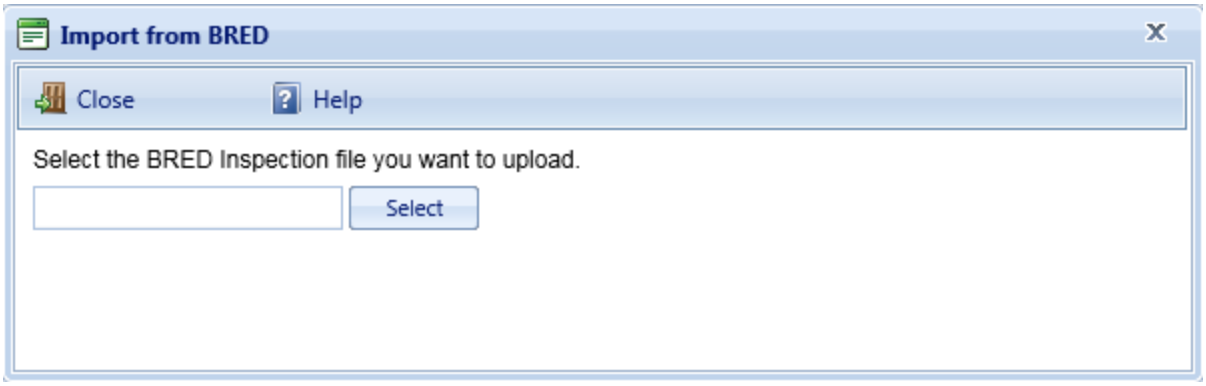
To import database information into BUILDER from BuilderRED:

[1]BUILDER Remote Entry Database (BuilderRED)

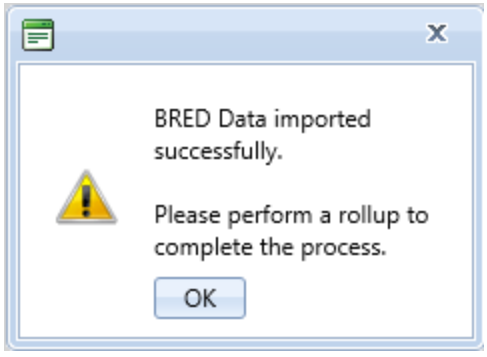
1. Save all changes to the database in BuilderRED.
2. Open BUILDER.
3. Select **Tools** > **Import** > **Import from BRED** from the navigation menu.



The "Import from BRED" window will appear:



4. Locate the database you wish to import, by either (a) entering the full path and file name in the text box or (b) clicking the **Select** button, navigating to the database file, and selecting it.
5. All changes to the database will be imported into BUILDER and you will see a popup window with the following message:

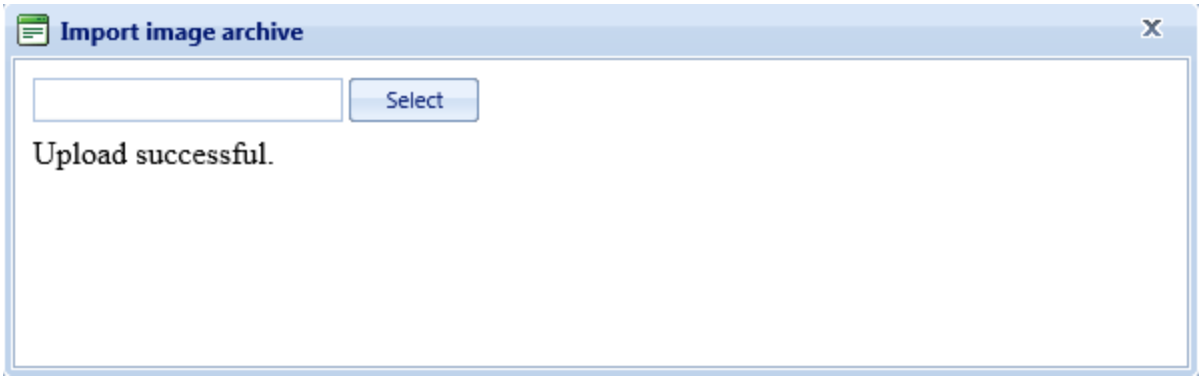


6. If you don't have any images to be imported into BUILDER, you are finished with the import and can perform a rollup.

7. If you have images to import from BuilderRED, it is recommended that you NOT click **OK** to perform a rollup at this point. Instead, close the popup box and follow the instructions in the next section:

How To Import Images

1. If you have new images that need to be imported from BRED, this procedure needs to be done *after* importing the database information (see "How To Import Database Information" on page 160).
2. Select **Tools > Import > Import image archive** from the navigation menu. The "Import image archive" window will appear.
3. Locate the image ("bredpackage") file corresponding to the database you just imported, by either (a) entering the full path and file name in the text box or (b) clicking **Select**, navigating to the database file, and selecting it. The image archive will be in the same location as the database file, and similarly named except that the extension is .bredpackage instead of .mdb.
4. When you see the message "Upload successful," close the "Import image archive" window. Follow with a rollup as warranted (see next section).



How To Perform a Rollup after Import

The items you import are unlocked as soon as the import is complete, whether or not you do a rollup. However, the Condition and Functionality Indexes will not yet have been updated.

Rollup after Performing Inventory in BuilderRED

If you only performed inventory with BuilderRED, then you do not need to do a rollup unless the cost books or other reference books have changed.

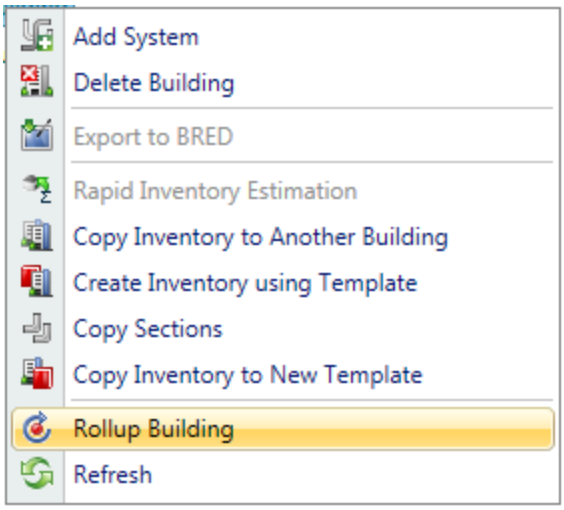
Rollup after Performing Inspection in BuilderRED

If you entered inspection data in BuilderRED, then in BUILDER, performing a rollup after the import is completed allows you to see the changes in Condition and Functionality Indexes. If you

do not perform a rollup at this time, the **SMS**[1] will do the rollup automatically overnight, and the updated index figures will be available the next day.

To perform the rollup, do *one* of the following:

a. Right-click on the affected Building (or Site, if multiple buildings were exported). Then select **Rollup Building** (or **Rollup Site**).



b. Select the Building (or Site, if multiple buildings were exported) and click the Rollup icon  on the toolbar.

[1]Sustainment Management System

APPENDIXES

Appendix A: Distress Survey Definitions

General Notes

1. These distresses are intended to apply generically to all subcomponents that collectively form Building Component-Sections.
2. Structural Component-Sections and subcomponents must be viewed from a loss of structural integrity perspective. A severity level of High must be recorded should the presence of any distress type compromise the structural integrity of the Component-Section or sub-component.
3. High severity must be recorded for any distress type, regardless of density, that is resulting in an unacceptable health, life/safety, or security risk.
4. There are two general rules. One is that if a certain distress type is a special case of another distress type, only record the special case. Two, if a certain distress type results from the existence of another distress, record both. Pay particular attention to the notes provided for each distress definition. They often address the application of these rules.
5. Where multiple severity levels are present for a given distress type on a given sub-component, record each separately, unless stated otherwise for a given distress type.
6. Distress quantities or distress density may be recorded. If distress quantities are recorded, density ranges will be computed in BuilderRED. If distress densities are recorded, distress quantities will be blank in BuilderRED.
7. Some of the distress definitions described herein make note of a "replacement unit." Certain Component-Sections are a collection of units. Examples of this are tiles (ceiling, floor, etc.). If the logical work action for these units is to replace some or all of them (e.g. a cracked ceiling tile will be replaced), then the distress quantity and/or density should reflect the area, length, or quantity of the distressed units rather than the distress itself.
8. If during the course of the inspection additional occurrences are found of distress-severity combinations for a given Component-Section, subcomponent or subcomponent sample (if sampling), adjust the distress quantity or distress density as necessary.
9. Density ranges, when recorded instead of distress quantities, can be estimated as described below.

Density (%)	Visual Cue (when applicable)
>0-0.1%	Difficult to notice even by careful observation, especially if spotty. (up to about 1"x 12" in a 8'x 10' area; ⅛" in 10' length; or 1 in 1000)
>0.1-1%	Somewhat noticeable, but easily missed by casual observation, especially if spotty; Careful observation usually needed, if spotty. (up to about 10"x 12" in a 8'x 10' area; 1¼" in 10' length; or 1 in 100)
>1-5%	Noticeable, even by casual observation, but still only a mere fraction. (up to about 1'x 4' in a 8'x 10' area; 6" in 10' length; or 1 in 20)
>5-10%	Easily noticeable even if spotty; more than a mere fraction. (up to about 1'x 8' in a 8'x 10' area; 1' in 10' length; or 1 in 10)
>10-25%	Readily noticeable, but less than ¼ of area, length, or amount.
>25-50%	Very noticeable, but less than ½ of area, length, or amount.
>50-<100%	Overwhelmingly noticeable; greater than ½ of area, length, or amount.
100%	Entire area, length, or amount.

10. Some subcomponents have a unit of measure of "Each." Distress densities may apply to the entire unit or a unit portion as indicated in the definitions below. Density must first be applied to an entire unit and then applied across multiple units, if present. For example, if a fan belt has been chewed by a rodent, the distress density for that unit would be 100% regardless of how much of the belt has been chewed. But if there are three belts present and the other two are free of distress, the density will drop to 33%.
11. Distresses for built-up, single-ply, and asphalt shingle roofing (membrane, flashing, etc.) shall follow the ROOFER **EMS**[1] definitions provided in Appendixes B through D. Densities may be estimated or distress quantities may be recorded.

Distress Summary Listing

[1]Engineered Management System

15. Loose
16. Missing
17. Moisture/Debris Contaminated
18. Noise/Vibration Excessive
19. Operationally Impaired
20. Overheated
21. Patched
22. Rotten
23. Stained

Animal/Insect Damaged

Definition:

Subcomponent has been gnawed, chewed, scratched, bitten, or otherwise damaged by animals, birds, and/or insects. Evidence includes holes, droppings, nests, sawdust, shavings, and particle matter indicating the presence of animals, birds, and/or insects.

Notes:

1. Nests, per se, may not indicate animal/insect damage, but indicate the past or a current presence of animals, birds, or insects. Nests should be recorded under "Moisture/Debris Contaminated".
2. Damage may be internal. Therefore, if clues indicate animal, bird, or insect damage, the subcomponent should be sounded with a hammer or mallet. A hollow sound may indicate internal damage.
3. If damage includes staining, record "Stained" in addition to "Animal/Insect Damaged." If the only damage is staining, only record "Stained" and do not record "Animal/Insect Damaged."
4. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the animal/insect damage a leak has also occurred, record the severity level as High and the distress type "Leaks," as well.
5. If the animals, birds, or insects causing the damage are still present, record as High severity.
6. If the subcomponent unit-of-measure is "Each," estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes).
7. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and animal/insect damage has occurred to subcomponents where the logical repair would be the replacement of a unit (e.g. wood deck member, fan belt) the measurement quantity will be that entire unit even though the animal/insect damage may only encompass portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
8. Assign only one severity level to a given logical replacement area, length, or quantity measured as described in 7 above.

Severity Levels:

Low - Distress exists, but damage is superficial.

Medium - Distress exists, but not superficial, nor raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The passage of animals, birds, or insects is possible and/or likely, but prevention is required.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Termite damage
- Pet scratches
- Rodent holes
- Fecal contamination
- Carpenter bee holes
- Animal pathways in insulation
- Screen in roof ventilator displaced and holed by animal in order to gain access to attic
- Bent roof ventilator blade caused by animal gaining access to attic
- Animal hole under security fence

Blistered

Definition:

Round or elongated raised areas of the subcomponent surface that are generally filled with air.

Note: "Blistered" is a special case of deterioration. When present, record "Blistered" instead of "Deteriorated."

Severity Levels:

Low - The raised areas are noticeable by vision or touch.

Medium - Blistered area has begun to show deterioration.

High - Blisters are broken or worn through.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Floor covering with raised area that is "soft" when walked on.
- Wall covering (wallpaper) with air pocket.

Broken

Definition:

Subcomponent has been fractured, shattered, or otherwise separated into two or more pieces and one or more of those pieces are missing or if the pieces are all present the separation is resulting in the loss of operability to this or other subcomponents.

Notes:

1. Care must be taken to differentiate between "Broken," "Cracked," "Damaged," "Operationally Impaired," and "Missing." The differentiation between "Broken" and "Cracked" are the missing pieces or loss of operability associated with "Broken." "Broken" provides greater problem specificity and should be used instead of "Damaged," when applicable. "Operationally Impaired" should be recorded instead of "Broken" if operability is lost, but there is no true separation of pieces or if a separation is unknown. Missing pieces as a result of fracturing denotes "Broken," whereas missing parts without fracturing denotes "Missing."

2. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the fracturing a leak has occurred, record the severity level as High and the distress type "Leaks," as well.
3. If the subcomponent unit-of-measure is "Each" estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
4. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and the logical repair would be the replacement of a unit (e.g. ceiling tile, window pane, etc.) the measurement quantity will be that entire unit even though the actual broken quantity may only encompass a portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
5. Assign only one severity level to a given logical repair or replacement area, length, or quantity measured as described in 4 above.

Severity Levels:

Medium - Distress exists.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent or Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Shattered window pane
- Wire separated from connector
- Ceiling tile separated into two pieces with the one piece missing

Capability/Capacity Deficient

Definition:

Component serviceability is lacking due to insufficient capacity, technical obsolescence, or lack of compliance to applicable codes. This can be due to poor original design, alterations, changes in component demand, and/or changes in building use.

Notes:

1. Capability/Capability Deficient" is defined at the Component level, but sometimes it is apparent at the System level (e.g., HVAC) or in a Facility functional area (e.g., kitchen). However, since inspection is performed on Component-Sections at the subcomponent level, "Capability/Capacity Deficient" should be applied to all applicable Component-Sections and their applicable subcomponents. This is done by using functional areas as the another basis for Component-Section identification.
2. Consider "Capability/Capacity Deficient" in a broad context (e.g. meeting Americans with Disabilities Act (ADA) requirements, building use demands, etc.)
3. Only rate Component-Sections actually present in the building, not those that may be required but never installed or constructed.
4. Check for problems with other components/subcomponents to ensure that other, more appropriate, distress types are not the true cause of the perceived deficiency.
5. This distress will be eliminated in a future version of BUILDER. Component-Section functionality metrics are under development and when completed this distress will be superseded by those in a functionality assessment procedure.

Severity Levels:

Low - Distress exists, but superficial. Mission or quality-of-life rarely affected.

Medium - Distress exists, but not superficial, nor raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Violation of law.
- Adversely affects mission or quality-of-life for an extended period of time.

Measurement:

Affected Area, Length, or Quantity

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- HVAC ductwork does not extend into an office
- HVAC unit size too small for cooling demand
- Furnace cannot adequately heat office in winter
- Pipe size too small for proper water flow
- Wheelchair ramp too steep
- Poor room lighting
- Door undersized for a wheelchair

Clogged

Definition:

Obstruction within a subcomponent that is disrupting the intended flow of air, other gasses, or liquids.

Notes:

1. "Clogged" applies to such items as pipes, drains, valves, ducts, troughs, gutters, filters, and other "enclosed (totally or partially)" subcomponents used to channel liquids and/or gasses.
2. The measurement amount and density are based on the subcomponent length, area, or quantity, not on the degree of blockage for that amount. The degree of blockage is used to determine severity level.
3. Sometimes, the extent of a clogged item is unknown (e.g. how much of a length of pipe is clogged?). If unknown, estimate a reasonable amount or density of the subcomponent length or area.
4. If blockage is due to corrosion, debris or vegetation, or dirt, record the distress type “Corroded,” “Moisture/Debris/Mold Contaminated, ” or “Stained/Dirty,” respectively, in addition to “Clogged.” If those distresses are present, but the flow is unaffected, do not record, “Clogged.”

Severity Levels:

Low - Distress exists, but superficial.

Medium - Distress exists, but not superficial, nor raised to the level of High.

High - Any of the following exists:

- Health, life/safety, or security problems.
- Flow is severely restricted.

- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Length or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Waste water pipe that will not drain or drains slowly
- Downspout with little flow and water spilling over gutter
- Low water flow from faucet (not due to low water pressure)
- Reduced air flow from duct due to presence of foreign matter

Corroded

Definition:

Subcomponent is wearing away, disintegrating, flaking, lensing, and/or scaling due to the effects of chemical, electrochemical, or electrolytic attack.

Notes:

1. "Corroded" is a special case of deterioration. When present, record "Corroded" instead of "Deteriorated."
2. Any staining of the surrounding area (e.g. rust streaks) will also be recorded as "Stained."
3. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the corroding a leak has also occurred, record the severity level as High and the distress type "Leaks," as well.
4. Record "Clogged," in addition if corrosion is causing clogging.
5. Paints and coatings that are failing to provide a protective coating, but NOT inventoried with the subcomponent, are included in the "Corroded" distress type at Low severity. Paints and coatings, inventoried with the subcomponent, that are failing to protect the subcomponent shall be given a separate paint/coating rating.
6. Do not record Low severity levels for paint or coatings and higher severity levels for the subcomponent at the same locations.

7. If the unit-of-measure of the subcomponent is "Each," estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
8. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and corrosion has occurred to subcomponents where the logical repair would be the replacement of a unit (e.g. metal panel) the measurement quantity will be that entire unit even though the corrosion may only encompass portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
9. Assign only one severity level to a given logical replacement area, length, or quantity measured as described in 8 above.
10. If the corrosion is desirable (e.g. patina on copper), "Corroded" will not be recorded.

Severity Levels:

Low - Any of the following exists:

- Corrosion exists, but can usually be brushed off.
- Deterioration superficial.
- Paint or protective coating (e.g. PVC) has failed and corrosion has begun (only when paint is not rated separately).

Medium - Flaking, lensing, and/or scaling exist, but not raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Spotty brown rust on metal roofs
- Brown water from internal pipe corrosion
- Rusty pipe supports
- Failure of the galvanized coating on a corrugated steel sheet wall

Cracked

Definition:

Subcomponent has been fractured. Separation into two or more pieces may or may not have occurred. Crack width may be variable and faulting may be present. There is no loss of operability to the subcomponent or Component-Section.

Notes:

1. A hairline crack is defined as having a width so small as to be very tight.
2. Care must be taken to differentiate between "Cracked," "Broken," "Damaged," and "Deteriorated." "Cracked" implies that the fractured pieces are intact, whereas "Broken" implies that some of the resulting cracked pieces are missing or a loss of operability. Fracturing may possibly be caused by a specific event which suggests the distress type "Damaged." However, record as "Cracked." Likewise, fracturing can occur as a consequence of weathering, humidity change, and sustained or repeated loading over long periods suggesting "Deteriorated." However, record "Cracked."
3. "Cracked" and the distress types "Broken" and/or "Damaged" can occur together in the same subComponent-Section, but only independently at different locations (e.g. different ceiling tiles in the same Component-Section).
4. If the fractured pieces are faulted, record the distress type "Displaced" also.
5. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the crack a leak has occurred, record the severity level as High and the distress type "Leaks," also.
6. Density is determined from dividing total crack length by the subcomponent surface area or length, as appropriate.
7. If the subcomponent unit-of-measure is "Each" estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10). If multiple cracks exist at different severity levels, record at the highest level.
8. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and cracking has occurred in subcomponents where the logical repair would be the replacement of a unit (e.g. ceiling tile, window pane, pipe section, etc.) the measurement quantity will be that entire unit even though the actual crack may only encompass portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.

9. Assign only one severity level to a given logical replacement area, length, or quantity measured as described in 8) above.

Severity Levels:

Low - Hairline cracks which may or may not divide the subcomponent into pieces. If distinct pieces exist, they are held tightly together.

Medium - Crack width greater than hairline and the subcomponent has been divided into pieces with clear separation, but not raised to the level of High.

High - Any if the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Fractured sidewalk, masonry wall, window, or ceiling tile with all pieces present
- Fractured pipe from frozen water

Damaged

Definition:

Dents, chips, gouges, tears, rips, distortion, rupture, etc. resulting from impact (e.g. vehicles), fire, flood, or other means associated with specific events.

Notes:

1. Care must be taken to differentiate between "Damaged," "Animal/Insect Damage," "Broken," "Cracked," and "Moisture/Debris Contaminated." Those other distress types imply a greater specificity and should be recorded, if applicable, instead of "Damaged."
2. "Damaged," "Animal/Insect Damage," "Broken," "Cracked," and/or "Moisture/Debris Contaminated" can occur within the same subcomponent, but only independently at different locations (e.g. different locations on the same wall.)
3. If displacement has occurred along with the damage, record the distress type "Displaced" also. If the damage event has only resulted in a displacement, record "Displaced" instead of "Damaged."
4. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the specific damage event a leak has occurred, record the severity level as High and the distress type "Leaks," also.
5. If the subcomponent unit-of-measure is "Each" estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
6. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and damage has occurred to subcomponents where the logical repair would be the replacement of a unit (e.g. ceiling tile, window pane, pipe section, etc.) the measurement quantity will be that entire unit even though the actual damage may only encompass portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
7. Assign only one severity level to a given logical replacement area, length, or quantity measured as described in 6 above.
8. If the damage is the result of liquids other than water (e.g. oil), record "Damaged" and clarify with a comment.
9. Tiny isolated dents, chips and gouges at extremely low density (difficult to see or even find) should not be recorded.

Severity Levels:

Low - Distress exists, but superficial.

Medium - Distress exists, but not superficial, nor raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Dent in metal column from collision with forklift
- Dent and hole in metal wall from impact of a forklift tine
- Scratches and chips in masonry wall from vehicle impact
- Dents in gutters from ladders
- Gouges in walls from abuse
- Deformation of roof from flying debris or hail
- Scratched, chipped, frayed, and/or holed ceiling tile from poor handling
- Hole in wall from hammer
- Carpeted wall torn from snag with passing sharp or pointed object
- Wall corner gouged or distorted from collision with a heavy object
- Charred wood column from fire

Deteriorated

Definition:

The natural degradation of the subcomponent through normal usage and/or environmental exposure. This may involve disintegration, erosion, delamination, weathering, checks, warps, bumps, raveling, flaking, pitting, spalling, wear, etc. and/or a change in properties (e.g. brittle). Included are a wearing away and/or thinning of coatings (e.g. paint, varnish, polyvinyl (PVC), etc.)

Notes:

1. "Corroded" and "Rotted" are special cases of "Deteriorated." When they are present, they should be recorded instead of "Deteriorated." Sometimes, "Cracked" and "Moisture/Debris Contaminated" may be a special case of "Deteriorated." Record the distress type "Cracked" or "Moisture/Debris Contaminated" instead of the distress type "Deteriorated" when cracks or contamination are present, respectively.
2. If displacement is occurring along with the natural degradation, record the distress type "Displaced," as well.

3. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the degradation a leak has occurred, record the severity level as High and the distress type "Leaks," also.
4. Paints and coatings that are degraded, but NOT inventoried with the subcomponent, are included in the "Deteriorated" distress type at Low severity. Paints and coatings, inventoried with the subcomponent, that are degraded shall be given a separate paint/coating rating.
5. Do not record Low severity levels for paint or coatings and higher severity levels for the subcomponent at the same locations.
6. If the subcomponent unit-of-measure is "Each" estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
7. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and deterioration has occurred to subcomponents where the logical repair would be the replacement of a unit (e.g. ceiling tile, door, wood cladding sheet, etc.) the measurement quantity will be that entire unit even though the actual deterioration may only encompass a portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
8. Assign only one severity level to a given logical replacement area, length, or quantity measured as described in 7 above.

Severity Levels:

Low - Either of the following exists:

- Distress exists, but superficial.
- Painted or coated surface worn, chipped, blistered, etc. (only when the paint is not being rated separately).

Medium - Distress exists, but not superficial, nor raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals or birds (and possibly insects) is possible and/or likely.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Delamination of brick faces
- Splits in wood members
- Brittle and cracked caulking
- Worn or raveled carpeting
- Warped flooring
- Peeling wallpaper
- Spalled concrete
- Weathered wood deck

Displaced

Definition:

Subcomponent has been moved, deflected, shifted, bulged, rotated, faulted, or settled from its intended position. This may be due to a specific event (e.g. earthquake, collision, failure of another subcomponent, etc.), plastic deformation, or consolidation over time.

Notes:

1. "Displaced" is a special case of either "Damaged" or "Deteriorated." It can be used together or separately from them. This should be used together with "Damaged" only when the subcomponent has been shifted from its normal position and the subcomponent is otherwise damaged. Distortion of the subcomponent either through being damaged or deteriorated does not, in itself, constitute being displaced. If the specific event causing the movement resulted in no other damage, record "Displaced" not "Damaged."
2. "Displaced" should be used together with "Deteriorated" if one or more subcomponent parts have moved and the distress type "Deteriorated," is apparent also.
3. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the displacement a leak has occurred, record the severity level as High and the distress type "Leaks," also.
4. Where displacement has resulted in cracking or vice versa, record the distress type "Cracked," as well.
5. A loose subcomponent may sag due to its weight. In these cases, record "Loose" instead of "Displaced."

6. "Displaced" may possibly occur to an entire Component-Section or to a subcomponent with other subcomponents attached to it. If so, record first to the primary subcomponent. Then, only record for other subcomponents if they have moved relative to the primary subcomponent.

Severity Levels:

Low - Distress exists, but magnitude of movement is slight.

Medium - Distress exists, but not slight, nor raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Leaning chimney or flue
- Uneven sidewalk
- Parapet movement
- Steps separated from building
- Sagging roof truss
- Dislodged door frame
- Open seams or joints in ductwork or gutters
- Light pole leaning after hit by truck
- Bulge in masonry wall resulting from brick unit expansion from moisture
- Floor with excessive deflection

- Sagging ceiling tiles
- Column out-of-plumb

Efflorescence

Definition:

Soluble salts encrusted on the surface of masonry, concrete, or plaster subcomponents caused by moisture leaching free alkalies from mortar or concrete. Efflorescence is typically seen as a white powdery coating.

Severity Levels:

Low - Coating is noticeable and easily brushed off, but the surface is visible.

Medium - Either of the following exists:

- Coating is not easily brushed off.
- Surface is obscured.

Measurement:

Affected Area, Length, or Quantity

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Example:

- White powder on brick or concrete masonry

Electrical Ground Inadequate or Unintentional

Definition:

Unintentional connection of very low resistance causing a short circuit or a high resistance connection resulting in inadequate grounding.

Notes:

1. "Electrical Ground Inadequate or Unintentional" is a special case of impaired operations. When present, record "Electrical Ground Inadequate or Unintentional" instead of

"Operationally Impaired."
2. Record additional distress types, if known, should they be contributing to this distress. These may include "Corroded," "Loose," "Damaged," etc.

Severity Levels:

High - Distress exists

Measurement:

Total Subcomponent Area, Length, or Quantity

Density:

100% (automatic)

Distress Examples:

- Lightning arrestor disconnected or broken
- Connector insulated by paint
- Open or no ground at outlet for interior wiring

Holes

Definition:

Drilling, punching or penetration of a subcomponent for an intended purpose. Penetration depth may be partial or complete.

Notes:

1. Do not record "Holes" along with the distress types "Animal/Insect Damaged," "Broken," "Corroded," "Damaged," "Deteriorated," "Missing," or "Rotten." The presence of holes determines the severity levels for those distress types.
2. Do not record if holes are not in plain view or do not degrade the subcomponent.
3. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the penetration a leak has occurred, record the severity level as High and the distress type "Leaks," as well.
4. Holes resulting from missing fasteners shall not be recorded if the fastener should be replaced. Record "Missing" for the fasteners instead.
5. Do not count pinholes, unless density is sufficient to be noticeable or a leak has occurred.
6. Clusters of four (4) or more Low severity holes shall count as one (1) Medium severity hole.
7. Weep holes shall not be recorded.

Severity Levels:

Low - Partial depth penetration.

Medium - Either of the following:

- Clusters of Low severity holes.
- Distress exists, but not raised to the level of High.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The penetration is adversely affecting the operation of another subcomponent, the parent Component-Section, or another Component-Section.
- The subcomponent is unusable.

Measurement:

Number of Holes

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Holes

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Pipe penetration that is not sealed
- Former anchor holes for signs since removed
- Permanently secured door with door lock removed, but hole for lock remains

Leaks

Definition:

The unwanted entry, passage, or escape of gas or liquid.

Notes:

1. If the leaking gas or liquid is a biological (e.g. herbicide, pesticide, etc.), chemical (e.g. volatile, flammable, explosive, corrosive, etc.), or radioactive hazard, High severity shall be recorded. Also, notify for immediate corrective action.
2. "Leaks" may be recorded without any other distresses.

3. Do not record "Leaks" in conjunction with "Animal/Insect Damaged," "Broken," "Corroded," "Cracked," "Damaged," "Deteriorated," "Displaced," "Holes," "Loose," "Missing," or "Rotten" unless the subcomponent is a tank, pipe, container, trough, pressure vessel or sealant. The loss of liquids or gas (or the gain from a vacuum loss) from those subcomponents as a result of those distresses is the trigger for "Leaks."
4. Leaks from cracks, joints, etc. should be measured as the crack or joint length, etc.

Severity Levels:

Low - Distress exists, but superficial.

Medium - Distress exists, but not raised to the level of High.

High - Any of the following exists:

- Health, life/safety, or security problems.
- Steady rate of flow and loss of air, gas, water, or other liquid of significant concern.
- Pressure or vacuum loss apparent and adversely affecting usage.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the leakage.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- Overall Component-Section, component, or System usage is adversely affected by liquid or gas loss.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Water dripping from hot water heater or pipe connection
- Air escaping from compressed air line
- Boiler tubes dripping water into firebox
- Water dripping from rain gutter
- Leaky faucet

- Loss of seal in a thermopane window causing the window to fog
- Water entering during a storm through failed sealant joint between window and wall

Loose

Definition:

Subcomponent or subcomponent parts are not secured tightly to one or more other subcomponents. Also, one or more fasteners (i.e. bolts, screws, pins, nails and/or rivets) are not tight (torqued to a proper tension).

Notes:

1. If subcomponent is loose due to being "Broken" or "Damaged" do not report "Loose."
2. 2) Fasteners are not considered subcomponents. If any fasteners are loose, record the subcomponent being fastened as “Loose” at Low severity. Estimate density based on the number of similar fasteners needed.
3. If the entire subcomponent is loose, record with a density of 100% at either Medium or High severity, as applicable. Any missing fasteners should be recorded as "Missing."
4. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of being loose a leak has occurred, record the severity level as High and the distress type "Leaks," as well.
5. Subcomponents firmly attached to a loose subcomponent are not loose.

Severity Levels:

Low - Fasteners are loose, but subcomponent is tight.

Medium - Subcomponent is loose, but not raised to the level of *High*.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Loose bolts holding light fixture to wall
- Roof or wall panels flapping in wind
- Non-secured stair railing
- Slackened guy wire
- Squeaky floor or stair when walked or stepped on
- Nail or screws popping out of drywall panel
- Raised nails or screws in a deck or flooring

Missing

Definition:

Subcomponent and/or subcomponent parts including fasteners (i.e. bolts, screws, pins, nails and/or rivets) are required, but absent due to removal, dislodgement, or deterioration.

Notes:

1. If a subcomponent or subcomponent parts are missing resulting in a hole, record "Missing." Do not record "Holes" for this subcomponent. The distress type "Holes" may be valid for the subcomponent to which this subcomponent was attached. See "Holes" definition.
2. If the entire subcomponent is missing and needed, record "Missing" with a density of 100% at either Medium or High severity, as applicable.
3. Fasteners are not considered subcomponents. If any fasteners are missing, record the subcomponent being fastened as “Missing” at Low severity. Estimate density based on the number of similar fasteners needed.
4. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the missing subcomponent a leak has occurred, record the severity level as High and the distress type "Leaks," as well.

Severity Levels:

Low - Fasteners are missing.

Medium - Portion of or entire subcomponent absent, but not raised to the level of *High*.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Holes where fasteners are currently required
- Ceiling tiles removed and never replaced
- Exhaust fan removed, but still needed
- Missing pin in a hinge
- Missing pop rivet from sheet metal panel
- Handrail removed and never replaced
- Ladder rung was loose and fell out

Moisture/Debris Contaminated

Definition:

The unintended presence of foreign material, vegetation, water and/or other liquid.

Note:

1. The presence of moisture, debris, sand, etc. does not necessarily constitute “Moisture/Debris/Mold Contaminated.” The presence must exceed the amount normally expected through typical usage. Cleaning efforts would need to exceed those normally expected from routine housekeeping.

2. "Moisture/Debris/Mold Contaminated" is a special case of either "Damaged" or "Deteriorated." When present, use "Moisture/Debris/Mold Contaminated" instead of either "Damaged" or "Deteriorated."
3. After debris, mold, mildew, etc. removal or cleaning, record "Stained/Dirty" instead of "Moisture/Debris/Mold Contaminated," if staining remains.
4. If the foreign material is dirt, record "Stained/Dirty" instead of "Moisture/Debris/Mold Contaminated."
5. The distress type "Clogged" should be used in addition to "Moisture/Debris/Mold Contaminated" if the presence of leaves, etc. in drains, gutters, downspouts, troughs, screens, etc. is affecting water or air flow.
6. If the unit-of-measure of the subcomponent is "Each," estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
7. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and moisture/debris contamination has occurred to subcomponents where the logical repair would be the replacement of a unit (e.g. room carpeting) the measurement quantity will be that entire unit even though the actual contamination may only encompass portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
8. Assign only one severity level to a given logical repair or replacement area, length, or quantity measured as described in 6) above.

Severity Levels:

Low - Distress exists and damage is superficial.

Medium - Subcomponent is wet or contaminated, but not raised to the level of High

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Cannot be cleaned, dried, or made useable.
- Other subcomponents may be damaged.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B} \times 100$ = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Gutters filled with leaves
- Trash on roof
- The presence of leaves in air handling unit coils
- Leaves present on insect screen to air intake vent
- Wet insulation
- Flood or water damage
- Bird, animal, or insect nest
- Grass growing in cracks in sidewalk
- Moss growing on side of building
- Unintended vines growing up downspout
- Mold or mildew growing on wall

Noise/Vibration Excessive

Definition:

Equipment noise and/or vibration in excess of normal or acceptable levels.

Severity Levels:

Medium - Noise or vibration can be corrected through adjustment.

High - Noise or vibration can only be corrected through replacement of one or more parts.

Measurement:

Each

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Quantity

B = Total Quantity of Subcomponent

Distress Examples:

- Wobbly or squeaky ceiling fan
- HVAC compressor motor with unusual whine
- Transformer with noisy "hum."

Operationally Impaired

Definition:

Subcomponent does not operate properly or at all due to improper installation or construction, misalignment, binding, over tightening, malfunctioning, part failure, or repair/maintenance practices.

Notes:

1. "Operationally Impaired" only applies to subcomponents of components normally associated with "operating." These include, but are not limited to, equipment, doors, windows, light fixtures, etc.
2. If impairment is caused by "Damage," "Corroded," "Animal/Insect Damage," "Rotted," or other distress types, record those distress types at the appropriate severity levels in addition to "Operationally Impaired." "Operationally Impaired" shall not be used with the distress type "Broken." "Operationally Impaired" is recorded used instead of "Broken" if operability is lost, but there is no true separation of pieces or if a separation is unknown.
3. Often, it may appear that the Component-Section as a whole (e.g. air handling unit) or a Component-Section unit (e.g. one door out of two) is operationally impaired. Care must be taken to assign "Operationally Impaired" to the appropriate subcomponent(s).
4. If the Component-Section is a unit that would normally be replaced if it did not operate properly (e.g. residential hot water heater, sump pump, etc.), record "Operationally Impaired" for all of the subcomponents at the appropriate severity level.

Severity Levels:

Low - Subcomponent does not operate ideally.

Medium - Impairment is significant, but not raised to the level of High.

High - Either of the following exists:

- Health, life/safety or security problem.
- No operation of the Component-Section or a Component-Section unit

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Door difficult to close due to high humidity or improperly hung
- Door rattles in breeze
- Window cannot be opened due to over painting
- Window will not stay open
- Bumper installed in incorrect location
- Failed AC compressor
- Improper bend (too sharp) in lightning down conductor
- Sump pump does not work
- No hot water from hot water heater
- Exhaust fan blowing air in wrong direction

Overheated

Definition:

Temperature exceeds normal or acceptable levels.

Notes:

1. If excessive heat has resulted in fire or other damage, the distress type, "Damaged" shall also be recorded at the applicable severity level.
2. If excessive heat has resulted in discoloration, the distress type "Stained/Dirty" shall also be recorded.
3. If evidence exists of overheating, but the subcomponent is not overheated at the time of the condition survey, ensure the problem that caused the overheating has been corrected. If uncertain, record "Overheated" at the appropriate severity level.
4. If evidence (e.g. damage or stains) exists of past overheating, but the overheating no longer exists, do not record "Overheated."

Severity Levels:

Medium - Excessively warm, but otherwise poses no health, life/safety, or operating problem.

High - Excessively warm or hot and poses a health, life/safety, or operating problem.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Excessively warm electrical circuit breaker
- Evidence of heat damage around heater
- Discolored flue

Patched

Definition:

An obvious localized repair to the subcomponent.

Notes:

1. Patched" at Medium and High severities is a special case of deterioration. When present, record "Patched" instead of "Deteriorated."
2. The patch must be obvious. Patches that exist, but are virtually invisible will not be recorded.
3. Patched areas may also experience other distresses unrelated to the performance of the patch itself. Record "Animal/Insect Damaged," "Cracked," "Damaged," or "Stained," as applicable and if present, as well.
4. If a temporary patch has been placed to rectify any other distress type, record that distress type at one severity level lower than it would be without the temporary patch. Record in addition to "Patched."
5. If a patch is recorded as High severity, also record the underlying distress type and severity level for the subcomponent.

Severity Levels:

Low - Permanent patch exists and there is no deterioration.

Medium - Any of the following exists:

- Permanent patch is deteriorated.
- A material mismatch was used to make the patch.
- A temporary patch exists.

High - Patch has failed.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Plaster repair of wall with poor workmanship
- Mastic to repair roof leak
- Pipe collar intended to repair pipe crack or hole
- Substitute prefabricated wall panel
- Color mismatch to replacement parts (when subcomponents are in plain sight)
- Isolated ceiling tile replacement of a different material
- Plywood covering over door or window
- Spackled area or holes in wall, but not painted over

Rotten

Definition:

Fungal or bacterial decay or decomposition resulting in softness, sponginess, disintegration, loss of strength, and/or distortion of the subcomponent.

Notes:

1. "Rotten" is a special case of deterioration. When present, record "Rotten" instead of "Deteriorated."
2. Subcomponent may or may not be accompanied by a musty odor depending on the moisture state at the time of the condition survey.
3. If the unit-of-measure of the subcomponent is "Each," estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
4. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and rotting has occurred to subcomponents where the logical repair would be the replacement of a unit (e.g. window sill, wood cladding, etc.) the measurement quantity will be that entire unit even though the actual rotting may only encompass a portion of that unit. If the subcomponent can be patched, the measurement quantity will only encompass the area to be potentially patched.
5. Assign only one severity level to a given logical repair or replacement area, length, or quantity measured as described in 4) above.

6. If the subcomponent is a tank, pipe, container, trough, pressure vessel, or sealant and as a result of the rot a leak has occurred, record the severity level as High and the distress type "Leaks," as well.

Severity Levels:

Medium - Distress exists.

High - Any of the following exists:

- Health, life/safety, security, or structural integrity problems.
- Other subcomponents, Component-Sections, equipment, furnishings, material, or other building contents may be damaged from the entry of rain, snow, wind, groundwater, etc.
- A leak has resulted in a tank, pipe, container, trough, pressure vessel, or sealant.
- The undesired passage of animals, birds, or insects is occurring.
- The operation of another subcomponent, the parent Component-Section, or another Component-Section is adversely affected.
- The subcomponent is unusable.

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Spongy roof deck
- Decayed soffit and fascia
- Wood column end loss of due to water immersion

Stained/Dirty

Definition:

Subcomponent discoloration resulting from liquids, graffiti, smudges, mildew, mold, moss, algae, soot, dirt, animal waste, or other sources.

Notes:

1. "Stained/Dirty" will not be recorded if normal housekeeping will rectify the problem. Normal housekeeping includes regular or routine vacuuming, dusting, mopping, wiping, etc.
2. "Stained/Dirty" will be recorded if "special" cleaning is needed, including filter cleaning or replacement.
3. If discoloration is due to excessive heat, record "Stained/Dirty" and also record "Over-heated," if applicable.
4. If discoloration is due to efflorescence, the record the distress type "Efflorescence" instead of "Stained/Dirty."
5. If mildew, mold, moss, or algae exist, record "Moisture/Debris/Mold Contaminated" instead of "Stained/Dirty." Only record "Stained/Dirty" if these contaminates have been removed, but a stain remains.
6. If the foreign material is other than dirt (e.g. leaves, vegetation, etc., record "Moisture/Debris/Mold Contaminated" instead of "Stained/Dirty."
7. The distress type "Clogged" should be used in addition to "Stained/Dirty" if the presence of dirt in screens, filters, coils, etc. is affecting air flow.
8. If discoloration is due to corrosion, the actual corroded area will be recorded as "Corroded" at the appropriate severity level, but the remaining area will be recorded as "Stained/Dirty."
9. Stains caused by animals, birds, or insects will be recorded as "Stained/Dirty" and not "Animal/Insect Damage."
10. If color mismatch exists due to a subcomponent part replacement, record "Patched" instead of "Stained/Dirty."
11. If surface is stained or dirty and painted (with paint inventoried as such), do not record "Stained/Dirty" for the section itself, but rate the paint according the definitions in Appendix F.
12. If the unit-of-measure of the subcomponent is "Each," estimate the density if the subcomponent is repairable or 100% if it must be replaced. (See General Notes #10).
13. If the subcomponent unit-of-measure is square feet (square meters) or linear feet (meters) and staining has occurred to subcomponents where the logical repair is the replacement of a unit (e.g. a ceiling tile), the measurement area will be that entire unit even though the actual stain may only encompass a portion of that unit.

Severity Levels:

Low - Distress exists

Measurement:

Affected Area, Length, or Quantity, as appropriate

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area, Length, or Quantity

B = Total Area, Length, or Quantity of Subcomponent

Distress Examples:

- Graffiti spray painted on wall
- Bird droppings
- Rust streaks
- Smudges on wall
- Localized ceiling tile discoloration due to past roof leak
- Widespread ceiling tile discoloration due to smoke, fumes, etc.
- Greasy/oily film on walls in a garage
- Excessively dirty floors in building that has been vacant for years
- Dirty filter reducing air flow
- Dirty cooling coils reducing air flow in an air handling unit

Appendix B: Built-Up Roofing Distress Survey Definitions

General Notes

1. These definitions are applicable to built-up (**BUR**[1]) roofing surfaces and flashing components.
2. Where multiple severity levels are present for a given distress record each separately.
3. Distress quantities or distress density may be recorded. If distress quantities are recorded, density ranges will be computed in BUILDER/BuilderRED. If distress densities are recorded, distress quantities will be blank in BUILDER/BuilderRED.
4. If during the course of the inspection additional occurrences are found of distress-severity combinations, adjust the quantity or density as necessary.
5. To estimate density when distress quantities are not recorded, follow the density definitions for the individual distresses. However, for use in BUILDER, density may be estimated since density ranges are used, not the precise density value. Generalized visual cues are offered below, but may not be applicable for certain distresses.

Density (%)	Visual Cue (when applicable)
>0-0.1%	Difficult to notice even by careful observation, especially if spotty. (up to about 1"x 12" in a 8'x 10' area; ⅛" in 10' length; or 1 in 1000)
>0.1-1%	Somewhat noticeable, but easily missed by casual observation, especially if spotty; Careful observation usually needed, if spotty. (up to about 10"x 12" in a 8'x 10' area; 1¼" in 10' length; or 1 in 100)
>1-5%	Noticeable, even by casual observation, but still only a mere fraction. (up to about 1'x 4' in a 8'x 10' area; 6" in 10' length; or 1 in 20)
>5-10%	Easily noticeable even if spotty; more than a mere fraction. (up to about 1'x 8' in a 8'x 10' area; 1' in 10' length; or 1 in 10)
>10-25%	Readily noticeable, but less than ¼ of area, length, or amount.
>25-50%	Very noticeable, but less than ½ of area, length, or amount.
>50-<100%	Overwhelmingly noticeable; greater than ½ of area, length, or amount.
100%	Entire area, length, or amount.

6. These distress definitions are reproduced from Membrane and Flashing Condition Indexes for Built-Up Roofs, Volume II: Inspection and Distress Manual, USACERL Technical Report M-87/13 by Shahin, Bailey, and Brotherson.

[1]Built-up Roofing

Distress Summary Listing

(BUR) Base Flashing

Definition:

Base flashing is one or more piles of material extend from the roof surface up onto vertical or inclined surface providing a watertight termination of the membrane.

Severity Levels:

Low - Any of the following conditions:

- Loss of surfacing on mineral-surfaced sheets or other poor appearance (including patching) but no apparent deterioration of felts.
- Top of base flashing is less than 6 in. above the roof surface.
- Flashing has permanent repairs.

Medium - Any of the following conditions:

- Slippage, wrinkling, blistering, or pulling of base flashing material.
- Loss of surfacing with some deterioration of felts but no holes, splits, or tears.
- Grease, solvent, or oil drippings on the base flashing but no deterioration of felts.
- Flashing has temporary repairs.

High - Any of the following conditions:

- Holes, split tears in flashing caused by deterioration or physical damage.
- Exposed gaps at the top of the base flashing which are not covered by counter-flashing or open side laps in the flashing which allow water to channel behind them.
- Grease, solvent, or oil drippings on the base flashing with deterioration of the felts.

Measurement:

Measure lineal feet of base flashing having the above conditions. Holes, open side laps, and seams count as 1 ft each. If an area of the base flashing is at medium severity and holes are closer than 6 in., count that entire length of distressed base flashing as high severity.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of base flashing defects (ft)

B = total length of flashed perimeter of roof section being rated including flashings for penthouses, courtyards, and curbed projections)

(BUR) Blisters

Definition:

Blisters are round or elongated raised areas of the membrane which are filled with air.

Note: Blisters and ridges are difficult to differentiate at the low and medium severity levels. The rating error will be insignificant because of the similarity in the deduct curves. At high severity, however, it is important to distinguish between the two distresses due to their different leak potentials.

Severity Levels:

Low - The raised areas are noticeable by vision or feel. The surfacing is still in place and the felts are not exposed

Medium - The felts are exposed or show deterioration.

High - The blisters are broken.

Measurement:

Measure the length and width of the blister in lineal feet and calculate the area (length times width). If the distance between individual blisters is less than 5 ft., measure the entire affected area in sq ft.

Note: When large quantities of this problem are present (especially on large roofs,), the representative sampling technique can be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of membrane blisters (sq ft)

B = total area of roof section being rated (sq ft)

(BUR) Debris And Vegetation

Definition:

Foreign objects on the roof which could damage or puncture the membrane, the growth of vegetation on the roof, and/or the accumulation of solvent and oil drippings on the roof.

Severity Levels:

Medium - Any of the following conditions:

- The collection of foreign objects which are not removed from the roof during the inspection.
- Grease, solvent, or oil drippings on the roof which is causing degradation of the roof membrane.
- Evidence of vegetation, but not penetrating the felts.

High - Any of the following conditions:

- Grease, solvent, or oil drippings on the roof which is causing degradation to the roofing system.
- Vegetation roots that have penetrated the felts.

Measurement:

Measure square feet of affected area. Each isolated case of debris and vegetation of less than 1 sq ft in area should be counted as 1 sq ft.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of debris and vegetation (sq ft)

B = total area of roof section being rated (sq ft)

(BUR) Holes

Description:

A membrane hole is any visible opening which extends through all membrane layers. Holes can be of various sizes and shapes, and can be located anywhere on the roof surface.

Severity Levels:

High - All holes in the membrane are considered high severity due to their high leak potential.

Measurement:

Count the total number of holes in the membrane, If the distance between two holes is less than 1 ft., count them as one hole.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = number of membrane holes

B = total area of roof section being rated (sq ft)

(BUR) Embedded Edge Metal

Definition:

Formed strip of metal at the roof edge which continues down the vertical part of the wall to form a fascia or drip. This stripped-in flashing provides a finished termination for the roofing membrane. A formed vertical projection (gravel stop) may be incorporated to prevent loose aggregate from rolling or washing off the roof. Exterior and interior gutter in a built-in trough of metal or other material which collects water from the roof and carries it to a downspout.

Note: A raised roof edge which is not stripped in, is rated as metal cap flashing and not embedded edge metal.

Severity Levels:

Low - The entire length of embedded edge metal flashings is rated low severity as a minimum due to the maintenance problems associated with it.

Medium - Any of the following conditions:

- The joints in embedded edge metal flashings are rated medium severity as minimum due to the maintenance problems associated with them.
- Nails under the stripping felts are backing out.
- Corrosion of the metal.
- Loose or lifted metal flange without deterioration of the stripping felts.

- The entire length of interior gutter is rated medium severity as a minimum due to the maintenance problems and high potential for leak damage associated with its presence.

High - Any of the following conditions:

- Stripping felts are missing or loose.
- Splits in the stripping felts above the metal joints.
- Holes have occurred through the metal.
- Loose or lifted metal flange with deterioration of the stripping felts.
- Holes or joint movement is present in the interior gutter.

Measurement:

Measure lineal feet of embedded edge metal flashing having the above conditions. Each split above a joint is counted as one foot. As a method of sampling the joints, determine to total number of joints by dividing the total length of embedded edge metal flashing by the length of edge metal sections (normally 10 ft). Every fourth joint should be inspected for splits in the stripping felts. Count the number of inspected joints that are high severity and multiply by 4 to determine the total lineal feet of high severity joints. All other joints are rated medium severity. Multiply the number of inspected joints not rated high severity by 4 to determine the total lineal feet of medium severity joints.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of embedded edge metal flashing defects (ft)

B = total length of flashed perimeter of roof section being rated (including flashings for penthouses, courtyards and curbed projections)

(BUR) Flashed Penetrations

Definition:

Open pipes, plumbing vent stacks, flues, ducts, continuous pipes, guy wires, drain sumps, and other penetrations through the roof membrane (excluding pitch pans but including metal curbing for hatches and ventilators, where the flange is stripped into the membrane).

Severity Levels:

Low - Either of the following conditions:

- Flashing sleeve is deformed.
- Opening in the penetration or flashing is less than 6 in. above the roof surface.

Medium - Any of the following conditions:

- Edge of stripping felts is exposed but there is no apparent felt deterioration.
- Top of flashing sleeve is not sealed or has not been rolled down into an existing plumbing vent stack.
- The sleeve or umbrella is open or no umbrella is present (where required).
- Metal is corroded.

High - Any of the following conditions:

- Flashing sleeve or metal curb has been installed with no stripping felts
- Flashing sleeve or metal curb is cracked, broken, or corroded through.
- No flashing sleeve is present.
- Penetration is not sealed at the membrane level.

Measurement:

Count each distressed flashed penetration as one linear ft at the highest severity level which exists. For metal curbs and ducts with greater than 1 ft of perimeter, count the actual length (in feet) of distressed perimeter.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = lineal feet of distressed flashed penetrations

B = total length of flashed perimeter of roof section being rated (including flashings for penthouses, courtyards and curbed projections)

(BUR) Improper Equipment Supports

Definition:

Improper equipment supports or pipes, conduits, and mechanical equipment supports (wood sleepers, channels, etc) that are placed directly on the membrane below the equipment. Repairing this distress may require replacing the surrounding insulation and membrane.

Severity Levels:

Low - All improper equipment supports are rated low severity as a minimum due to the maintenance problems associated with them.

Medium - Any of the following defects:

- Movement of the support has displaced the membrane, but has not cut or punctured it.
- Equipment is bolted through the membrane but the membrane is sealed and watertight.

High - Any of the following defects:

- Movement of the support has cut or punctured the roof membrane.
- The equipment is bolted through the membrane and the membrane is not sealed, allowing water to penetrate.

Measurement:

Measure square feet of each improper equipment support. The minimum dimensions for the length and width of a support shall be 1 ft.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of improper equipment supports (sq ft)

B = total area of roof section being rated (sq ft)

(BUR) Interior Drains And Roof Level Scuppers

Definition:

A drain is a penetration at the roof membrane which allows water to flow from the roof surface into a piped drainage system. The drain fixture at the roof has a flange and/or clamping arrangement to which the roofing membrane is attached. A roof level scupper is a channel through a parapet or raised roof edge which is designed for peripheral drainage of the roof.

Note: Stripping felts around scuppers should be carefully inspected for holes at corners.

Severity Levels:

Low - Bitumen has flowed into the drain leader but the drain is not clogged.

Medium - Any of the following conditions:

- Stripping felts are exposed but there is no apparent deterioration of felts.
- Strainer is broken or missing.
- Scupper shows loss of paint or protective coating or start of metal corrosion.

High - Any of the following conditions:

- Stripping felts have holes or are deteriorated.
- Clamping ring is loose or missing from drain body or bolts are missing.

- Drain is clogged.
- Scupper metal is broken or holes have occurred through the metal.

Measurement:

Each distressed drain and scupper should be counted once at the highest severity level which exists.

Density:

$\frac{A}{B}$ x 100= Problem Density

A = number of distressed interior drains and roof level scuppers

B = total length of flashed perimeter of roof section being rated (including flashings for penthouses, courtyards and curbed projections)

(BUR) Metal Cap Flashing

Definition:

Metal cap flashing includes counterflashing and any sheet metal coping cap which serves as part of the counterflashing or the cover over a detail such as a roof area divider, equipment curb, raised roof edge, or an expansion joint (including the rubber bellows of an expansion joint).

Note: Counterflashing is the material, usually sheet metal, which protects the top termination of base flashing and sheds water away from it. Counterflashing should be free to expand and contract.

Severity Levels:

Low -Any of the following conditions:

- Loss of paint or protective coating or start of metal corrosion.
- Metal coping cap is deformed and allows water to pond on the top.
- Counterflashing is deformed but still performing its function.
- Counterflashing has been sealed to the base flashing.

Medium - Any of the following conditions:

- Corrosion holes have occurred through the metal on a vertical Surface.
- Metal coping cap has loose fasteners, failure of soldered or sealed joints, open joints, or loss of attachment.
- Sealant at reglet or top of counterflashing is missing or no longer functioning, allowing water to channel behind counterflashing.

- Counterflashing is loose at the top, allowing water to channel behind it.
- Counterflashing does not extend over top of base flashing.

High - Any of the following conditions:

- Metal coping cap or counterflashing is missing or displaced from its original position.
- Corrosion holes have occurred through the metal on a horizontal surface.
- Metal coping cap has mission joint covers where joint covers were originally installed.

Measurement:

Measure lineal feet of metal cap flashing having the above conditions. For individual defects (i.e., joints, holes) count as one foot minimum.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of metal cap flashing defects (ft)

B = total length of flashed perimeter of roof section being rated (including flashings for penthouses, courtyards, and curbed projections)

(BUR) Patching

Description:

Patching is a localized temporary or permanent repair of the membrane using dissimilar materials. Repairs made with similar materials are not counted as patches; distresses associated with these repairs should be recorded in the appropriate category and not as patching distresses.

Severity Levels:

Low - All patches that are not made with similar materials as that of the original construction are rated as low severity as a minimum.

Medium - All patches made with temporary materials (i.e., duct tape, caulking, and sealants) are rated medium severity as a minimum.

High - Other distresses of high severity are present within the patched area (count as patching distress only).

Measurement:

Measure square feet of each patch having the above conditions.

When large quantities of this problem are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of patching (sq ft)

B = total area of roof section being rated (sq ft)

(BUR) Pitch Pans

Definition:

A pitch pan is a flanged metal sleeve placed around a roof-penetrating element and filled with a sealer**.**

Severity Levels

Low - Pitch pans are rated low severity as a minimum due to the maintenance problems associated with them.

High - Any of the following conditions:

- Metal corrosion.
- Sealing material is below metal rim.
- Stripping felts are exposed or deteriorated.
- Sealing material has cracked or separated from pan or penetration.

Measurement:

Each distressed pitch pan should be counted once at the highest severity level which exists.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = number of distressed pitch pans

B = total length of flashed perimeter of roof section being rated (including flashings for penthouses, courtyards, and curbed projections)

(BUR) Ponding

Definition:

Standing water is present or there is evidence of ponding by the presence of staining. Water which remains after 48 hr. is considered ponded water.

Severity Levels:

Low - Ponding is rated low severity due to the maintenance problems associated with it.

Measurement:

Measure square feet of affected area.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of ponding (sq ft)

B = total area of roof section being rated (sq ft)

(BUR) Ridges

Definition:

Ridges are long, narrow (usually less than 3 in.), raised portions of the roof membrane. Their maximum height is about 2 in. Usually ridges occur directly above the insulation board joints and run perpendicular or parallel to the felts. They include all the plies and therefore are generally stiffer than blisters.

Note: Blisters and ridges are difficult to differentiate at the low and medium severity. The rating error will be insignificant because of the similarity in the deduct curves. However at the high severity, it is important to distinguish between the two distresses due to their different leak potentials.

Severity Levels:

Low - The ridges are noticeable but the felts are not exposed.

Medium - The ridges are raised and clearly visible. The surfacing on the ridge is gone and the top felt is exposed.

High - Either of the following conditions:

- Open breaks have developed in the ridge.
- Felt deterioration has progressed through the top ply. exposing underlying plies.

Measurement:

Measure lineal feet of ridges running in all directions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total length of membrane ridges (ft)

B = total area of roof section being rated (sq ft)

(BUR) Slippage

Description:

Slippage is a downslope lateral movement of felt plies. Slippage usually occurs on roofs with slopes greater than ¼ in./ft.

Severity Levels:

Low - Less than 2 in. of slippage has occurred, evidenced by the presence of narrow bare strips perpendicular to the slope.

Note: Low severity slippage requires inspection at 6 month intervals.

High - More than 2 in. of slippage has occurred. There is evidence of humping and wrinkling.

Measurement:

Measure square feet of affected roof area. The affected area extends from the high point on the slope where bare felts are noticeable, down to the low point of the slope or the area where humping and wrinkling are noticeable.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total affected area of roof (sq ft)

B = total area of roof section being rated (sq ft)

(BUR) Splits

Definition:

Splits are tears that extend through all membrane felts. They vary in length from a few feet to the length of the roof and in width from a hair-line crack to more than 1 in. Splits generally occur directly above the joints between the long sides of insulation boards and run in the direction the felts were installed.

Severity Levels:

High - An unrepaired split or a repaired split which has started to re-open.

Measurement:

Measure lineal feet of split.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total length of membrane splits (ft)

B = total area of roof section being rated (sq ft)

(BUR) Surface Deterioration

Description:

A built-up roofing membrane will generally have one of the following types of surfacing: Aggregate surface, mineral surface-cap or smooth surface-coated. The membrane surface may show any of the following distressed condition:

- Lack of top surface or coating.
- Alligatoring (interconnected hairline cracks that resemble alligator hide).
- Lack of adhesion between the membrane plies.

Note: Walkways are treated as part of the membrane surfacing.

Severity Levels:

Low - Any of the following conditions:

- On aggregate surfaced roofs, the aggregate is not embedded or is poorly embedded but the felts remain covered with aggregate.
- Open edge laps or fishmouths.

- On smooth surfaced roofs, there is evidence of crazing of top surface with hairline cracks (alligatoring).
- Walkways shows loss of surfacing, loss of adhesion, cracks, blistering or cracked coating.

Medium - Any of the following conditions:

- On aggregate surfaced roofs, the aggregate is displaced and the top coat of bitumen is exposed.
- On mineral surfaced-cap sheet roofs, the mineral granules have come off the cap sheet, exposing the underlying felt.
- On smooth surfaced roofs, no surface coating exists or there is a loss of surface coating.
- On smooth surfaced roofs, alligator cracks extend down through the bitumen to the top felt.

High - Any of the following conditions:

- On aggregate surfaced roofs, the aggregate cover has been displaced and the bitumen pour coat is deteriorated, leaving the underlying felts exposed. The felts may be deteriorated.
- On mineral surfaced-cap sheet roofs, the cap sheet felt is deteriorated.
- On smooth surfaced roofs, alligator cracks extend down through one or more plies.
- Shrinking of the walkway has torn the membrane below it.

Measurement:

Measure square feet of each affected area and rate at highest severity level which exists.

Note: When large quantities of this problem are present (especially on large roofs), the representative sampling technique can be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of surface deterioration (sq ft)

B = total area of roof section being rated (sq ft)

Appendix C: Single Ply Roofing Distress Survey Definitions

General Notes

1. These definitions are applicable to Single Ply roofing surfaces and flashing components.
2. Where multiple severity levels are present for a given distress record each separately.
3. Distress quantities or distress density may be recorded. If distress quantities are recorded, density ranges will be computed in BuilderRED. If distress densities are recorded, distress quantities will be blank in BuilderRED.
4. If during the course of the inspection additional occurrences are found of distress-severity combinations, adjust the quantity or density as necessary.
5. To estimate density when distress quantities are not recorded, follow the density definitions for the individual distresses. However, for use in BUILDER, density may be estimated since density ranges are used, not the precise density value. Generalized visual cues are offered below, but may not be applicable for certain distresses.

Density (%)	Visual Cue (when applicable)
>0-0.1%	Difficult to notice even by careful observation, especially if spotty. (up to about 1"x 12" in a 8'x 10' area; ⅛" in 10' length; or 1 in 1000)
>0.1-1%	Somewhat noticeable, but easily missed by casual observation, especially if spotty; Careful observation usually needed, if spotty. (up to about 10"x 12" in a 8'x 10' area; 1¼" in 10' length; or 1 in 100)
>1-5%	Noticeable, even by casual observation, but still only a mere fraction. (up to about 1'x 4' in a 8'x 10' area; 6" in 10' length; or 1 in 20)
>5-10%	Easily noticeable even if spotty; more than a mere fraction. (up to about 1'x 8' in a 8'x 10' area; 1' in 10' length; or 1 in 10)
>10-25%	Readily noticeable, but less than ¼ of area, length, or amount.
>25-50%	Very noticeable, but less than ½ of area, length, or amount.
>50-<100%	Overwhelmingly noticeable; greater than ½ of area, length, or amount.
100%	Entire area, length, or amount.

6. These distress definitions are reproduced from Membrane and Flashing Condition Indexes for Single-Ply Membrane Roofs-Inspection and Distress Manual, USACERL Technical Report FM-93/11 by Bailey, Brotherson, Tobiasson, Foltz, and Knehans.

Distress Summary Listing

(SP) Base Flashing-Coated Metal

Definition:

Base flashing material is composed of membrane-coated metal. The metal extends from the roof surface upwards above the plane of the membrane providing a watertight termination of the membrane.

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or light corrosion.
- Distortion of joint covers.
- Top of flashing is less than 6 in. above the roof surface.
- Exposed fasteners.

Medium - Any of the following defects:

- Joint cover is unbonded to metal base flashing, but does not allow water to penetrate.
- Coated metal base flashing fasteners are loose.
- Coated metal base flashing has pulled away from the wall or curb or has lifted up but top termination is watertight.
- Crazing or eroding of the joint cover material that has not worn through and does not allow water to penetrate.
- Coated metal base flashing has repairs made with dissimilar materials.

High - Any of the following conditions:

- Holes in metal base flashing.
- Hole in joint cover or unbonding of joint cover from metal base flashing, allowing water to penetrate.
- Exposed gaps at top termination of the base flashing.
- Coated metal base flashing has pulled away from the wall or curb or has lifted up, allowing water to penetrate (rate full section of metal, normally a 10-ft length).

Measurement:

Measure length (ft) of base flashing having the above conditions. Holes, open side laps, and seams count as 1 ft each. Each joint cover having a hole is counted as 1 ft. As a method of sampling the joint covers for ballasted systems, determine the total number of existing joints by dividing the total length of coated metal base flashing by the length of metal sections (usually 10 ft). Every fourth joint should be inspected for defects in the cover strip. Count the number of inspected joints having a specific defect and multiply by 4 to determine the total length of the defect.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of base flashing defects (ft)

B = total length of flashed perimeter of roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Base Flashing-Membrane Material

Definition:

Base flashing is composed of membrane material or other flexible material. The base flashing extends from the roof surface upward above the plane of the membrane to provide a watertight termination of the membrane.

Severity Levels:

Low - Any of the following defects:

- Light crazing or eroding of the base flashing.
- Top of the base flashing is less than 6 in. above the membrane
- Nailing strip or flashing batten with exposed fasteners is less than 6 in above the roof surface.
- Seam or side lap is open less than ½ in.
- Flashing has repairs with compatible materials.

Medium - Any of the following defects:

- Crazing or eroding of the base flashing that has worn through to a reinforcement or scrim sheet or down to another layer of different color, or has resulted in obvious loss of sheet thickness.
- Slippage, wrinkling, blistering, pulling, unbonding, or bridging of base flashing material that does not allow water to penetrate.
- The presence of solvents, oil, or other chemicals with deterioration of the base flashing but does not allow water to penetrate.
- Flashing has repairs made with dissimilar materials.
- Seam or side lap is open more than ½ in. but does not allow water to penetrate the flashing.
- Loose or missing termination bar where no counterflashing is used.
- Loose or missing nailing strip.

High - Any of the following defects:

- Crazing or eroding of the base flashing that has worn through the flashing allowing water to penetrate.
- Holes, splits, or tears in base flashing, allowing water to penetrate.
- Exposed gaps at top of the base flashing.
- Seam or side lap is open through its entire width, allowing water to penetrate the flashing.
- Holes through the base flashing caused by solvent, oil, or other chemicals.

Measurement:

Measure length (ft) or base flashing having the above conditions. Holes, open side laps, and seams count as 1 ft each.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of base flashing defects (ft)

B = total length of flashed perimeter of roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Debris and Vegetation

Definition:

Debris and vegetation includes the presence of foreign objects, vegetation, fungal growth, solvents, oils, or other chemicals that could damage, puncture, or degrade the membrane.

Notes:

1. Accumulation of oils and grease can present a significant fire hazard and should be reported immediately.
2. Do not rip out vegetation that is growing into the waterproofing systems, as that may allow water to penetrate.

Severity Levels:

Medium - Any of the following defects:

- Vegetation that has not penetrated the membrane.
- Degradation of the membrane caused by solvents, oil, or other chemicals.
- Foreign materials that are not removed from the roof during the inspection.

High - Any of the following defects:

- Vegetation that has penetrated the membrane.
- Degradation of the membrane caused by solvent, oils, or other chemicals allowing water to penetrate.

Measurement:

Measure square feet of debris and vegetation having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of debris and vegetation (sq ft)

B = total area of roof section being rated (sq ft)

(SP) Defective Seams

Definition:

Defective seams include incomplete, damaged, or weak seams that join two sheets of a membrane.

Note: For EPDM and polyvinyl chloride (PVC) membranes, all field seams should have lap sealant at the edges. All other membranes should have lap sealant at cut edges of seams that have exposed reinforcement material.

Severity Levels:

Low - Any of the following defects:

- Missing lap sealant at field seam (EPDM) and PVC membranes only).
- Missing lap sealant at field seam which has exposed reinforcement material at seam edge (usually at end laps and field-cut edges of sheets).
- Seam is open less than ½ in.
- Wrinkling at seam that is watertight.
- Seam intersections (e.g., T-joints) on EPDM that do not have a patch covering them.
- Blisters within the seam.

Medium - Any of the following defects:

- Seam is open ½ in. or more, but does not allow water to penetrate the membrane.
- Pinch wrinkle at seam.

High - Any of the following conditions:

- Seam is open through is entire depth, allowing water to penetrate.
- Fishmouths, wrinkles, or bunches at the seam that allow water to penetrate.

Measurement:

- For exposed membranes (no overlying ballast), inspect all seams visually.
- For ballasted roofs, check field seams at five different locations on the roof section. Clear ballast from 5 ft of the seam at each location that clean the exposed seam with a whisk broom. If all checked seams are without defects, assume the remaining field seams are satisfactory. If any defects are found, use the following sampling technique:
    - For roof sections with sheet widths of 10 ft or less, inspect 2 percent of the total length of field seams (2 ft every 100 ft of seam). For roof sections having sheet widths greater than 10 ft, inspect 4 percent of the total length of field seams (2 ft every 50 ft of seam). Measure length of each specific seam defect found.
    - Extrapolate to determine the total length of seam defects for the entire roof section from the total length of defect found. When 2 percent of the seams are inspected, multiply the actual defect length by 50 to compute total length of defect. When 4 percent of the seams are inspected, multiply actual defect length by 25 to compute total length of defect.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total length of defective seams (ft)

B = total area of roof section being rated (sq ft).

(SP) Embedded Edge Metal

Definition:

Embedded edge metal is a formed strip of metal at the edge of the roof that continues down the vertical part of the wall to form a fascia or drip edge. This stripped-in flashing provides a finished termination for the roofing membrane. On all but coated-metal flashing systems, the metal is placed on top of the membrane, and fastened to the deck through it. To make the area watertight, the metal is covered with membrane or flashing material (i.e., it is stripped in). Coated metal systems have their edge metal placed before the membrane. The membrane is adhered to the top of the coated metal, thereby eliminating the need to have it stripped in. A formed vertical projection (gravel stop) may be incorporated to prevent ballast from rolling or washing off the roof. Exterior and interior gutters, which are embedded in the membrane, are considered embedded edge metal. (an interior gutter is a built-in trough of metal or other material that collects water from the roof and carries it to a drain or downspout.)

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or light corrosion.
- Termination battens have exposed fasteners.
- Stripping material is open less than ½ in.
- Distortion of joint covers.
- For coated metal edge flashings that are not stripped in, membrane is open less than ½ in.

Medium - Any of the following defects:

- Joint cover is unbonded to embedded edge metal, but does not allow water to penetrate.
- Nails under stripping material are backing out.
- Stripping material is crazing, checked, or cracked.
- Stripping material is open more than ½ in., but edge metal fasteners are not exposed.
- Loose or lifted metal with deterioration of the stripping material.
- Embrittled joint stripping material.
- The entire length of interior gutter is rated medium as a minimum due to the potential for leak damage.
- For coated metal edge flashing that are not stripped in, membrane is open more that ½ in. but does not allow water to penetrate.

High - Any of the following conditions:

- The stripping material is missing or open and edge metal fasteners are exposed, or stripping material has holes, cuts or tears, allowing water to penetrate.
- Hole in joint cover or unbonding of joint cover from embedded edge metal, allowing water to penetrate.

- Holes through the metal.
- Holes associated with loose or lifted embedded edge metal.
- Holes in interior gutter.
- For coated metal edge flashing that are not stripped in, membrane is open allowing water to penetrate.

Measurement:

Each split above a joint is counted as 1 ft. As a method of sampling the embedded edge metal joints for ballasted systems, determine the number of joints by dividing the total length of embedded edge metal flashing by the length of the edge metal sections (often 10 ft). Gravel should be moved at every fourth joint and the stripping material inspected for splits. Count the number of inspected joints having a specific defect and multiply by four to determine the total length of the defect.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of embedded edge metal flashing defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Flashed Penetrations

Definition:

This category includes pipes, plumbing vent stacks, flues, ducts, conduits, guy wires, drain sumps, and other penetrations through the roof membrane (excluding pitch pans but including metal curbing for hatches and ventilators, where the metal flange is stripped into the membrane or, in the case of some coated metal flashing systems, the membrane is adhered to the top of the coated metal flange, thereby eliminating the need to have it stripped in).

Severity Levels:

Low - Any of the following defects:

- Flashing sleeve is deformed.
- Stripping material, boot, or membrane (for coated metal flashing sleeves) is open less than ½ in.
- Top of flashing is less than 6 in. above the membrane.

Medium - Any of the following defects:

- Stripping material is crazing, checked, or cracked.
- Stripping material, boot, or membrane (for coated metal flashing sleeves) is open more than ½ in. but does not allow water to penetrate the flashing.
- Top of flashing sleeve or boot is not sealed or is not rolled down into the existing plumbing vent stack.
- Clamping band is loose or missing (where required).
- Umbrella is open or no umbrella is present (where required).
- Corrosion of metal or delamination of coating.

High - Any of the following conditions:

- Stripping material has holes, cuts, or tears.
- Stripping material, boot, or membrane (for coated metal flashing sleeves) is open, allowing water to penetrate.
- Holes, cuts, or tears in flashing sleeve or metal curb.
- No flashing sleeve present.
- Incompatible flashing material has been used.

Measurement:

Count each small distressed flashed penetration as 1 ft at the highest severity level present. For metal curbs and ducts with more than 1 ft of perimeter, measure the length (in ft) of the distressed perimeter.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of distressed flashed penetration (ft)

B = total length of flashed perimeter of roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Holes, Cuts, and Abrasions

Definition:

Holes and cuts are membrane distresses caused by physical abuse from tools, traffic, debris, gravel, wind, etc., or manufacturing defects such as pinholes. Holes and cuts can be of various shapes and sizes. Abrasion is physical damage that has roughened or worn the membrane surface.

Severity Levels:

Low - Surface scratches or abrasions with no significant loss of membrane thickness.

Medium - Cuts, gouges, or abrasions with loss of membrane thickness but not fully penetrating the membrane.

High - Any of the following defects:

- Holes, cuts, gouges, or abrasions that penetrate the membrane.
- Holes, through the membrane caused by underlying mechanical fasteners.

Measurement:

Count the total number of scratches, gouges, holes, and cuts in the membrane. If the distance between distresses is less than 1 ft, count the distresses as one. If the distress is longer than 1 ft, measure the length. Measure area of abrasion in square feet.

When large quantities of this problem are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total number and/or length of membrane scratches, gouges, holes, and cuts (ft) or total area of abrasion (sq ft).

B = total area or roof section being rated (sq ft).

(SP) Improper Equipment Supports

Definition:

Improper equipment supports or pipes, conduits, and mechanical equipment supports (wood sleepers, channels, etc) that are placed directly on the membrane below the equipment. Repairing this distress may require replacing the surrounding insulation and membrane.

Severity Levels:

Low - All improper equipment supports are rated low severity as a minimum due to the maintenance problems associated with them.

Medium - Any of the following defects:

- Movement of the support has displaced the membrane, but has not cut or punctured it.
- Equipment is bolted through the membrane but the membrane is sealed and watertight.

High - Any of the following defects:

- Movement of the support has cut or punctured the roof membrane.
- The equipment is bolted through the membrane and the membrane is not sealed, allowing water to penetrate.

Measurement:

Measure square feet of each improper equipment support. The minimum dimensions for the length and width of a support shall be 1 ft.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of improper equipment supports (sq ft)

B = total area of roof section being rated (sq ft)

(SP) Interior Drains and Roof Level Scuppers

Definition:

A drain is a penetration of the roof membrane that allows water to flow into a piped drainage system. The drain fixture at the roof has a flange and/or clamping arrangement to which the roofing membrane is attached. A scupper is a channel through a parapet or raised roof edge that is designed to drain the roof. Roof-level scuppers are for primary drainage. Elevated (overflow) scuppers are for emergency drainage.

Note: Most single-ply roofing systems do not require stripping material around the drain.

Severity Levels:

Low - Any of the following defects:

- Field seam within 1 ft of a drain or roof-level scupper.
- Stripping material or membrane is open less than ½ in.

Medium - Any of the following defects:

- Crazing material is crazing, checked, or cracked.
- Stripping material or membrane is open ½ in. or more, but does not allow water to penetrate.
- Strainer is broken or missing
- Scupper shows loss of protective coating or start of metal corrosion.
- Drain has a field seam in the clamming ring.

High - Any of the following conditions:

- Stripping material has holes, cuts or tears, allowing water to penetrate.
- Stripping material or membrane is open, allowing water to penetrate.
- Clamping ring is loose or missing from drain or bolts are missing.
- Drain is clogged.
- Scupper is broken or contains holes.
- Holes, cuts, tears, or abrasions through the membrane within 2 ft of the drain or scupper.

Measurement:

Each distressed drain and scupper should be counted once at the highest severity level present.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = number of distressed interior drains and scuppers (ft)

B = total length of flashing on roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Membrane Deterioration

Definition:

This category includes erosion or crazing or the membrane. Erosion is the wearing away of the membrane surface creating a rough texture. Crazing is hairline cracking of the membrane.

Severity Levels:

Low - Light crazing of the membrane surface.

Medium - Crazing or eroding of the membrane surface that has worn through to a reinforcement or scrim sheet or down to another layer of different color, or has resulted in obvious loss of sheet thickness.

High - Crazing or eroding of the membrane surface that has worn through the membrane allowing water to penetrate.

Measurement:

Measure the square feet of each affected area and rate at the highest severity level present.

When large quantities of this problem are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of membrane deterioration (ft)

B = total area of roof section being rated.

(SP) Membrane Support Deficiencies

Definition:

The surface on which the membrane rests may not be smooth and continuous. For fully adhered membranes, partially adhered membranes, partially adhered membranes, and mechanically attached membranes, this category includes warping, bowing, or shrinking of insulation boards. For ballasted membranes, it includes displaced insulation boards. Localized absence of membrane support may be due to missing components below.

Note: Mechanical fasteners and loose insulation boards are rated as System Securement Deficiencies.

Severity Levels:

Low - Any of the following defects:

- Membrane tension caused by warping or bowing of substrate.
- Uneven joints or gaps more than ½ in. wide, but less than 2 in. between insulation boards.

Medium - Any of the following defects:

- Uneven joints or gaps more than 2 in. wide between insulation boards or absence of substrate support for width of 2 in. or more.
- For ballasted systems, insulation boards have been displaced.
- Lumps indicating presence of foreign material between membrane and substrate.

Measurement:

- Measure square feet of membrane having the above conditions.
- When many of these deficiencies are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of membrane support distress (ft)

B = total area of roof section being rated (sq ft).

(SP) Metal Cap Flashing

Definition:

Metal cap flashing includes any sheet metal that serves to counterflash or cover a detail such as a parapet, firewall, roof area divider, equipment curb, raised roof edge, or an expansion joint, protecting the top termination of the base flashing and shedding water away from it. The metal cap flashing should be free to expand and contract.

Note: Note all single plys are installed with counterflashing to protect the top of the base flashing

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or corrosion without holes.
- Top of counterflashing or metal coping is deformed and allows water to pond on the top.
- Metal cap flashing is deformed but still performing its function.
- Metal cap flashing has been sealed to base flashing

Medium - Any of the following defects:

- Corrosion has caused holes in the metal on a sloping or vertical surface.
- Metal cap flashing has loose fasteners, failure or soldered or sealed joints, or loss of attachment.
- Metal cap flashing has rough edges that are in contact with the base flashing.

High - Any of the following conditions:

- Metal cap flashing is missing or displaced from its original position.
- Corrosion has caused holes in the metal on a horizontal surface.
- Metal cap flashing has open joints or missing joint covers where covers were originally installed.
- Sealant at reglet or top of counterflashing is missing or no longer functional, allowing water to channel behind it.
- Counterflashing is loose at the top allowing water to channel behind it.
- Metal cap flashing does not extend over top of the base flashing.

Measurement:

Measure length (ft) or metal cap flashing having the above conditions. Individual defects (i.e., joints, holes) count as 1 ft minimum.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of metal cap flashing defects (ft)

B = total length of flashed perimeter of roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Patching

Definition:

Patching is a localized temporary or permanent repair of the membrane using dissimilar materials. Repairs made with similar materials are not counted as patches; distresses associated with these repairs should be recorded in the appropriate category and not as patching distresses.

Severity Levels:

Low - All patches that are not made with similar materials as that of the original construction are rated as low severity as a minimum.

Medium - All patches made with temporary materials (i.e., duct tape, caulking, and sealants) are rated medium severity as a minimum.

High - Other distresses of high severity are present within the patched area (count as patching distress only).

Measurement:

Measure square feet of each patch having the above conditions.

When large quantities of this problem are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of patching (sq ft)

B = total area of roof section being rated (sq ft)

(SP) Pitch Pans

Definition:

A pitch pan is a flanged metal sleeve placed around a roof penetration element and filled with a sealer. For pitch pans on ethylene-propylene-diene monomer (EPDM) and Hypalon roofing systems, stripping materials should cover the sides of the metal pan and terminate within the pan below the sealer.

Severity Levels:

Low - All pitch pans are low severity at a minimum due to maintenance requirements.

Medium - Any of the following defects:

- Stripping material is crazing, checked, or cracked.
- Stripping material or membrane (on coated metal pitch pans) is open more than ½ in. but does not allow water to penetrate the flashing.
- Loss of protective coating or corrosion of metal.
- For EPDM and Hypalon, stripping material is not covering the top of the metal pan or does not terminate below the sealer.

High - Any of the following conditions:

- Stripping material has holes, cuts, or tears, allowing water to penetrate through.
- Edge of stripping material or membrane (on coated metal pitch pans) is open, allowing water to penetrate.
- Sealer is below the metal rim, allowing ponding in the pan.
- Sealer has cracked or separated from the pan or penetration.
- Corrosion through the metal pan.

Measurement:

Each distressed pitch pan should be counted once at the highest severity level present.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = number of distressed pitch pans (ft)

B = total length of flashing on roof section being rated (including perimeter flashings and flashings for penthouses, courtyards, and curbed projections)

(SP) Ponding

Definition:

Ponding includes standing water or evidence of standing water by the presence of staining or accumulation of debris. Water that remains longer than 48 hr is considered ponded water.

Severity Levels:

Low - General Ponding is rated low severity.

Medium - Any of the following defects:

- Ponding caused by wrinkles or folds in the membrane that blocks drainage.
- Ponding caused by warping or bowing of the substrate beneath the membrane.

Measurement:

Measure square feet of affected area.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of ponding (sq ft)

B = total area of roof section being rated (sq ft)

(SP) Ridges

Definition:

Ridges are long, narrow (usually less than 3 in.), raised portions of the roof membrane. Usually ridges occur directly above the insulation board joints.

Severity Levels:

Low - All ridges are rated low severity as a minimum.

High - Open breaks have developed in the ridge allowing water to penetrate.

Measurement:

Measure length of ridges running in all directions. When many ridges are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total length of membrane ridges (ft)

B = total area or roof section being rated (sq ft)

(SP) Splits

Definition:

Splits are cracks or tears that extend through the membrane. They vary in length from a few inches to the length of the roof and in width from hair-line to more than 1 in.

Severity Levels:

High - All splits in the membrane are considered high severity due to their leak potential.

Measurement:

Measure length of split.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total length of membrane splits (ft).

B = total area or roof section being rated (sq ft).

(SP) Surface Coating Deterioration

Definition:

Surface coating deterioration includes wear, blistering, or peeling of any surface coating applied for fire protection (such as adhesive coating and sand on an EPDM membrane) or solar reflectivity, but not waterproofing.

Severity Levels:

Low - Color of underlying membrane can be seen through the coating or membrane has lost protection (for membrane with coating protection that does not have sand or mineral matter embedded).

Medium - Membrane area has lost the sand or mineral matter portion of the coating protection (for membrane with coating protection that has sand or mineral matter embedded).

Measurement:

Measure the square feet of each affected area and rate at the highest severity level present.

When large quantities of this problem are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of surface coating deterioration (ft)

B = total area of roof section being rated.

(SP) System Securement Deficiencies

Definition:

For fully adhered membranes, system securement deficiencies include membrane areas (including blisters) that are unattached to the substrate. For mechanically attached membranes, this category includes failed mechanical fasteners. For partially adhered membranes, the category includes membrane that is not adhered at points of attachment. For ballasted membranes, the membrane has areas where ballast is missing or displaced.

Notes:

1. Holes in the membrane caused by mechanical fasteners are rated as Holes.
2. If ballast is redistributed by the inspector to cover bare areas, the areas should not be counted as defects.
3. For defect definitions, “building perimeter” is area within 10 ft of a roof edge. These areas experience high wind uplift pressures.

Severity Levels:

Low - Any of the following defects:

- For fully adhered systems, an area of unattached membrane substrate of 2 sq ft or less.
- For ballasted systems, a bare area of 4 sq ft or less.

Medium - Any of the following defects:

- For fully adhered systems, an area of unattached membrane substrate of greater than 2 sq ft but less than 100 sq ft (less than 25 sq ft at building perimeter).
- For mechanically attached systems, an isolated mechanical fastener that has lost its attachment capability or backed out causing bridging of the membrane.
- For partially adhered systems, an isolated point of attachment that has lost adherence.
- For ballasted systems, a bare area of greater than 4 but less than 100 sq ft (less than 25 sq ft at building perimeter).

High - Any of the following conditions:

- For fully adhered systems, an area of unattached membrane or substrate 100 sq ft of greater (25 sq ft at building perimeter).
- For mechanically attached systems, adjacent mechanical fasteners that have lost their attachment capability or backed out causing bridging of the membrane.
- For partially adhered systems, adjacent points of attachment that have lost adherence.
- For ballasted systems, a bare area of 100 sq ft or greater (25 sq ft at building perimeter).

Measurement:

Measure square feet of membrane having the above conditions. For mechanically fastened and partially adhered systems, count the effective area of unattached membrane.

When large quantities of this problem are present, the representative sampling technique may be used.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of attachment defects (ft)

B = total area of roof section being rated (sq ft).

Appendix D: Shingled Roofing Distress Survey Definitions

General Notes

1. These definitions are applicable to shingled roofing surfaces and flashing components.
2. Where multiple severity levels are present for a given distress record each separately.
3. Distress quantities or distress density may be recorded. If distress quantities are recorded, density ranges will be computed in BuilderRED. If distress densities are recorded, distress quantities will be blank in BuilderRED.
4. If during the course of the inspection additional occurrences are found of distress-severity combinations, adjust the quantity or density as necessary.
5. To estimate density when distress quantities are not recorded, follow the density definitions for the individual distresses. However, for use in BUILDER, density may be estimated since density ranges are used, not the precise density value. Generalized visual cues are offered below, but may not be applicable for certain distresses.

Density (%)	Visual Cue (when applicable)
>0-0.1%	Difficult to notice even by careful observation, especially if spotty. (up to about 1"x 12" in a 8'x 10' area; ⅛" in 10' length; or 1 in 1000)
>0.1-1%	Somewhat noticeable, but easily missed by casual observation, especially if spotty; Careful observation usually needed, if spotty. (up to about 10"x 12" in a 8'x 10' area; 1¼" in 10' length; or 1 in 100)
>1-5%	Noticeable, even by casual observation, but still only a mere fraction. (up to about 1'x 4' in a 8'x 10' area; 6" in 10' length; or 1 in 20)
>5-10%	Easily noticeable even if spotty; more than a mere fraction. (up to about 1'x 8' in a 8'x 10' area; 1' in 10' length; or 1 in 10)
>10-25%	Readily noticeable, but less than ¼ of area, length, or amount.
>25-50%	Very noticeable, but less than ½ of area, length, or amount.
>50-<100%	Overwhelmingly noticeable; greater than ½ of area, length, or amount.
100%	Entire area, length, or amount.

6. These distress definitions are reproduced from ROOFER: Steep Roofing Inventory Procedures and Inspection and Distress Manual for Asphalt Shingle Roofs, CERL Technical Report 99/100 by David M. Bailey.

Distress Summary Listing

(SR) Age Deterioration

Definition:

Age deterioration includes clawing and curling of the shingles, and exposure of the shingle felt/mat due to excessive loss of granules, all of which indicate brittleness. Normally, these are not localized problems but are general conditions found on large areas of the roof, such as individual roof exposures, or the entire roof. The occurrence of these problems indicate aging and reduced service life. Clawing is the turning under of the tab corners of the shingle and curling is the turning up of the tab corners.

Severity Levels:

Low - Any of the following defects:

- Loss of granular surfacing on shingle, but the reinforcement felt or mat is not exposed.
- Erosion of material around the edge of the shingle, normally found less than 1/4 inch from the edge.

Medium - Any of the following defects:

- Corners of the shingle are turned under or up (that is, clawing or curling).
- Loss of granular surfacing on shingle that results in bare spots and exposes reinforcing felt or mat.
- Loss of delamination of loil on loil-surfaced shingle.

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) having age deterioration defects.

B = total area of roof section being rated (sq ft).

(SR) Debris and Vegetation

Definition:

This category includes any of the following items:

- Foreign objects on the roof that could cause damage or puncture the shingles or flashing.
- The growth of vegetation on the roof.
- Accumulation of solvent or oil drippings on the roof.

Severity Levels:

Medium - Any of the following defects:

- Collection of foreign objects or vegetation on the field of the roof.
- Grease, solvent, or oil drippings on the roof but no apparent degradation or the roofing system.
- Evidence of branches making contact with the roof shingles.

High - Any of the following defects:

- Grease, solvent, or oil drippings on the roof that have caused degradation of the roofing shingles.
- Vegetation roots that have penetrated the roof shingles.

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) debris and vegetation defects.

B = total area of roof section being rated (sq ft).

(SR) Edge Metal

Definition:

Formed edge of metal, often referred to as drip edge, placed along eaves and rakes and covered by shingles. The edge metal allows water to drip way from the vertical surfaces and protects underlying building components.

Note: In some cases edge metal may not have been installed. If no edge metal exists for the roof section and there is no evidence that the edge metal was originally installed, do not count its absences as a distress.

Severity Levels:

Medium - Missing or displaced section of edge metal (where originally installed).

Measurement:

Measure length (ft) of edge metal flashing having the conditions described above. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of edge metal defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Exposed Fasteners

Definition:

Shingle fasteners are visible in the field of the roof.

Note: If a shingle fastener has backed out , count it as a hole

Severity Levels:

Medium - A fastener is exposed but not backed out.

Measurement:

Measure the number of exposed fasteners. Individual exposed fasteners count as 1 sq ft minimum. If more than one exposed fastener is found in an area of 1 sq ft, count the distressed area as 1 sq ft.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of exposed fasteners (sq ft) having defects.

B = total area of roof section being rated (sq ft).

(SR) Flashed Penetrations

Definition:

Flashing for open pipes, plumbing vent stacks, attic vents, flues, ducts, continuous pipes, guy wires, and other roof penetrations that require a deck flange integrated into the shingles.

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or corrosion
- Flashing sleeve is deformed.
- Top of flue is less than 5 in. above the roof surface on the upslope side.

Medium - Any of the following defects:

- Exposed fastener in flashing.
- The sleeve or umbrella is open or no umbrella is present (where required).

High - Any of the following defects:

- Edge of deck flange on upslope side of penetration is exposed or visible.
- Edge of deck flange on downslope side of penetration is not overlapping shingles or is sealed to underlying shingles.
- Top of flashing sleeve is not sealed or has not been rolled down into existing plumbing vent stack.
- Flashing sleeve is cracked, broken, or corroded through.
- No flashing sleeve is present.

Measurement:

Count each distressed flashed penetration as 1 ft at the highest severity level present.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of flashed penetrations defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Holes/Splits/Missing Shingles

Definition:

This category of distresses is characterized by holes, splits, cracks, or visible tears in the shingle reinforcing felt or mat, or missing shingles or tabs.

Severity Levels:

Medium - Any of the following defects:

- Holes, splits, or cracks that do not extend down to the underlayment or substrate.
- Misaligned shingle resulting in partial loss of coverage but no exposed underlayment or substrate.
- Missing shingle, but no exposed underlayment or substrate.

High - Any of the following defects:

- Holes or splits that extend down to the underlayment or substrate.
- Misaligned shingle, resulting in exposed underlayment or substrate.
- Missing shingle, resulting in exposed underlayment or substrate.
- Exposed fastener that has backed out. (Note: if fastener has not backed out, count as exposed fastener distress, not a hole).

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) having holes/splits/missing shingle defects.

B = total area of roof section being rated (sq ft).

(SR) Improper Equipment Supports

Definition:

This distress category includes pipe, conduit, and mechanical equipment supports (wood sleepers, channels, etc.) that are placed directly on the roof surface with no protective pad or placed at an insufficient height to allow for maintaining the roofing system below the equipment. Repairing this type of distress may require replacing the surrounding roofing system.

Note: Termination for guy wires are to be rated as flashed penetration distresses.

Severity Levels:

Medium - The equipment is bolted through the shingles and the bolts appear to be sealed.

High - Any of the following defects:

- The support has caused movement or damage to the shingles.
- The equipment is bolted through the shingles and the bolts do not appear to be sealed.

Measurement:

Measure square feet of each improper equipment support. The minimum dimension for length and width of a support shall be 1 foot.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total area of improper equipment supports (sq ft).

B = total area of roof section being rated (sq ft).

(SR) Interior Gutters

Definition:

An interior gutter is a built-in trough of metal or other material that collects water from the roof and carries it to a drain or downspout.

Severity Levels:

Low - Entire length of interior gutter is rated low severity, as a minimum, due to the maintenance problems and high potential for leak damage associated with its presence.

High - Any of the following defects:

- Clogged gutter or drain.
- Holes or open seams in interior gutter.

Measurement:

Measure entire length of gutter having the conditions described above. For clogged gutters, count lineal feet of clogging material. For clogged drain, count as 1 ft. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of gutter defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Lumps/Ridges/Sags

Definition:

Lumps, ridges, or sags are present on the surface of the roof.

Note: If other problems exist in the areas that exhibit lumping, sagging, or ridging, record them under the appropriate distresses.

Severity Levels:

Medium - Any of the following defects:

- Lumps or ridges that do not appear to be caused by unevenness in the supporting substrate or underlying flashing component (i.e., wrinkles in the underlying felt).
- Lumps, ridges, or sags caused by unevenness in the supporting substrate or underlying flashing component.

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) having lumps/ridges/sags defects.

B = total area of roof section being rated (sq ft).

(SR) Metal Apron Flashing

Definition:

Roof-to-wall sheet metal flashing used at the upslope and downslope sides of chimneys, dormers, curbs, and other projections. Apron flashing should be placed at the downslope side of the projection with the edge of the deck flange exposed. The metal apron at the upslope side of the projection should have the edge of the deck flange covered by overlaying shingles. A projection that is wider than 2 ft should have a saddle-shaped cricket that diverts water around the projection.

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or corrosion.
- Vertical height is less than 4 in. high.

Medium - Any of the following defects:

- Absence of cricket on upslope side of penetration that is wider than 2 ft.
- Exposed fastener in flashing.

High - Any of the following defects:

- Edge of deck flange on upslope side of penetration is exposed or visible.
- Edge of deck flange on downslope side of penetration is not overlapping shingles or is sealed to underlying shingles.
- Holes, splits, or cracks in metal flashing.
- Metal flashing is open at vertical corner.
- No apron flashing exists.

Measurement:

Measure length (ft) of metal apron flashing having the conditions described above. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of flashing defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Metal Cap Flashing

Definition:

Metal cap flashing includes counterflashing and any sheet metal coping cap that serves as part of the counterflashing or cover over a detail such as roof area divider, equipment curb, expansion joint, step flashing, ridge, or hip. Metal cap flashing protects the top termination of the vertical flashing (step flashing or metal apron flashing) and sheds waters away from it. It should be free to expand and contract. Properly lapped exterior siding or cladding can perform the function of metal cap flashing.

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or corrosion.
- Metal coping cap is deformed, allowing water to pond on the top.
- Counterflashing is deformed but still functioning.
- Counterflashing has been sealed to the step flashing.
- Exposed fasteners on horizontal surfaces of metal cap flashing.

Medium - Any of the following defects:

- Corrosion holes are present in the metal on a vertical surface.
- Metal coping cap has loose fasteners, failure of soldered or sealed joints, open joints, or loss of attachment.

High - Any of the following defects:

- Metal coping cap or counter flashing was not installed, or is missing or displaced from its original position, allowing water to channel behind it.
- Corrosion holes are present in the metal on a horizontal surface.
- Metal coping cap has missing joint covers (where originally installed).
- Sealant at reglet or top of counterflashing is missing or no longer functioning, allowing water to channel behind counterflashing.

- Counterflashing, exterior siding, or cladding does not extend over the top of the step flashing or apron flashing.

Measurement:

Measure length (ft) of metal cap flashing having the conditions described above. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of metal cap flashing defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Patching

Definition:

Roof repairs were previously made using dissimilar materials such as mastics or shingles of a different color or design.

Severity Levels:

Low - Replacement shingle does not match appearance or composition of original adjacent shingles.

Medium - Shingle replacement patch is composed of dissimilar materials such as mastic, roofing felts, or coatings.

High - Shingle replacement patch composed of dissimilar materials, that have other high severity distresses (i.e., holes, splits, and cracks).

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) having patching defects.

B = total area of roof section being rated (sq ft).

(SR) Pitch Pans

Definition:

A pitch pan is a flanged sleeve with an open bottom that is placed around a roof penetration and filled with a bituminous, polymeric, or grout sealant to seal the area around the penetration.

Severity Levels:

Medium - Top rim of pitch pan is not level on all sides.

High - Any of the following defects:

- Holes, splits, or cracks in metal.
- Sealing material is below metal rim.
- Sealing material has cracked or separated from pan or penetration.
- Edge of deck flange on upslope side of penetration is exposed.
- Edge of deck flange on downslope side of penetration is not overlapping shingles or is sealed to underlying shingles.

Measurement:

Count each distressed pitch pan once at the highest severity level present.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = number of distressed pitch pans (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Ridge/Hip Shingles

Definition:

Portions of shingles (usually one tab width) that are cut from a full 3-tab shingle and laid perpendicular to the hip or ridge, providing a finished water-shedding cap. Note: Ridge and Hip Shingles are treated as flashings because they provide protection of the roofing system at the termination of adjoining roof planes.

Severity Levels:

Medium - Any of the following defects:

- Holes, splits, or cracks not extending down to the underlayment or substrate.
- Misaligned shingle resulting in partial loss of coverage but no exposed underlayment or substrate.
- Missing shingle, but no exposed underlayment or substrate.
- Exposed fasteners that has not backed out.

High - Any of the following defects:

- Holes or splits that extend down to the underlayment or substrate.
- Misaligned shingle resulting in exposed underlayment or substrate.
- Missing shingle resulting in exposed underlayment or substrate.
- Exposed fastened that has backed out.

Measurement:

Measure lineal feet of exposure of ridge or hip shingle tabs having the conditions described above. Round total quantity to next higher whole foot. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of ridge or hip shingles having defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Ridge/Hip Vents

Definition:

Any device installed on and along the roof ridge or hip for the purpose of ventilating the underside of the roof deck.

Severity Levels:

Medium - Missing component of vent assembly (i.e., end caps, baffles, etc.).

High - Any of the following defects:

- Missing or loose section of ridge or hip vent.
- Holes, splits, or cracks in ridge or hip vent.
- Missing cap shingle on roof vent.

Measurement:

Measure length (ft) of ridge/hip vent flashing having the conditions described above. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of ridge/hip vent flashing defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Stains/Rust/Fungus/Mildew

Definition:

The shingle surface shows evidence of stains, rust, fungus, or mildew.

Note: If the appearance is unacceptable, corrective treatments can be applied, such as cleaning with trisodium hypochlorate or installing zine strips.

Severity Levels:

Low - Evidence of stains, rust, fungus, or mildew.

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) having stains/rust/fungus/mildew defects.

B = total area of roof section being rated (sq ft).

(SR) Step Flashing

Definition:

Individual pieces of metal flashing material used to flash vertical walls, chimneys, dormers, and other projections. The pieces range from 7 to 10 in. long and have a 90-degree bend with a horizontal and a vertical leg. The pieces are individually placed at the end of each course of shingles where the roof meets a vertical surface. They are overlapped and "stepped up" the slope, and are fastened through the horizontal surface to the deck. Step flashing should be used only to flash a vertical surface that runs up a slope, and not across the slope.

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or corrosion of step flashing.
- Overlay roof system shingles are not step flashed.
- Coverages of less than one step flashing unit per shingle course exists.

Medium - Any of the following defects:

- Vertical leg of step flashing is less than in. high.
- Bent, deformed, or wide gaps in vertical leg of step flashing.
- Loose or displaced step flashing
- Vertical joints between step flashing pieces have been sealed closed.
- Continuous "L" flashing exists instead of incremental step flashing.

High - Any of the following defects:

- Holes exists in the step flashing.
- No vertical flashing exists.
- Top edge of step flashing is exposed, allowing water to penetrate behind flashing.

Measurement:

Measure length (ft) of step flashing having the conditions described above. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of step flashing defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

(SR) Unsealed/Unlocked Tab

Definition:

For a seal-down shingle, a lack of adhesion between the tab of a shingle and underlying shingles indicates an unsealed condition. Displacement or damage to a lock-down shingle that results in the loss of its interlocking mechanism indicates an unlocked condition.

Note: For seal-down shingles, use a trowel or fingers and gently try to lift tab. Any adherence of the shingle tab to underlying shingles should be judged as adequate. Test several adjacent shingles in three or four randomly selected areas of the roof. If any shingles are found to be unsealed, use the sampling method to determine the quantity of the affected area.

Severity Levels:

Medium - Any of the following defects:

- The tab of a shingle, that is designed to be sealed down is unsealed.
- A lock-down shingle is not interlocked.

Measurement:

Measure the exposed area (sq ft) of shingles having the above conditions.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = total exposed area of shingles (sq ft) unsealed/unlocked defects.

B = total area of roof section being rated (sq ft).

(SR) Valley Flashing

Definition:

Roof valley flashings are formed when two sloping sections intersect to form a “V”. Water from both sections of roof runs through the valley making it especially vulnerable to deterioration and leakage. Valley flashings for asphalt shingles may be of three types: (1) open valleys lined with sheet metal or mineral-surfaced asphalt roll (composition) material, (2) closed cut valleys having shingles on one side of the valley cut on an angle parallel with the valley, and (3) woven valleys

lined with interwoven asphalt shingles form the adjoining roof sections. All three types of valley flashings should have underlying asphalt roll material.

Severity Levels:

Low - Any of the following defects:

- Loss of protective coating or corrosion on metal open valley flashing.
- No fabricated "V" crimp (vertical ridge) in center of metal open valley flashing.

Medium - Any of the following defects:

- Loss of surfacing with exposure of felts in valley flashing.
- Unsealed laps in open composition valley flashing.
- Holes, splits, or cracks in valley flashing not extending down to the underlayment.
- Loose or missing valley shingles with no underlayment or substrate exposed.
- Edges of valley shingles are sealed (in open or closed valleys).
- Exposed fasteners within 12 in. of centerline of closed or woven valley.

High - Any of the following defects:

- Holes or splits in valley flashing with underlayment or substrate exposed.
- Loose or missing valley shingles with underlayment or substrate exposed.
- Exposed fastener within 12 in. of centerline of open valley.

Measurement:

Measure length (ft) of valley flashing having the conditions described above. Individual defects count as 1 ft minimum. If the distance between distresses is less than 1 ft, count the distresses as one.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = length of valley flashing defects (ft)

B = total length of flashing on roof section being rated (including perimeter flashings such as flashing, edge metal, ridge and hip shingles, and valley flashings; and curb flashings around large penetrations such as dormers and skylights).

Appendix E: Direct Condition Rating Definitions

Table E-1. Direct Condition Rating Definitions

Rating	SRM[1] Needs	Rating Definition
Green (+)	Sustainment consisting of possible preventive maintenance (where applicable)	Entire Component-Section or Component-Section sample free of observable or known distress
Green	Sustainment consisting of possible preventive maintenance (where applicable) and minor repairs (corrective maintenance) to possibly few or some subcomponents.	No Component-Section or sample serviceability or reliability reduction. Some, but not all, minor (non-critical) subcomponents may suffer from slight degradation or few major (critical) subcomponents may suffer from slight degradation.
Green (-)		Slight or no serviceability or reliability reduction overall to the Component-Section or sample. Some, but not all, minor (non-critical) subcomponents may suffer from minor degradation or more than one major (critical) subcomponent may suffer from slight degradation.
Amber (+)	Sustainment or restoration to any of the following: Minor repairs to several subcomponents; or Significant repair, rehabilitation, or replacement of one or more subcomponents, but not enough to encompass the Component-Section as a whole; or Combinations thereof	Component-Section or sample serviceability or reliability is degraded, but adequate. A very few, major (critical) subcomponents may suffer from moderate deterioration with perhaps a few minor (non-critical) subcomponents suffering from severe deterioration.
Amber		Component-section or sample serviceability or reliability is definitely impaired. Some, but not a majority, major (critical) subcomponents may suffer from moderate deterioration with perhaps many minor (non-critical) subcomponents suffering from severe deterioration.
Amber (-)		Component-section or sample has significant serviceability or reliability loss. Most subcomponents may suffer from moderate degradation or a few major

[1]Sustainment, Restoration, & Modernization

		(critical) subcomponents may suffer from severe degradation.
Red (+)		Significant serviceability or reliability reduction in component–section or sample.A majority of subcomponents are severely degraded and others may have varying degrees of degradation.
Red	Sustainment or restoration required consisting of major repair, rehabilitation, or replacement to the component- section as a whole.	Severe serviceability or reliability reduction to the Component-Section or sample such that it is barely able to perform. Most subcomponents are severely degraded.
Red (-)		Overall Component-Section degradation is total. Few, if any, subcomponents salvageable. Complete loss of Component-Section or sample serviceability.

Appendix F: Paint Rating Definitions

Table F-1. Paint/Coating Rating Definitions

Rating	% Deteriorated	Relative Amount Deteriorated
Green (+)	0.00-0.03	Up to about 1” x 4” in a 8' x 10’ area; 1/32” in a 10’ length; or 3 in 10,000
Green	0.03 – 0.10	Between about 1” x 4” and 1” x 12” in a 8’ x 10’ area; 1/32” and ⅛” in a 10’ length; or 3 and 10 in 10,000
Green (-)	0.10 – 0.30	Between 1” x 12” and 3” x 12” in a 8’ x 10’ area; ⅛” and ⅜” in a 10’ length, or 1 and 3 in 1000
Amber (+)	0.30 – 1.00	Between 3” x 12” and 10” x 12” in a 8’ x 10’ area; ⅜” and 1¼” in a 10’ length; or 3 and 10 in 1000
Amber	1.00 – 3.00	Between 10” x 12” and 18” x 18” in a 8’ x 10’ area; 1¼” and 3¾” in a 10’ length; or 1 and 3 in 100
Amber (-)	3.00 – 10.0	Between 1’ x 2½’ and 1’ x 8’ in a 8’ x 10’ area; 3¾” and 12” in a 10’ length; or 3 and 10 in 100
Red (+)	10.0 – 17.0	Between 1' x 8’ and 1¾' x 8’ in a 8’ x 10’ area; 1’ and 1¾’ in a 10’ length; or 10 and 17 in 100
Red	17.0 – 33.0	Between 1¾’ x 8’ and 3⅓’ x 8’ in a 8' x 10’ area; 1¾’ and 3⅓’ in a 10’ length; or 17 and 33 in 100
Red (-)	33.0 - 100	Greater than 1/3 of area, length, or amount

Appendix G: Color Chart for Direct Ratings

Rating	SRM Needs	Rating Definition
Green (+)	Sustainment consisting of possible preventive maintenance (where applicable).	Entire component-section or component-section sample free of observable or known distress.
Green	Sustainment consisting of possible preventive maintenance (where applicable) and minor repairs (corrective maintenance) to possibly few or some subcomponents.	No component-section or sample serviceability* or reliability* reduction. Some, but not all, minor (non-critical) subcomponents may suffer from slight degradation or few major (critical) subcomponents may suffer from slight degradation.
Green (-)		Slight or no serviceability or reliability reduction overall to the component-section or sample. Some, but not all, minor (non-critical) subcomponents may suffer from minor degradation or more than one major (critical) subcomponent may suffer from slight degradation.
Amber (+)	Sustainment or restoration to any of the following: Minor repairs to several subcomponents; or Significant repair, rehabilitation, or replacement of one or more subcomponents, but not enough to encompass the component-section as a whole; or Combinations thereof.	Component-section or sample serviceability or reliability is degraded, but adequate. A very few, major (critical) subcomponents may suffer from moderate deterioration with perhaps a few minor (non-critical) subcomponents suffering from severe deterioration.
Amber		Component-section or sample serviceability or reliability is definitely impaired. Some, but not a majority, major (critical) subcomponents may suffer from moderate deterioration with perhaps many minor (non-critical) subcomponents suffering from severe deterioration.
Amber (-)		Component-section or sample has significant serviceability or reliability loss. Most subcomponents may suffer from moderate degradation or a few major (critical) subcomponents may suffer from severe degradation.
Red (+)	Sustainment or restoration required consisting of major repair, rehabilitation, or replacement to the component-section as a whole.	Significant serviceability or reliability reduction in component–section or sample. A majority of subcomponents are severely degraded and others may have varying degrees of degradation.
Red		Severe serviceability or reliability reduction to the component-section or sample such that it is barely able to perform. Most subcomponents are severely degraded.
Red (-)		Overall component-section degradation is total. Few, if any, subcomponents salvageable. Complete loss of component-section or sample serviceability.

Appendix H: Functionality Sub-Issue Definitions

(FA) Access - Egress

Issue: Access

Sub-Issue: Egress

Definition:

Egress from the building (or functional area) is difficult and slow.

Severity Levels:

Red - Egress from the building (or functional area) is slow and/or difficult, posing a life safety issue.

Amber - Egress from the building (or functional area) is slow and/or difficult, but life safety is not an issue.

Green(+) - Egress from the building (or functional area) is quick and easy.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Protrusions block the path of egress in the building (or functional area).
- Not enough exits from the building in the building (or functional area).
- Egress route is not slip-resistant in the building (or functional area).

(FA) Access - Entry

Issue: Access

Sub-Issue: Entry

Definition:

Entry into the building (or functional area) is slow and/or difficult.

Severity Levels:

Red - Entry into the building (or functional area) is slow and/or difficult, posing a life safety issue or adversely affecting the mission to a significant degree.

Amber - Entry into the building (or functional area) is slow and/or difficult, but life safety is not an issue and the mission is not affected to the level of red.

Green (+) - Entry into the building (or functional area) is quick and easy.

Examples:

- Building (or functional area) entrance is not large enough for equipment entry.
- Not enough doors at building (or functional area) entrance for occupant usage at peak usage.

(FA) Access - Signage

Issue: Access

Sub-Issue: Signage

Definition:

The directional, informational, and room signage in and around the building (or functional area) is inadequate.

Severity Levels:

Red - Directional, informational and room signage in and around the building (or functional area) is inadequate, adversely affecting the mission to a significant degree.

Amber - Directional, informational and room signage in and around the building (or functional area) is inadequate, but the mission is not affected to the level of red.

Green (+) - Directional, informational and room signage in and around the building (or functional area) is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- No room numbers are posted in the building (or functional area).
- Inaccurate directional signage posted in the building (or functional area).
- Out-dated informational signage posted in the building (or functional area).

(FA) ADA Grandfathered

Issue: Americans with Disabilities Act (ADA)

Sub-Issue: Grandfathered Buildings (or Functional Areas)

Definition:

A building (or functional area) built before July 26, 1992 that does not meet the ADA standards and does not have users that require compliance.

Severity Levels:

Red - The ADA standards are not met in the building (or functional area), and there are users that require ADA compliance.

Amber - The ADA standards are not met in the building (or functional area), but there are no users that require ADA compliance.

Green(+) - The ADA standards are met in the building (or functional area) or the building (or functional area) is exempt.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- No accessible route of travel to upper floors.
- There are not enough accessible parking spots.
- Emergency systems do not have flashing lights and audible signals.

(FA) ADA Non-Grandfathered

Issue: Americans with Disabilities Act (ADA)

Sub-Issue: Non-Grandfathered Buildings (or Functional Areas)

Definition:

The building (or functional area) was built after July 26, 1992 and does not meet the ADA standards.

Severity Levels:

Red - The ADA standards are not met in the building (or functional area).

Green(+) - The ADA standards are met in the building (or functional area).

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- There is no accessible restroom in the building.
- Slope of accessibility ramp is too steep.
- Entrance doors are not wide enough for wheelchair entrance.

(FA) Aesthetics - Exterior

Issue: Aesthetics

Sub-Issue: Exterior

Definition:

The quality and appearance of the exterior of the building does not create a positive impression on the public and the building occupants.

> **Note**: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Amber - The quality and appearance of the exterior of the building does not create a positive impression on the public and the building occupants.

Green (+) - The quality and appearance of the exterior of the building creates a positive impression on the public and the building occupants.

Examples:

- The exterior of the building does not appear proportional.
- The exterior of the building has a lack of detail.

(FA) Aesthetics - Functional Area

Issue: Aesthetics

Sub-Issue: Functional Area

Definition:

The quality and appearance of the functional area does not create a positive impression on the public and the building occupants.

> **Note**: This sub-issue only appears in the second tier of the functionality assessment.

Severity Levels:

Amber - The quality and appearance of the functional area does not create a positive impression on the public and the building occupants.

Green (+) - The quality and appearance of the functional area creates a positive impression on the public and the building occupants.

Examples:

- The functional area does not appear proportional.
- The functional area has a lack of detail.

(FA) Aesthetics - Interior

Issue: Aesthetics

Sub-Issue: Interior

Definition:

The quality and appearance of the interior of the building does not create a positive impression on the public and the building occupants.

> **Note**: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Amber - The quality and appearance of the interior of the building does not create a positive impression on the public and the building occupants.

Green(+) - The quality and appearance of the interior of the building creates a positive impression on the public and the building occupants.

Examples:

- The interior of the building does not use a variety of materials.
- Building services are not well integrated with the interior of the building.

(FA) Anti-Terrorism/Force Protection (ATFP)

Issue: Anti-Terrorism/Force Protection (ATFP)

Sub-Issue: Requirements and Recommendations

Definition:

The building (or functional area) does not meet the ATFP requirements and recommendations.

Severity Levels:

Red - The applicable ATFP requirements are not met in the building (or functional area).

Amber – The ATFP requirements are met, but the ATFP recommendations are not met in the building (or functional area).

Green (+) - The ATFP requirements and recommendations are met in the building (or functional area).

Density:

Automatically computed by BUILDER

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Standoff distances are not met.
- Mailroom does not have a separate ventilation system.
- Masonry walls are not reinforced.

(FA) Building Services - Compressed Air System

Issue: Building (or Functional Area) Services

Sub-Issue: Compressed Air System

Definition:

The compressed air system in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no compressed air system or the compressed air system violates code or is inadequate (pressure or capacity), adversely affecting the mission to a significant degree.

Amber - The compressed air system is inadequate, but the mission is not affected to the level of red.

Green (+) - The compressed air system is adequate.

*If the building (or functional area) does not have and does not require a fuel distribution system, rate this sub-issue "**N/A**[1]."

Examples:

- The compressed air system has inadequate pressure.
- The compressed air system is contaminated.
- The compressed air system does not serve all necessary parts of the building (or functional area).

(FA) Building Services - Electrical Distribution Capacity

Issue: Building (or Functional Area) Services

Sub-Issue: Electrical Distribution Capacity

Definition:

The electrical distribution in the building (or functional area) is inadequate.

Severity Levels:

Red - Circuit breakers trip due to an overload of the distribution system, posing a life safety issue or adversely affecting the mission to a significant degree.

Amber - Circuit breakers trip due to an overload of the distribution system, but life safety is not an issue and the mission is not affected to the level of red.

Green (+) - The distribution system is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

[1]Not Applicable

Examples:

- Circuit breakers trip occasionally when computers and printers are running at the same time.
- Circuit breakers trip when every time refrigerator, electric stove, and microwave are running at the same time.

(FA) Building Services - Electrical Grounding

Issue: Building (or Functional Area) Services

Sub-Issue: Electrical Grounding

Definition:

The electrical distribution system is grounded inadequately in the building (or functional area).

Severity Levels:

Red - The electrical system is not grounded or grounded inadequately.

Green (+) - The electrical system is grounded adequately.

Examples:

- Electrical system is not grounded at all.
- Electrical ground connection is inadequate.

(FA) Building Services - Electrical Outlets

Issue: Building (or Functional Area) Services

Sub-Issue: Electrical Outlets

Definition:

The electrical outlets in the building (or functional area) are inadequate.

Severity Levels:

Red - Electrical outlets are inadequate, violating code, posing a life safety issue, and/or adversely affecting the mission to a significant degree.

Amber - Electrical outlets are inadequate, but codes are not violated, life safety is not an issue, and the mission is not affected to the level of red.

Green (+) - Electrical outlets are adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Electrical Outlets in the Building (or Functional Area)

B = Total Number of Electrical Outlets in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- There are not enough electrical outlets in the building (or functional area).
- The electrical outlets are in poor locations throughout the building (or functional area).

(FA) Building Services - Fuel Distribution System

Issue: Building (or Functional Area) Services

Sub-Issue: Fuel Distribution System

Definition:

The fuel distribution system in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no fuel distribution system* or the fuel distribution system violates code and/or is inadequate adversely affecting the mission to a significant degree.

Amber - A substitute or temporary fuel is used instead of the required fuel system (i.e. propane tanks).

Green (+) - The fuel distribution system is adequate.

*If the building (or functional area) does not have and does not require a fuel distribution system, rate this sub-issue "**N/A**[1]."

[1]Not Applicable

Examples:

- The fuel distribution system has inadequate pressure.
- The fuel distribution system has inadequate capacity to serve all parts of the building (or functional area).
- Propane tanks are used in the production area instead of hooking into the natural gas line.

(FA) Building Services - Gas System

Issue: Building (or Functional Area) Services

Sub-Issue: Oxygen (or Other Gas) System

Definition:

The oxygen (or other gas) system in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no oxygen (or other gas) system* or the oxygen (or other gas) system violates code or is inadequate (pressure or capacity), adversely affecting the mission to a significant degree.

Amber - The oxygen (or other gas) system is inadequate, but the mission is not affected to the level of red.

Green (+) - The oxygen (or other gas) system is adequate.

*If the building (or functional area) does not have and does not require an oxygen or other gas distribution system, rate this sub-issue "**N/A**[1]."

Examples:

- The oxygen system is contaminated.
- The nitrogen system has inadequate pressure.
- There is no hydrogen system in the building (or functional area), and it is necessary for the mission.

(FA) Building Services - Hot Water Supply

Issue: Building (or Functional Area) Services

Sub-Issue: Hot Water Supply

[1]Not Applicable

Definition:

The hot water supply in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no hot water supply or the water supply is inadequate, posing a health problem or adversely affecting the mission to a significant degree.

Amber - The hot water supply is inadequate, but health is not a problem and the mission is not affected to the level of red.

Green (+) - The hot water supply is adequate.

Examples:

- The water in the building (or functional area) cannot be heated to the necessary temperature.
- There is not enough hot water in the building (or functional area).
- There is no hot water connection in the building (or functional area).

(FA) Building Services - Industrial Wastewater Removal

Issue: Building (or Functional Area) Services

Sub-Issue: Industrial Wastewater Removal System

Definition:

The industrial wastewater removal system is inadequate in the building (or functional area).

Severity Levels:

Red - There is no industrial waste removal system, or the industrial waste removal system violates code or is out of date/undersized.

Amber - The industrial waste removal system is exempt from current compliance, but future modernization will be required.

Green (+) - The industrial waste removal system is adequate.

Examples:

- The industrial wastewater removal system has an inadequate capacity.
- The industrial wastewater removal system is in violation of local codes
- The industrial wastewater removal system is obsolete.

(FA) Building Services - Internal Power Supply

Issue: Building (or Functional Area) Services

Sub-Issue: Internal Power Supply

Definition:

The internal power supply, such as a generator, within the building (or functional area) is inadequate.

Severity Levels:

Red - The components assigned to the generator do not receive the appropriate power, posing a life safety issue or adversely affecting the mission to a significant degree.

Amber - The components assigned to the generator do not receive the appropriate power, but life safety is not an issue and the mission is not affected to the level of red.

Green (+) - The internal power supply is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Components not Receiving Appropriate Power in the Building (or Functional Area)

B = Total Number of Components on Power Supply in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Lighting fixtures are not connected to generator.
- Generator runs out of power in a half hour before it needs to be recharged.
- Only half of the computers receive adequate power from the generator.

(FA) Building Services - IT System

Issue: Building (or Functional Area) Services

Sub-Issue: Information Technology (IT) System

Definition:

The IT system in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no IT system or the IT system is obsolete and/or has insufficient connections, adversely affecting the mission to a significant degree.

Amber - The IT system is slowed or bogged down and/or has insufficient connections, but the mission is not affected to the level of red.

Green (+) - The IT system is adequate.

Examples:

- Dial-up internet services are used instead of high-speed internet services.
- There is an inadequate number of IT hookups in the building (or functional area).
- The IT system does not serve all necessary parts of the building (or functional area).

(FA) Building Services - Telephone System

Issue: Building (or Functional Area) Services

Sub-Issue: Telephone System

Definition:

The telephone system in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no telephone system or the telephone system is obsolete, experiences frequent outages, and/or has insufficient instruments, adversely affecting the mission to a significant degree.

Amber - The telephone system experiences occasional outages, has static/interference, and/or has insufficient instruments, but the mission is not affected to the level of red.

Green (+) - The telephone system is adequate.

Examples:

- Not enough telephone hook-ups in the building (or functional area).
- Obsolete rotary phones are used in the building (or functional area).
- Phone hooks-ups are in poor locations in the building (or functional area).
- The voicemail system is obsolete.

(FA) Building Services - Plumbing Fixtures

Issue: Building (or Functional Area) Services

Sub-Issue: Plumbing Fixtures

Definition:

The plumbing fixtures in the building (or functional area) are inadequate.

Severity Levels:

Red - The plumbing fixtures are inadequate, adversely affecting the mission to a significant degree.

Amber - The plumbing fixtures are inadequate, but the mission is not affected to the level of red.

Green (+) - The plumbing fixtures are adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Plumbing Fixtures in the Building (or Functional Area)

B = Total Number of Plumbing Fixtures in the Building (or Functional Area)

Density Ranges:

- 1%-10%
- 10%-25%
- 25% - 50%
- 50% - 100%

Examples:

- There are not enough sinks in the building (or functional area).
- Water fountain is in a dead end hallway.
- Water fountains are metal when they should be ceramic.

(FA) Building Services - Stand-Alone Wastewater Removal System

Issue: Building (or Functional Area) Services

Sub-Issue: Stand-Alone Wastewater Removal System

Definition:

The stand-alone wastewater removal system is inadequate in the building (or functional area).

Severity Levels:

Red - There is no stand-alone wastewater removal system, or the wastewater removal system violates code and/or is out of date/undersized.

Amber - The stand-alone wastewater removal system is exempt from current compliance, but future modernization will be required.

Green (+) - The stand-alone wastewater removal system is adequate.

Examples:

- A septic tank is used instead of connecting to the municipal line.
- The stand-alone wastewater removal system has an inadequate capacity.
- The stand-alone wastewater removal system is in violation of local codes.

(FA) Building Services - Security System

Issue: Building (or Functional Area) Services

Sub-Issue: Security System

Definition:

The security system in the building (or functional area) is inadequate for the associated threat level.

> **Note:** If the building (or functional area) does not have or require a security system, rate this sub-issue "**N/A**[1]."

Severity Levels:

Red - There is no security system or the security system is inadequate for threat.

Green (+) - The security system is adequate for threat.

Examples:

- There are an inadequate number of intruder detection devices in use.
- There is no alarm system, and one is required.
- There locations of the security cameras in the building (or functional area) are inadequate.

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[1]Not Applicable

(FA) Building Services - Specialty Water Supply

Issue: Building (or Functional Area) Services

Sub-Issue: Specialty Water Supply

Definition:

The specialty water supply in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no specialty water supply or the water supply is inadequate, posing a health problem or adversely affecting the mission to a significant degree.

Amber - The specialty water supply is inadequate, but health is not a problem and the mission is not affected to the level of red.

Green (+) - The specialty water supply is adequate.

Examples:

- The water in the building (or functional area) is not deionized.
- The water in the building (or functional area) is not distilled.

(FA) Building Services - Uninterruptible Power Supply

Issue: Building (or Functional Area) Services

Sub-Issue: Uninterruptible Power Supply (UPS)

Definition:

The UPS in the building (or functional area) is inadequate.

Severity Levels:

Red - The components assigned to the UPS do not receive the appropriate power, posing a life safety issue or adversely affecting the mission to a significant degree.

Amber - The components assigned to the UPS do not receive the appropriate power, but life safety is not an issue and the mission is not affected to the level of red.

Green (+) - The uninterruptible power supply is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Components not Receiving Appropriate UPS in the Building (or Functional Area)

B = Total Number of Components on UPS in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Emergency lighting fixtures are not connected to UPS.
- Only a quarter of the critical equipment is connected to the UPS.
- UPS only supplies power for one hour before shutting down.

(FA) Building Service - Water Supply

Issue: Building (or Functional Area) Services

Sub-Issue: Water Supply

Definition:

The water supply in the building (or functional area) is inadequate.

Severity Levels:

Red - There is no water supply or the water supply is inadequate, posing a health problem or adversely affecting the mission to a significant degree.

Amber - The water supply is inadequate, but health is not a problem and the mission is not affected to the level of red.

Green (+) - The water supply is adequate.

Examples:

- There is inadequate water pressure in the building (or functional area).
- The water is not potable in the building (or functional area).

(FA) Building Size and Configuration - Configuration

Issue: Building (or Functional Area) Size and Configuration

Sub-Issue: Configuration

Definition:

The configuration of the building (or functional area) is inadequate.

Severity Levels:

Red - The building (or functional area) configuration is inadequate, adversely affecting the mission to a significant degree.

Amber - The building (or functional area) configuration is inadequate, but the mission is not affected to the level of red.

Green(+) - The building (or functional area) configuration is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Protrusions in the building (or functional area).
- Irregular floor shapes in the building (or functional area) hindering furniture placement.
- Outdated design of the building (or functional area).
- Inadequate movement through the building (or functional area) due to configuration.

(FA) Building Size and Configuration - Overcrowding

Issue: Building (or Functional Area) Size and Configuration

Sub-Issue: Overcrowding

Definition:

The building (or functional area) is inadequately sized and is overcrowded.

Severity Levels:

Red - The building (or functional area) is overcrowded, adversely affecting the mission to a significant degree.

Amber - The building (or functional area) is overcrowded, but the mission is not affected to the level of red.

Green (+) - The building (or functional area) is not overcrowded.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Building occupant load exceeds maximum allowed in the building (or functional area).
- There is not have enough room in the building (or functional area) to perform mission to the highest ability.

(FA) Building Size and Configuration - Occupant Interaction

Issue: Building (or Functional Area) Size and Configuration

Sub-Issue: Occupant Interaction

Definition:

The level of occupant interaction in the building (or functional area) is inadequate.

Severity Levels:

Red - The building (or functional area) does not encourage the appropriate level of occupant interaction, adversely affecting the mission to a significant degree.

Amber - The building (or functional area) does not encourage the appropriate level of occupant interaction, but the mission is not affected to the level of red.

Green (+) - The building (or functional area) encourages the appropriate level of occupant interaction.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The building (or functional area) has an inadequate number of areas where interaction can occur between users.
- The building (or functional area) has inadequately sized areas where informal interaction can occur between users.

(FA) Comfort - Cooling Capacity

Issue: Comfort

Sub-Issue: Cooling Capacity

Definition:

The HVAC system does not have the capacity to adequately cool the building (or functional area).

Severity Levels:

Red - The building (or functional area) cannot be adequately cooled on a regular basis.

Amber - The building (or functional area) cannot be adequately cooled occasionally.

Green (+) - The building (or functional area) can be adequately cooled.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The building (or functional area) cannot be adequately cooled throughout the summer.
- The building (or functional area) cannot be adequately cooled, but only on the hottest days of the year.

(FA) Comfort - Dehumidification Capacity

Issue: Comfort

Sub-Issue: Dehumidification Capacity

Definition:

The HVAC system does not have the capacity to adequately dehumidify the building (or functional area).

Severity Levels:

Red - The building (or functional area) cannot be adequately dehumidified on a regular basis.

Amber - The building (or functional area) cannot be adequately dehumidified occasionally.

Green (+) - The building (or functional area) can be adequately dehumidified.

Density:

x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The building (or functional area) cannot be dehumidified throughout the summer.
- The building (or functional area) cannot be adequately dehumidified, but only on the most humid days of the year.

(FA) Comfort - Disruptive Noise

Issue: Comfort

Sub-Issue: Disruptive Noise

Definition:

There is disruptive noise within the building (or functional area).

Severity Levels:

Red - There is disruptive noise within the building (or functional area), adversely affecting the mission to a significant degree.

Amber - There is some disruptive noise within the building (or functional area), but the mission is not affected to the level of red.

Green (+) - There is no disruptive noise within the building (or functional area).

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Overhead vents rattle in the building (or functional area).
- Inadequately muting of exterior noises into the building (or functional area).
- Inadequate muting of surrounding interior noise within the building (or functional area).

(FA) Comfort - Heating

Issue: Comfort

Sub-Issue: Heating Capacity

Definition:

The HVAC system does not have the capacity to adequately heat the building (or functional area).

Severity Levels:

Red - The building (or functional area) cannot be adequately heated on a regular basis.

Amber - The building (or functional area) cannot be adequately heated occasionally.

Green(+) - The building (or functional area) can be adequately heated.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The building (or functional area) cannot be adequately heated throughout the winter.
- The building (or functional area) cannot be adequately heated, but only on the coldest days of the year.

(FA) Comfort - Humidifying

Issue: Comfort

Sub-Issue: Humidification Capacity

Definition:

The HVAC system does not have the capacity to adequately humidify the building (or functional area).

Severity Levels:

Red - The building (or functional area) cannot be adequately humidified on a regular basis.

Amber - The building (or functional area) cannot be adequately humidified occasionally.

Green (+) - The building (or functional area) can be adequately humidified.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The building (or functional area) cannot be humidified throughout the winter.
- The building (or functional area) cannot be adequately humidified, but only on the most arid days of the year.

(FA) Comfort - HVAC Controls

Issue: Comfort

Sub-Issue: HVAC Controls

Definition:

The HVAC controls in the building (or functional area) are inadequate.

Severity Levels:

Red - The HVAC controls are inadequate, adversely affecting the mission to a significant degree.

Amber - The HVAC controls are inadequate, but the mission is not affected to the level of red.

Green (+) - The HVAC controls are adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Area of Inadequate HVAC Control in the Building (or Functional Area)

B = Total Area of HVAC Control (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- HVAC controls are in the incorrect location in the building (or functional area).
- HVAC controls cannot adequately control the HVAC services in the building (or functional area).

(FA) Comfort - Lighting

Issue: Comfort

Sub-Issue: Lighting

Definition:

The lighting in the building (or functional area) is inadequate.

Severity Levels:

Red - The building (or functional area) is inadequately lit, adversely affecting mission to a significant degree.

Amber - The building (or functional area) has inadequate natural lighting and/or is inadequately lit, but the mission is not affected to the level of red.

Green (+) - The building (or functional area) is adequately lit, including natural lighting where applicable.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The building (or functional area) is too dark.
- The building (or functional area) area is too bright.
- There is inadequate natural lighting where necessary in the building (or functional area).

(FA) Comfort - Lighting Controls

Issue: Comfort

Sub-Issue: Lighting Controls

Definition:

The lighting controls in the building (or functional area) are inadequate.

Severity Levels:

Red - The lighting controls are inadequate, adversely affecting the mission to a significant degree.

Amber - The lighting controls are inadequate, but the mission is not affected to the level of red.

Green (+) - The lighting controls are adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Lighting Controls in the Building (or Functional Area)

B = Total Number of Lighting Controls in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Lighting controls are in the incorrect location in the entire building (or functional area).
- Lighting controls in the building (or functional area) do not serve the correct lighting fixtures.
- Dimmers are not used in the building (or functional area).

(FA) Comfort - Ventilation Capacity

Issue: Comfort

Sub-Issue: Ventilation Capacity

Definition:

The HVAC system does not have the capacity to adequately ventilate the building (or functional area).

Severity Levels:

Red - The building (or functional area) cannot be adequately ventilated on a regular basis.

Amber - The building (or functional area) cannot be adequately ventilated occasionally.

Green(+) - The building (or functional area) can be adequately ventilated.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Odors are present in the building (or functional area).
- The building (or functional area) is stuffy.

(FA) Cultural Resources - Second Tier

Issue: Cultural Resources

Sub-Issue: Second Tier

Definition:

For the second tier of assessment there is only one sub-issue for the cultural resources issue, which is determined from the results of the first tier Cultural Resources Wizard results. If the wizard has identified cultural resources within the building, then the following sub-issue question will appear:

"Are the cultural resources/historical aspects identified in the first tier assessment present in this functional area?"

If the wizard has not identified cultural resources within the building, then the following sub-issue wording will appear:

"Results of the first tier assessment identified no cultural resources or historical aspects in the building."

Sub-Issue Responses:

If cultural resources were identified in the building, the following responses are available:

- Yes – The cultural resources/historical aspects identified in the first tier of assessment are present in and affect the functional area.
- No - The cultural resources/historical aspects identified in the first tier of assessment are not present in and do not affect the functional area.

If no cultural resources were identified in the building, then no response is required because this sub-issue does not apply to the functional area.

(FA) Cultural Resources - Archeological Site

Issue: Cultural Resources

Sub-Issue: Archeological Site

Definition:

The building is located on or near a National Register eligible or listed archeological site.

> **Note:** The cultural resources sub-issues are not rated in the same manner as the rest of the sub-issues. Instead of choosing a severity and density, these sub-issues are questions that are answered either "Yes" or "No" to determine if the building has historic or cultural resource aspects.

These sub-issues are not rated like the other sub-issues because there is no inherent "functionality loss" associated with these sub-issues. The objective of these sub-issues is to determine which buildings have historic or cultural resource aspects that would govern the types of work items that can be performed in the building.

Also, these sub-issues only appear in the first tier of the functionality assessment.

Sub-Issue Responses:

Yes – The building is located on or near a National Register eligible or listed archeological site.

No - The building is not on or near a National Register eligible or listed archeological site.

(FA) Cultural Resources - Contributing Resource

Issue: Cultural Resources

Sub-Issue: Contributing Resource

Definition:

The building is a contributing resource in a National Register eligible or listed historic district or cultural landscape.

> **Note:** The cultural resources sub-issues are not rated in the same manner as the rest of the sub-issues. Instead of choosing a severity and density, these sub-issues are questions that are answered either "Yes" or "No" to determine if the building has historic or cultural resource aspects.

These sub-issues are not rated like the other sub-issues because there is no inherent "functionality loss" associated with these sub-issues. The objective of these sub-issues is to determine which

buildings have historic or cultural resource aspects that would govern the types of work items that can be performed in the building.

Also, these sub-issues only appear in the first tier of the functionality assessment.

Sub-Issue Responses:

Yes – The building is a contributing resource in a National Register eligible or listed historic district or cultural landscape.

No - The building is not a contributing resource in a National Register eligible or listed historic district or cultural landscape.

(FA) Cultural Resources - Programmatic Agreement/MOA/MOU

Issue: Cultural Resources

Sub-Issue: Programmatic Agreement/MOA/MOU

Definition:

The building has a Programmatic Agreement or MOA/MOU that would govern the work items (repair, replacement, modernization) in the building.

> **Note:** The cultural resources sub-issues are not rated in the same manner as the rest of the sub-issues. Instead of choosing a severity and density, these sub-issues are questions that are answered either "Yes" or "No" to determine if the building has historic or cultural resource aspects.

These sub-issues are not rated like the other sub-issues because there is no inherent "functionality loss" associated with these sub-issues. The objective of these sub-issues is to determine which buildings have historic or cultural resource aspects that would govern the types of work items that can be performed in the building.

Also, these sub-issues only appear in the first tier of the functionality assessment.

Sub-Issue Responses:

Yes – There is a Programmatic Agreement or MOA/MOU governing the work items in the building.

No - There is no Programmatic Agreement or MOA/MOU in the building.

(FA) Cultural Resources - NAGPRA Sacred Site

Issue: Cultural Resources

Sub-Issue: NAGPRA Sacred Site

Definition:

The building is located on or near a NAGPRA eligible Native American sacred site.

> **Note:** The cultural resources sub-issues are not rated in the same manner as the rest of the sub-issues. Instead of choosing a severity and density, these sub-issues are questions that are answered either "Yes" or "No" to determine if the building has historic or cultural resource aspects.

These sub-issues are not rated like the other sub-issues because there is no inherent "functionality loss" associated with these sub-issues. The objective of these sub-issues is to determine which buildings have historic or cultural resource aspects that would govern the types of work items that can be performed in the building.

Also, these sub-issues only appear in the first tier of the functionality assessment.

Sub-Issue Responses:

Yes – The building is located on or near a National Register eligible or listed archeological site.

No - The building is not on or near a National Register eligible or listed archeological site.

(FA) Cultural Resources - National Register Eligibility

Issue: Cultural Resources

Sub-Issue: National Register Eligibility

Definition:

The building is on or is eligible to be placed on the National Register for historic buildings.

> **Note:** The cultural resources sub-issues are not rated in the same manner as the rest of the sub-issues. Instead of choosing a severity and density, these sub-issues are questions that are answered either "Yes" or "No" to determine if the building has historic or cultural resource aspects.

These sub-issues are not rated like the other sub-issues because there is no inherent "functionality loss" associated with these sub-issues. The objective of these sub-issues is to determine which buildings have historic or cultural resource aspects that would govern the types of work items that can be performed in the building.

Also, these sub-issues only appear in the first tier of the functionality assessment.

Sub-Issue Responses:

Yes – The building is on or eligible for the National Register.

No - The building is not on or eligible for the National Register.

(FA) Cultural Resources - Near a Historic Property

Issue: Cultural Resources

Sub-Issue: Near a Historic Property

Definition:

The building is located near or in the view shed of a National Register eligible or listed historic property, historic district, or cultural landscape?

> **Note:** The cultural resources sub-issues are not rated in the same manner as the rest of the sub-issues. Instead of choosing a severity and density, these sub-issues are questions that are answered either "Yes" or "No" to determine if the building has historic or cultural resource aspects.

These sub-issues are not rated like the other sub-issues because there is no inherent "functionality loss" associated with these sub-issues. The objective of these sub-issues is to determine which buildings have historic or cultural resource aspects that would govern the types of work items that can be performed in the building.

Also, these sub-issues only appear in the first tier of the functionality assessment.

Sub-Issue Responses:

Yes – The building is located near or in the view shed of a National Register eligible or listed historic property, historic district, or cultural landscape.

No - The building is not located near or in the view shed of a National Register eligible or listed historic property, historic district, or cultural landscape.

(FA) Efficiency - Equipment

Issue: Efficiency and Obsolescence

Sub-Issue: Equipment

Definition:

The equipment in the building (or functional area) is inefficient and/or obsolete.

Severity Levels:

Amber - The equipment's technology is ineffective, inefficient, and/or unreliable.

Green (+) - The equipment's technology is effective, efficient, and reliable.

Density:

Automatically computed by BUILDER.

Examples:

- The water pump is energy inefficient.
- The boiler cannot be repaired due to obsolescence (i.e. cannot get repair parts).

(FA) Efficiency - HVAC Controls

Issue: Efficiency and Obsolescence

Sub-Issue: HVAC Controls

Definition:

Efficient HVAC controls in the building (or functional area) are inadequate.

Severity Levels:

Amber - Efficient HVAC controls are inadequate or not used or where applicable.

Green(+) - Efficient HVAC controls are in use and adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate HVAC Controls in the Building (or Functional Area)

B = Total Number of HVAC Controls in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Occupant sensors, timers, etc. are not used where applicable.
- Occupant sensors, timers, etc. do not conserve an adequate amount of energy.

(FA) Efficiency - HVAC Zones

Issue: Efficiency and Obsolescence

Sub-Issue: HVAC Zones

Definition:

The building (or functional area) is inadequately zoned for HVAC to accommodate varying needs for environmental controls.

Severity Levels:

Amber - The building (or functional area) is inadequately zoned for HVAC.

Green (+) - The building (or functional area) is adequately zoned for HVAC.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The restrooms do not have their own ventilation system.
- The kitchen and office area are in the same HVAC zone.

(FA) Efficiency - Insulation

Issue: Efficiency and Obsolescence

Sub-Issue: Insulation

Definition:

The insulation in the building (or functional area) does not meet the building (or functional area) requirements.

Severity Levels:

Amber – The insulation does not meet the building (or functional area) requirements.

Green (+) - The insulation meets the building (or functional area) requirements.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Exterior walls on part of the building (or functional area) have an inadequate R-value.
- The roof has an inadequate insulation type (i.e. rigid when non-rigid is required).

(FA) Efficiency - Lighting Fixtures

Issue: Efficiency and Obsolescence

Sub-Issue: Lighting Fixtures

Definition:

Energy efficient lighting fixtures in the building (or functional area) are inadequate.

Severity Levels:

Amber - Energy efficient lighting fixtures are inadequate or not used where applicable.

Green (+) - Energy efficient lighting fixtures are in use and adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Lighting Fixtures in the Building (or Functional Area)

B = Total Number of Lighting Fixtures in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Energy efficient lighting fixtures are not used anywhere in the building (or functional area) and should be.
- The efficient lighting fixtures in the building (or functional area) do not conserve an adequate amount of energy.

(FA) Efficiency- Lighting Controls

Issue: Efficiency and Obsolescence

Sub-Issue: Lighting Controls

Definition:

Efficient lighting controls in the building (or functional area) are inadequate.

Severity Levels:

Amber - Efficient lighting controls are inadequate or not used or where applicable.

Green (+) - Efficient lighting controls are in use and adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Lighting Controls in the Building (or Functional Area)

B = Total Number of Lighting Control in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Light sensors, timers, photocells, etc. are not used in the building (or functional area) and should be.
- Light sensors, timers, photocells, etc. are energy inefficient for current standards.

(FA) Efficiency- Water Conservation Mechanisms

Issue: Efficiency and Obsolescence

Sub-Issue: Water Conservation Mechanisms

Definition:

The water conservation mechanisms in the building (or functional area) are inadequate.

Severity Levels:

Amber - Water conservation mechanisms are inadequate or not used where applicable.

Green (+) - Water conservation mechanisms are in use and adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Water Conservation Mechanisms in the Building (or Functional Area)

B = Total Number of Water Conservation Mechanisms in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Faucet sensors are not installed in sinks where they are necessary.
- Toilets and urinals have inefficient flush mechanisms installed on them.

(FA) Efficiency- Windows and Doors

Issue: Efficiency and Obsolescence

Sub-Issue: Windows and Doors

Definition:

The windows and doors in the building (or functional area) are energy inefficient.

Severity Levels:

Amber – Energy efficient windows and doors are inadequate or not used where applicable.

Green (+) - Energy efficient windows and doors are in use and adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Number of Inadequate Windows and Doors in the Building (or Functional Area)

B = Total Number of Windows and Doors in the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The windows in the building (or functional area) are single pane when they should be double pane.
- The entry doors into the building (or functional area) are not completely sealed.
- The exterior doors on the building (or functional area) have an inadequate R-Value.

(FA) Environment/Health - Asbestos

Issue: Environment/Health

Sub-Issue: Asbestos

Definition:

Asbestos is present in the building (or functional area).

Severity Levels:

Red - Friable asbestos is present in the building (or functional area), posing a health problem.

Amber - Encapsulated or non-friable asbestos is present in the building (or functional area), but health is not a problem.

Green (+) - No asbestos is present in the building (or functional area).

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Friable asbestos pipes are present in the building (or functional area).
- Encapsulated asbestos insulation is present in the building (or functional area).

(FA) Environment/Health - Flammable/Combustible Material Storage

Issue: Environment/Health

Sub-Issue: Flammable/Combustible Material Storage

Definition:

Flammable/combustible materials are inadequately stored in the building (or functional area).

Severity Levels:

Red - Flammable and combustible materials are inadequately stored in the building (or functional area), posing a life safety issue or violating code.

Green (+) - Flammable and combustible materials are adequately stored in the building (or functional area).

(FA) Environment/Health - Fire and Smoke Warning System

Issue: Environment/Health

Sub-Issue: Fire and Smoke Warning/Detection System

Definition:

The fire and smoke warning/detection system is inadequate in the building (or functional area).

Severity Levels:

Red - The fire and smoke warning/detection system is inadequate, posing a life safety issue or violating code.

Amber - The fire and smoke warning/detection system meets code and life safety is not an issue, but the system could be upgraded.

Green (+) - The fire and smoke warning/detection system is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- There is no fire and smoke/warning detection system in the building (or functional area).
- There are an inadequate number of smoke detectors in the building (or functional area).

(FA) Environment/Health - Fire Suppression Equipment

Issue: Environment/Health

Sub-Issue: Fire Suppression Equipment

Definition:

The fire suppression equipment in the building (or functional area) is inadequate.

Severity Levels:

Red - The fire suppression equipment is inadequate, posing a life safety issue or violating code.

Amber - The fire suppression equipment meets code and life safety is not an issue, but the system could be upgraded.

(+) - The fire suppression equipment is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- There is no sprinkler system in the building (or functional area).
- Halon sprinklers could be used instead of water sprinklers in the building (or functional area).

(FA) Environment/Health - Indoor Air Quality

Issue: Environment/Health

Sub-Issue: Indoor Air Quality (IAQ)

Definition:

The IAQ in the building (or functional area) is inadequate.

Severity Levels:

Red - The IAQ in the building (or functional area) is inadequate, posing a health problem.

Amber - The IAQ is inadequate (or functional area) in the building, but health is not a problem.

Green (+) - The IAQ is adequate (or functional area) in the building (or functional area).

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Toxic chemicals are present in the building (or functional area).
- Multiple users have developed occupational asthma in the building (or functional area).

(FA) Environment/Health - Lead in Water

Issue: Environment/Health

Sub-Issue: Lead in Water

Definition:

Lead is present in the building's (or functional area's) water.

Note: This sub-issue deals with lead in the water only from pipe solder, etc; not water contaminated with lead from the source.

Severity Levels:

Red - Lead is present in the building's (or functional area's) water, posing a health problem.

Amber - Lead is present in the building's (or functional area's) water, but health is not a problem.

Green (+) - No lead is present in the building's (or functional area's) water.

Density:

x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- The amount of lead present in the building's (or functional area's) water is above the safety threshold.
- There is a minimal amount of lead present in the building's (or functional area's) water, but it is below the safety threshold.

(FA) Environment/Health - Lead Paint

Issue: Environment/Health

Sub-Issue: Lead Paint

Definition:

Lead paint is present in the building (or functional area).

Severity Levels:

Red - Lead paint is present in the building (or functional area), posing a health problem.

Amber - Lead paint is present in the building (or functional area), but health is not a problem.

Green (+) - No lead is present in the building (or functional area).

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Lead paint is flaking off the walls in the building (or functional area).
- Lead paint is painted over and sealed with a non-lead based paint in the building (or functional area).

(FA) Environment/Health - Lightening Protection

Issue: Environment/Health

Sub-Issue: Lightning Protection

Definition:

The building (or functional area) has inadequate lightning protection

Severity Levels:

Red - The building (or functional area) has inadequate or no lightning protection.

Green (+) - The building (or functional area) has adequate lightning protection.

Examples:

- There is no lightning protection on parts of the roof where it is necessary.
- The lightning protection has inadequate connections.

(FA) Environment/Health - Polychlorinated Biphenyls

Issue: Environment/Health

Sub-Issue: Polychlorinated Biphenyls (PCBs)

Definition:

PCB's are present in the building (or functional area).

Severity Levels:

Red - PCB's are present in the building (or functional area), posing a health problem or violating code.

Amber - PCB's are used in the building (or functional area), but health is not a problem and codes are not violated.

Green (+) - No PCB's are present in the building (or functional area).

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Exposed PCB's are present in the building (or functional area).
- Encapsulated PCB's are present in the lighting fixtures in the building (or functional area).

(FA) Environment/Health - Radon

Issue: Environment/Health

Sub-Issue: Radon

Definition:

Radon is present in the building (or functional area).

Severity Levels:

Red - Radon is present in the building (or functional area), posing a health problem.

Amber - Radon is present in the building (or functional area), but health is not a problem.

Green (+) - No radon is present in the building (or functional area).

Examples:

- Radon is present in the building (or functional area), and it is above the threshold of safety.
- Radon is present in the building (or functional area), but it is below the threshold of safety.

(FA) Location - Airfield Safety Clearance

Issue: Location

Sub-Issue: Airfield Safety Clearance

Definition:

The building is located in an airfield safety clearance.

> **Note:** This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Red - The building is located in an airfield safety clearance and is unable to obtain a location waiver.

Amber - The building is located in an airfield safety clearance but has a location waiver.

Green (+) - The building is not located in an airfield safety clearance.

(FA) Location - Excessive Noise

Issue: Location

Sub-Issue: Excessive Noise

Definition:

The building is located in an area of disruptive noise.

> **Note**: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Red - The building is located near sources of excessive noise, posing a health problem or adversely affecting the mission to a significant degree.

Amber - The building is located near sources of excessive noise, but health is not a problem and the mission is not affected to the level of red.

Green (+) - The building is not located near sources of excessive noise.

(FA) Location - Explosive Arc Distance

Issue: Location

Sub-Issue: Explosive Arc Distance

Definition:

The building is located in an explosive arc.

Note: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Red - The building is located in an explosive arc and is unable to obtain a location waiver.

Amber - The building is located in an explosive arc but has a location waiver.

Green (+) - The building is not located in an explosive arc.

(FA) Location - Floodplain

Issue: Location

Sub-Issue: Floodplain

Definition:

The building is located on a floodplain.

Note: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Red - The building is located on a floodplain, and the building and/or site floods frequently (roughly every 1-2 years).

Amber - The building is located on a floodplain, but building and/or site floods infrequently (roughly every 25-30 years).

Green (+) - The building is not located on a floodplain.

(FA) Location - Mission Support (Building)

Issue: Location

Sub-Issue: Mission Support

Definition:

The building's location is inadequate to support the mission.

Note: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Red - The building is located inadequately for support, adversely affecting the mission to a significant degree.

Amber - The building is located inadequately for support, but the mission is not affected to the level of red.

Green (+) - The building is located adequately for support of the mission.

(FA) Location - Functional Area Location

Issue: Functional Area Size and Configuration

Sub-Issue: Functional Area Location

Definition:

The functional area's location is inadequate to support the mission.

Note: This sub-issue only appears in the second tier of the functionality assessment.

Severity Levels:

Red - The functional area is located inadequately for support, adversely affecting the mission to a significant degree.

Amber - The functional area is located inadequately for support, but the mission is not affected to the level of red.

Green (+) - The functional area is located adequately for support of the mission.

Examples:

- The administration area is not located near the conference rooms (assembly areas).
- The restrooms are not located centrally to the building.
- The security area is located in or near public areas of the building.

(FA) Maintainability - Design and Placement of Equipment

Issue: Maintainability

Sub-Issue: Design and Placement of Equipment

Definition:

The design and/or placement of equipment in the building (or functional area) does not allow for easy maintenance.

Severity Levels:

Amber - The design and/or placement of equipment does not allow for easy maintenance, resulting in insufficient care.

Green (+) - The design and placement of equipment allows for easy maintenance.

Density:

Automatically computed by BUILDER.

Examples:

- The transformer is directly next to a fence, making it difficult to maintain.
- Deficient sub-components on an air handler cannot be reached to repair or replace.

(FA) Missing Component - Needed or Desired Component

Issue: Missing or Improper Component Types

Sub-Issue: Needed or Desired Components

Definition:

Needed or desired components are missing from the building (or functional area).

> **Note:** The sub-issue is intended only for components that have not been evaluated in other sub-issues.

Severity Levels:

Red - Needed or desired components are not present in the building (or functional area), posing a life safety issue or adversely affecting the quality of life or mission to a significant degree.

Amber - Desired components are not present in the building (or functional area), but life safety is not an issue and the mission and quality of life are not affected to the level of red.

Green (+) - All needed and desired components are present in the building (or functional area).

Density:

Automatically computed by BUILDER.

Examples:

- An elevator is needed in the building (or functional area) and not present.
- There is no vehicle lift in the maintenance shop.

(FA) Missing Component - Incorrect Component Types

Issue: Missing or Improper Component Types

Sub-Issue: Incorrect Component Types

Definition:

Component(s) in the building (or functional area) are the incorrect type.

> **Note**: The sub-issue is intended only for components that have not been evaluated in other sub-issues.

Severity Levels:

Red – Component(s) in the building (or functional area) are the incorrect type, posing a life safety issue or adversely affecting the quality of life or mission to a significant degree.

Amber - Component(s) in the building (or functional area) are the incorrect type, but life safety is not an issue and the mission and quality of life are not affected to the level of red.

Green (+) - Component(s) in the building (or functional area) are the correct type.

Density:

Automatically computed by BUILDER.

Examples:

- A 20-ton crane is present where a 40-ton crane is necessary in the building (or functional area).
- A building has a flat roof instead of a pitched roof.

(FA) Structural Adequacy - Loading Conditions

Issue: Structural Adequacy

Sub-Issue: Loading Conditions

Definition:

The building’s (or functional area's) structural system is inadequate for the loading conditions (dead, live, wind, snow, etc.) of its current use.

Severity Levels:

Red - The building's (or functional area's) structural system is inadequate, posing a life safety issue.

Amber - The building's (or functional area's) structural system is inadequate, but life safety is not an issue.

Green (+) - The building's (or functional area's) structural system is adequate.

Density:

$\frac{A}{B}$ x 100 = Problem Density

A = Affected Area of the Building (or Functional Area)

B = Total Area of the Building (or Functional Area)

Density Ranges:

- 1% - 10%
- 10% - 25%
- 25% - 50%
- 50% - 100%

Examples:

- Excessive floor deflections in the building (or functional area).
- Cracks in the shear walls in the building (or functional area).
- Stairways vibrate when used by occupants.

(FA) Structural Adequacy - Seismic Conditions

Issue: Structural Adequacy

Sub-Issue: Seismic Conditions

Definition:

The building's structural system is inadequate for seismic conditions.

> **Note**: This sub-issue only appears in the first tier of the functionality assessment.

Severity Levels:

Red - The building's structural system is inadequate for seismic conditions.

Amber - The building's structural system is exempt from seismic evaluation.

Green (+) - The building's structural system is adequate for seismic conditions.

Examples:

- FEMA rating of the building is sub-standard for local conditions.

Appendix I: Americans with Disabilities Act (ADA) Checklist

Included below is a checklist of the major requirements in the Department of Justice's ADA Standards for Accessible Design. This checklist is intended to be used as a reference, not as the governing document, when comparing a building against the standards. For the complete version of the ADA standards, see http://www.usdoj.gov/crt/ada/adastd94.pdf.

To answer each of the questions in the checklist, the sub-questions of the question must be answered first. If all of the sub-questions are answered "Yes," then the question is also answered as "Yes." For questions answered "Yes," mark the **Compliant** radio button in the ADA Wizard. If one or more of the sub-questions are answered "No," the question is also answered "No" and the **Non-Compliant** radio button is marked in the ADA Wizard. If a particular question does not apply to the building (or functional area), mark the **N/A** radio button.

Question 1 - Is the route of travel from the site to the building (or functional area) ADA compliant?

- Is at least one accessible route of travel provided from the site to an accessible entrance into the building (or functional area)?
- Is the route of travel free of stairs?
- Is the route of travel stable, firm, and slip-resistant?
- Is the route of travel at least 36-in wide?
- Is the slope of the route of travel no greater than 1:20?
- Is the cross slope of the route of travel (sidewalks, pathways, etc.) no greater than 1:50?
- Do all obstacles and protrusions between 27-in and 80-in above the ground protrude less than 4-in into the route of travel (obstacles and protrusions less than 27-in above the ground can protrude any amount into the route of travel because they are cane-detectable)?
- Is at least 80-in of clear headroom provided along the route of travel?
- Is there a 5-ft circle or T-shaped space along the circulation route for a person using a wheelchair to reverse direction?
- Do curbs on the route of travel have curb cuts at least 36-in wide at drives, parking, and sidewalks?
- Do curb cuts leading to ramps or traffic crossings have detectable warnings (raised truncated domes)?
- Do gratings on the route of travel have spaces no greater than ½-in wide in the direction of travel?

Question 2 - Is the parking and/or drop-off area ADA compliant?

- Are the accessible parking spaces and drop-off areas closest to the accessible entrance and along an accessible route of travel?
- Are there an adequate number of accessible parking spaces?

- Are accessible parking spaces a minimum of 8-ft wide and have a 5-ft wide aisle?
- Are there an adequate number of van accessible spaces?
- Are van accessible parking spaces a minimum of 8-ft wide, have an 8-ft wide aisle, and have at least 98-in of vertical clearance?
- Are the parking space access aisles part of the accessible route of travel?
- Is there signage, which meet the requirements of Question 17, marking each accessible parking space?
- Are the slopes of parking spaces and drop-off areas no greater than 1:50?
- Is the vertical clearance at drop-off areas at least 114-in?

Question 3 - Is there an ADA compliant entrance?

- Is at least one accessible entrance provided into the building (or functional area)?
- Is the accessible entrance a non-service entrance (unless it is the only entrance into the building or functional area)?
- Is the accessible entrance part of the accessible route of travel?
- Does the door(s) at the accessible entrance meet the requirements of Question 4?
- Is there signage, which meet the requirements of Question 17, at inaccessible entrances that give directions to accessible entrances?
- Is at least 30-in by 48-in clear floor space, outside of the door swing, provided in vestibules?
- Is carpeting low-pile, tightly woven, securely attached along edges, and a maximum of ½-in thick?

Question 4 - Are all doors leading into necessary spaces ADA compliant?

- Do doors have at least a 32-in clear opening?
- Do doors meet the minimum maneuvering clearances?
- Is at least 48-in of clear space, outside of door swing, provided between two doors in a series?
- Do doors in a series swing in the same direction or away from the space between the doors?
- Are thresholds no greater than ½-in (exception: ¾-in for exterior sliding doors)?
- Is the slope of threshold bevels no greater than 1:2?
- Are door handles or other operation devices (key card readers, etc.) no higher than 48-in above the floor?
- Can doors be operated with a closed fist with a force of no greater than 5 lbf?
- Is there at least 18-in of clear wall space on the pull side of doors next to the handle?
- Do door closers have a minimum sweep period of 3 seconds from an open position of 70 degrees to 3-in from the door latch?
- Do automatic doors take at least 3 seconds to open and require no greater than 15 lbf to stop door movement?

Question 5 - Is horizontal circulation in the building (or functional area) ADA compliant?

- Are all necessary spaces in the building (or functional area) on an accessible route that is at least 36-in wide?

- Is the slope of the circulation route no greater than 1:20?
- Is at least 80-in of clear headroom provided along the circulation route?
- Do all obstacles and protrusions between 27-in and 80-in above the floor protrude less than 4-in into the route of travel (obstacles and protrusions less than 27-in above the floor can protrude any amount into the route of travel because they are cane-detectable)?
- Is there a 5-ft circle or T-shaped space along the circulation route for a person using a wheelchair to reverse direction?
- Are changes in elevation ¼-in to ½-in beveled with a slope no greater than 1:2 (changes in slope greater than ½-in shall be accomplished by means of a ramp meeting the requirements of Question 9)?
- Is carpeting low-pile, tightly woven, securely attached along edges, and a maximum of ½-in thick?

Question 6- Are all necessary rooms and spaces ADA compliant?

- Are aisles and pathways to materials and services within the room/space at least 36-in wide?
- Do all obstacles and protrusions between 27-in and 80-in above the floor protrude less than 4-in into the route of travel through the room/space (obstacles and protrusions less than 27-in above the floor can protrude any amount into the route of travel through the room/space because they are cane-detectable)?
- Is there a 5-ft circle or T-shaped space in the room/space for a person using a wheelchair to reverse direction?
- Does the door into the room/area meet the requirements of Question 4?
- Is carpeting low-pile, tightly woven, securely attached along edges, and a maximum of ½-in thick?

Question 7 - Are assembly areas ADA compliant?

- When seating capacity is less than 300, is one wheelchair location with at least 30-in by 48-in clear floor space provided?
- When seating capacity is greater than 300, is more than one wheelchair location with at least 30-in by 48-in clear floor space provided?
- Is at least one companion fixed seat provided next to each wheelchair seating area?
- Are all wheelchair locations along an accessible route of travel that meets the requirements of Question 5?
- Do the doors into the assembly area meet the requirements of Question 4?
- Is the floor at the wheelchair location level, stable, and firm?
- Are listening systems, if provided, located within a 50 ft viewing distance and with a complete view of the stage or playing area?

Question 8 - Are areas of rescue assistance ADA compliant?

- Is there an area of rescue assistance in an approved area?
- For every 200 occupants the area of rescue assistance serves, is there one accessible area at least 30-in by 48-in clear floor space that does not encroach on any required exit width?

- Do stairways adjacent to areas of rescue assistance have a minimum clear width of 48-in between handrails?
- Is there audible and visible two-way communication between the area of rescue assistance and the primary entry or another location approved by the fire department?
- Is there signage, which meets the requirements of Question 17 and is illuminated when necessary, identifying areas of rescue?
- Is there signage, which meets the requirements of Question 17, at inaccessible exits that give directions to areas of rescue assistance?

Question 9 - Is vertical circulation ADA compliant?

- Are there ramps, lifts, or elevators to all necessary levels?
- If there are stairs between the entrance and/or elevator and required areas on any level, is there an alternate accessible route?

Question 10 - Are ramps ADA compliant?

- Is the slope of the ramp surface no greater than 1:12?
- Is the cross slope of the ramp surface no greater than 1:50?
- Is the ramp surface stable, firm, and slip-resistant?
- Do ramps longer than 6-ft have sturdy handrails on both sides?
- Do handrails have a diameter of 1-¼ in to 1-½ in with 1–½ in of clear space between the handrail and the wall?
- Are handrails mounted 34 in to 38 in above the ramp surface?
- Are handrails continuously grippable and have extensions beyond the top and bottom of the ramps?
- Is the width between the handrails and/or curbs of the ramp at least 36-in?
- Is there a 5-ft landing for every 30-ft horizontal length of ramp, at the top of the ramp, at the bottom of the ramp, and at all switchbacks?
- Do outdoor ramps prevent water from accumulating on the walking surface?

Question 11 - Are stairs ADA compliant?

- Are stair tread and riser dimensions constant?
- Are stair treads sturdy and non-slip?
- Are stair treads at least 11-in deep with the radius of curvature no greater than ½ in at the leading edge?
- Are stair risers closed with a slope no greater than 60 degrees from the horizontal?
- Do nosings project no more than 1–½ in?
- Do stairs have sturdy handrails on both sides?
- Do handrails have a diameter of 1-¼ in to 1-½ in with 1–½ in of clear space between the handrail and the wall?
- Are handrails mounted 34 in to 38 in above the stair surface?
- Are handrails continuously grippable and have extensions beyond the top and bottom of the stairs?

- Is the width between the handrails at least 36-in?
- Do outdoor stairs prevent water from accumulating on the treads?

Question 12 - Are elevators ADA compliant?

- Does the floor area of the elevator allow for wheelchair users to enter the car, maneuver within reach of controls, and exit the car?
- Are floor surfaces in the elevator stable, firm, and slip-resistant?
- Are call buttons in the hallway outside the elevator no higher than 42-in above the floor?
- Are call buttons in the elevator no higher than 54-in above the floor for side approach or 48-in above the floor for forward approach?
- Are protrusions below call buttons less than 4-in?
- Are call buttons at least ¾-in in the smallest dimension?
- Do the controls inside the elevator have signage complying with the requirements of Question 17?
- Is the emergency intercom, if provided, no higher than 48-in above the floor, usable without voice communication, and identified by signage complying with Question 17?
- Is there signage on both door jams at every floor, which meets the requirements of Question 17, identifying the floor?
- Are visible and audible door opening, closing, and floor indicators present in the elevator and in the hallway outside the elevator?
- Do elevators have a self-leveling feature that automatically brings the car to floor landings within a tolerance of ½-in?
- Do elevators have a protective and reopening device that will stop and reopen a car door if it becomes obstructed?
- Is the minimum acceptable time from notification that an elevator is answering a call to the doors start closing met?
- Do elevators doors remain fully open for a minimum of 3 seconds?

Question 13 - Are lifts ADA compliant?

- Can the lift be used without assistance or is a call button provided?
- Is at least 30-in by 48-in clear space provided to approach the lift, to reach the controls, and use the lift?
- Are controls 15-in to 48-in above the lift for forward approach or 9-in to 54-in above the lift for side approach?

Question 14 - Are drinking fountains ADA compliant?

- Is there at least one accessible drinking fountain per floor?
- Is at least 30-in by 48-in clear floor space provided in front of accessible drinking fountains?
- Is the spout on the drinking fountain no higher than 36-in above the floor?
- Is the spout located on the front of the fountain and does it direct the water flow parallel to the front of the unit at least 4-in high?
- Are the controls mounted on the front or side near the front edge?

- Are the controls operable with a closed fist with a force of no greater than 5 lbf?
- For cantilevered fountains, is the clear knee space between the bottom of the apron and the floor at least 27-in high, 30-in wide, and 17-in to 19-in deep?

Question 15 - Are restrooms ADA compliant?

- Is there at least one accessible restroom for each sex or one accessible unisex restroom?
- Is there signage, which meet the requirements of Question 17, identifying accessible restrooms?
- Is there signage, which meet the requirements of Question 17, at inaccessible restrooms that give directions to accessible ones?
- Is there a 36-in wide path to all accessible fixtures and stalls?
- Does the door(s) into the restroom meet the requirements of Question 4?
- Is there a 5-ft circle or T-shaped space along the circulation route for a person using a wheel-chair to reverse direction?
- Is there an ADA compliant stall?
- Does the stall door meet the requirements of Question 4?
- Are stall dimensions clear of door swing at least 56-in by 60-in, 36-in by 69-in, or 48-in by 69-in?
- If the depth of the stall is less than 60-in, is at least 9-in of toe clearance provided for the front and one side partition?
- Are grab bars with a diameter of 1-¼ to 1-½ in located behind and on the sidewall nearest the fixture?
- Are the grab bars mounted 33–in to 36-in above the floor with 1-½ in clear space between the grab bar and the wall?
- Is the toilet seat 17-in to 19-in above the floor?
- Are toilet flush controls automatic or operable with a closed fist, with a force of no greater than 5 lbf, mounted on the wide side of the toilet, and no higher than 44-in above the floor?
- Is there an ADA compliant lavatory?
- Is at least 30-in wide by 48-in deep clear space provided for accessible lavatories, with a maximum of 19-in of the required depth under the lavatory?
- Is there at least 29-in from the floor to the bottom of the lavatory apron, excluding pipes?
- Is at least 27-in high, 30-in wide, and 8-in deep clear knee space provided?
- Is at least 9-in high, 30-in wide, and 17-in deep clear toe space provided?
- Is the lavatory rim no higher than 34-in above the floor?
- Is the depth of the lavatory no greater than 6-½ in?
- Is the faucet automatic or can it be operated with a closed fist with a force of no greater than 5 lbf?
- Are hot water and drain pipes under lavatories insulated or configured to protect against contact?
- If urinals are provided, is at least one ADA compliant?
- Is the urinal wall-hung with an elongated rim no greater than 17-in above the floor?
- Is at least 30-in by 48-in clear space provided in front of the urinal?

- Are flush controls automatic or operable with a closed fist, a force of no greater than 5 lbf, and located no higher than 44-in above the floor?

Question 16 - Are bathing facilities and shower rooms ADA compliant?

- Is there at least one accessible bathing facility or shower room for each sex or one accessible unisex bathing facility or shower room?
- Is there signage, which meet the requirements of Question 17, identifying accessible bathing facilities and shower rooms?
- Is there signage, which meet the requirements of Question 17, at inaccessible bathing facilities and shower rooms that give directions to accessible ones?
- Does the door(s) into the bathing facility or shower room meet the requirements of Question 4?
- Is there a 5-ft circle or T-shaped space along the circulation route for a person using a wheelchair to reverse direction?
- Is there a 36-in wide path to all accessible fixtures, stalls, bathtubs, and showers?
- If the bathing facility or shower room has stalls, does at least one stall comply with the requirements described in 15?
- If the bathing facility or shower room has urinals, does at least one urinal comply with the requirements described in 15?
- If the bathing facility or shower room has lavatories, does at least one lavatory comply with the requirements described in 15?
- If bathtubs are provided, is at least one ADA accessible?
- Is at least 30-in by 60-in clear floor space, which can include one accessible lavatory, provided in front of the bathtub?
- Is a structurally sound, securely mounted, and slip-resistant seat provided at the head end of the bathtub?
- Are grab bars with a diameter of 1-¼ to 1-½ in located on the head, back, and foot walls of the bathtub?
- Are the grab bars mounted 33–in to 36-in above the floor with 1-½ in clear space between the grab bar and the wall?
- Can the faucet (or other controls) be operated with a closed fist with a force of no greater than 5 lbf?
- Is a shower spray unit with a hose of at least 60 in, which can be used as a fixed shower head and as a hand-help shower, provided?
- Is the bathtub enclosure installed so it avoids obstructing the controls or transfer from wheelchairs onto bathtub seats or into bathtubs?
- Are bathtub enclosure tracks not mounted on bathtub rims?
- If shower stalls are provided, is at least one ADA accessible?
- Are shower stalls a minimum of 36-in by 36-in or 30-in by 60-in?
- Is at least 36-in by 48-in clear floor space provided for 36-in by 36-in shower stalls?
- Is at least 36-in by 60-in clear floor space, which can include one accessible lavatory, provided for 30-in by 60-in shower stalls?

- Is a structurally sound, full-depth seat, located on the wall opposite the controls, provided in 36-in by 36-in shower stalls?
- If a seat is provided for 30-in by 60-in shower stalls, is it structurally sound, folding, and located on the wall adjacent to the controls?
- Are all seats in shower stalls 17-in to 19-in above the floor?
- Are grab bars with a diameter of 1-¼ in to 1-½ in located along all walls that do not have a seat?
- Are the grab bars mounted 33–in to 36-in above the floor with 1-½ in clear space between the grab bar and the wall?
- Can the faucet (or other controls) be operated with a closed fist with a force of no greater than 5 lbf?
- Is a shower spray unit with a hose of at least 60-in, which can be used as a fixed shower head and as a hand-help shower, provided?
- Are curbs in 36-in by 36-in shower stalls no higher than ½-in (no curbs are allowed in 30 in by 60 in shower stalls)?
- Is the shower stall enclosure installed so it avoids obstructing the controls or transfer from wheelchairs onto shower seats?

Question 17 - Is signage ADA compliant?

- Is the symbol of accessibility shown on accessible elements?
- Does signage have characters with a width-to-height ratio between 3:5 and 1:1 and a stroke-width-to-height ratio between 1:5 and 1:10?
- Does signage have adequately sized characters according to the viewing distance from which they are to be read?
- Does signage have a non-glare background with high-contrast characters?
- Does signage have raised braille text 5/8-in to 2-in high?
- Does signage with pictograms have raised braille characters accompanying it?
- Is signage mounted with centerline 60-in from the floor?
- Is permanent room identification signage mounted on the wall adjacent to the latch side of the door or as close as possible?

Question 18 - Are fixed cabinets, shelves, and drawers ADA compliant?

- Is at least 30-in by 48-in clear space provided in front of cabinets, shelves, and drawers?
- Are cabinets, shelves, and drawers located 9-in to 54-in above the floor for side approach or 15-in to 48-in above the floor for front approach?
- Is hardware on cabinets, shelves, and drawers operable with a closed fist with a force no greater than 5 lbf?

Question 19 - Are fixed seats, tables, and counters ADA compliant?

- Is at least 27-in high, 30-in wide, and 19-in deep knee space provided at each seating space?
- Is at least 30-in by 48-in clear floor space, overlapping the knee space by no greater than 19 in, provided at all accessible seating spaces?

- Are aisles between fixed seating, tables, and counters at least 36-in wide?
- Are the tops of tables and counters 28-in to 34-in above the floor?

Question 20 - Are the necessary controls ADA compliant?

- Is at least 30-in by 48-in clear floor space provided in front of the controls?
- Are controls located 9-in to 54-in above the floor for side approach or 15-in to 48-in above the floor for front approach?
- Can the controls be operated with a closed fist with a force of no greater than 5 lbf?

Question 21 - Are emergency egress alarm systems ADA compliant?

- Does the emergency egress alarm system have visual signals in restrooms and general usage areas?
- Does the emergency egress alarm system have audible signals in restrooms and general usage areas?

Appendix J: ATFP Appendixes

This Appendix contains information from the Appendixes to the ATFP guidance.

ATFP Appendix B

Included below is an overview of the Appendix B of the DoD Minimum Antiterrorism Standards for Buildings(UFC 4-010-01). This overview is intended to be used as reference, not as the governing document, when comparing a building against the standards. For the complete version of Appendix B and the entire UFC 4-010-01 document, see https://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf.

To determine if each standard is met, check if all of the requirements for each standard is met. If all of the requirements of the standard are met, select the **Compliant** radio button next to the standard in the "Anti-Terrorism/Force Protection (ATFP) Wizard" on page 131.

If one or more of requirements of the standard are not met, select the **Non-Compliant** radio button next to the standard in the ATFP Wizard. If a standard does not apply to the building (or functional area), select the **N/A** radio button.

Appendix B - DoD Minimum Antiterrorism Standards for New and Existing Buildings

Shown below is Table 2-1, taken from the DoD Minimum Antiterrorism Standards for Buildings,

Table 2-1 Levels of Protection – New and Existing Buildings

Level of Protection	Potential Structural Damage	Potential Door and Glazing Hazards	Potential Injury
Below AT standards	Severely damaged. Frame collapse/massive destruction. Little left standing.	Doors and windows fail and result in lethal hazards	Majority of personnel suffer fatalities.
Very Low	Heavily damaged - onset of structural collapse: Major deformation of primary and secondary structural members, but progressive collapse is unlikely. Collapse of non-structural elements.	Glazing will break and is likely to be propelled into the building, resulting in serious glazing fragment injuries, but fragments will be reduced. Doors may be propelled into rooms, presenting serious hazards.	Majority of personnel suffer serious injuries. There are likely to be a limited number (10% to 25%) of fatalities.
Low	Damaged – unrepairable. Major deformation of non-structural elements and secondary structural members and minor deformation of primary structural members, but progressive collapse is unlikely.	Glazing will break, but fall within 1 meter of the wall or otherwise not present a significant fragment hazard. Doors may fail, but they will rebound out of their frames, presenting minimal hazards.	Majority of personnel suffer significant injuries. There may be a few (<10%) fatalities.
Medium	Damaged – repairable. Minor deformations of non-structural elements and secondary structural members and no permanent deformation in primary structural members.	Glazing will break, but will remain in the window frame. Doors will stay in frames, but will not be reusable.	Some minor injuries, but fatalities are unlikely.
High	Superficially damaged. No permanent deformation of primary and secondary structural members or non-structural elements.	Glazing will not break. Doors will be reusable.	Only superficial injuries are likely.

which shows the levels of protection for new and existing buildings and the potential structural damage, door and glazing hazards, injuries associated with each level of protection. The table can be used as a reference when determining if the requirements of the standards are met.

Standard 1 – Minimum Standoff Distance

Where the standoff distances in the "Conventional Construction Standoff Distance" column of Table B-1 can be met, conventional construction may be used for the buildings without a specific analysis of blast effects, except as otherwise required in these standards. Where those distances are not available, an engineer experienced in blast-resistant design should analyze the building and apply building hardening as necessary to mitigate the effects of the explosives indicated in Table B-1 at the achievable standoff distance to the appropriate level of protection. The appropriate levels of protection for each building category are shown in Table B-1, and are described in Table 2-1.

Table B-1 Minimum Standoff Distances and Separation for Buildings					
Location	Structure Category	Standoff Distance or Separation Requirements			
		Applicable Level of Protection	Conventional Construction Standoff Distances	Effective Standoff Distances[1]	Applicable Explosive Weight[2]
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter[3]	Billeting	Low	45 m (148 ft)	25 m (82 ft)	I
	Primary Gathering Structure[4]	Low	45 m (148 ft)	25 m (82 ft)	I
	Inhabited Structure	Very Low	25 m (82 ft)	10 m (33ft)	I
Parking and Roadways within a Controlled Perimeter[3]	Billeting	Low	25 m (82 ft)	10 m (33ft)	II
	Primary Gathering Structure[4]	Low	25 m (82 ft)	10 m (33ft)	II
	Inhabited Structure	Very Low	10 m (33ft)	10 m (33ft)	II
Trash Containers	Billeting	Low	25 m (82 ft)	10 m (33ft)	II
	Primary Gathering Structure	Low	25 m (82 ft)	10 m (33ft)	II
	Inhabited Structure	Very Low	10 m (33ft)	10 m (33ft)	II

- Even with analysis, standoff distances less than those in this column are not allowed for buildings built in or after FY 2004, but are allowed for buildings built before FY 2004 if constructed/retrofitted to provide the required level of protection at the reduced standoff distance.
- See UFC 4-010-02 for specific explosive weights (kilograms or pounds of TNT)
- For building built before FY 2004, see paragraph B-1.1.2.2 for additional options
- For family housing built before FY 2004, see paragraph B-1.1.2.2.3 for additional options

Standard 2 – Unobstructed Space

- Ensure that obstructions within 10 meters (33 feet) of inhabited buildings or portions thereof do not allow for concealment from observation of explosive devices 150 mm (6 inches) or greater in height. This does not preclude the placement of site furnishings or plantings around buildings. It only requires conditions such that any explosive devices placed in that space would be observable by building occupants. For buildings built before FY 2004 where the standoff distances for parking and roadways have been established at less than 10 meters (33 feet) in accordance with standard 1, the unobstructed space may be reduced to be equivalent to that distance.
- The preferred location of electrical and mechanical equipment such as transformers, air-cooled condensers, and packaged chillers is outside the unobstructed space or on the roof.

However this equipment can be placed within the unobstructed space as long the equipment provides no opportunity for concealment of explosive devices.

- If walls or other screening devices with more than two sides are placed around electrical or mechanical equipment within the unobstructed space, enclose the equipment on all four sides and the top. Openings in screening materials and gaps between the ground and screens or walls making up an enclosure will not be greater than 150 mm (6 inches). Secure any surfaces of the enclosures that can be opened so that unauthorized personnel cannot gain access through them.

Standard 3 – Drive-Up/Drop-Off Areas

- Where operational or safety considerations require drive-up areas, drop-off areas, or drive through lanes near buildings (or functional areas), ensure those areas or lanes are clearly defined and marked and that their intended use is clear to prevent parking of vehicles in those areas.
- Do not allow unattended vehicles in drive-up areas, drop-off areas, or drive through lanes.
- Do not allow drive-up areas, drop-off areas, or drive through lanes to be located under any inhabited portion of a building (or functional area).

Standard 4 – Access Roads

- Ensure for that access control measures are implemented to prohibit unauthorized vehicles from using access roads within the required standoff distances.

Standard 5 – Parking Beneath Buildings or on Rooftops

- Eliminate parking beneath inhabited buildings (or functional areas) or on rooftops of inhabited buildings (or functional areas).

When such parking is unavoidable, the following measures are necessary to achieve an equivalent level of protection:

- Ensure that access control measures are implemented to prohibit unauthorized personnel and vehicles from entering parking areas.
- Ensure that the floors beneath or roofs above inhabited areas and all other adjacent supporting structural elements will not fail from the detonation in the parking area of an explosive equivalent to explosive weight II in Table B-1.
- All structural elements within and adjacent to the parking area are subject to all progressive collapse provisions of Standard 6, except interior vertical or horizontal load carrying elements must also comply with the exterior member removal provision.

Standard 6 – Progressive Collapse Avoidance

- Design the superstructure to sustain local damage with the structural system as a whole remaining stable and not being damaged to an extent disproportionate to the original local damage. Achieve this through an arrangement of the structural elements that provides

stability to the entire structural system by transferring loads from any locally damaged region to adjacent regions capable of resisting those loads without collapse. Accomplish this by providing sufficient continuity, redundancy, or energy dissipating capacity (ductility, damping, hardness, etc.), or a combination thereof, in the members and connections of the structure.

- Design all exterior vertical load-carrying columns and walls to sustain a loss of lateral support at any of the floor levels by adding one story height to the nominal unsupported length. Where parking beneath buildings (or functional areas) is unavoidable, this provision also applies to internal vertical load carrying columns and walls.
- Analyze the structure to ensure it can withstand removal of one primary exterior vertical or horizontal load-carrying element (i.e., a column or a beam) without progressive collapse.
- Design all floors with improved capacity to withstand load reversals due to explosive effects by designing them to withstand a net uplift equal to the dead load plus one-half the live load.

Standard 7 – Structural Isolation

- Design all building additions to be structurally independent from the existing part of the building or verify through analysis that collapse of either the addition or the existing building will not result in collapse of the remainder of the building.
- Where there are areas of buildings that do not meet the criteria for inhabited buildings, design the superstructures of those areas to be structurally independent from the inhabited area or verify through analysis that collapse of uninhabited portions of the building will not result in collapse of any portion of the building covered by this standard.

Standard 8 – Building Overhangs

- Avoid building overhangs with inhabited spaces above them where people could gain access to the area underneath the overhang.

Where such overhangs must be used, the following measures are necessary to achieve an equivalent level of protection:

- Ensure that there are no roadways or parking areas under overhangs.
- Ensure that the floors beneath inhabited areas will not fail from detonation underneath the overhang of an explosive equivalent to explosive weight II where there is a controlled perimeter and explosive weight I for an uncontrolled perimeter.
- The progressive collapse provisions of Standard 6, including the provision for loss of lateral support for vertical load carrying elements, will include all structural elements within and adjacent to the overhang.

Standard 9 – Exterior Masonry Walls

- Unreinforced masonry exterior walls in buildings (or functional areas) built after FY 2004 are prohibited. A minimum of 0.05 percent vertical reinforcement with a maximum spacing of 1200 mm (48 in.) will be provided.

- For buildings (or functional areas) constructed before FY 2004, implement mitigating measures to provide an equivalent level of protection for exterior masonry walls with a minimum of 0.05 percent vertical reinforcement and a maximum spacing of 1200 mm (48 in.).

Standard 10 – Windows, Skylights, and Glazed Doors

Note: This standard applies to windows provided their visual glazing openings do not exceed 3 square meters (32 square feet). For larger windows, refer to the DoD Security Engineering Design Manual.

- Use a minimum of 6-mm (1/4-in) nominal laminated glass for all exterior windows, skylights, and glazed doors. The 6-mm (1/4-in) laminated glass shall consist of two nominal 3-mm (1/8-in) glass panes bonded together with a minimum of a 0.75-mm (0.030-inch) polyvinyl-butyral (PVB) interlayer. For insulated glass units, use 6 mm (1/4 inch) laminated glass inner pane as a minimum. For alternatives to the 6-mm (1/4-in) laminated glass that provide equivalent levels of protection, refer to the *DoD Security Engineering Manual*.
- Provide window and skylight frames, mullions, sashes, and connections of aluminum or steel. Steel members may be designed using the ultimate yield stress and aluminum members may be designed based on the 0.2% yield offset. Alternatively, use frames that provide performance to the required level of protection.
- To ensure that the full strength of the PVB inner layer is engaged, design frames, mullions, and window hardware to resist a static load of 7 kilopascals (1 lb per square in) applied to the surface of the glazing. Frame and mullion deformations shall not exceed 1/160 of the unsupported member lengths.
- The glazing shall have a minimum frame bite of 9.5-mm (3/8-in) for structural glazed window systems and 25-mm (1-in) for window systems that are not structurally glazed.
- Design frame connections to surrounding walls to resist a static load of 75 kilopascals (10.8 lbs per square inch) for glazing panels with a vision area less than or equal to 1.0 square meters (10.8 square feet) and 30 kilopascals (4.4 lbs per square inch) for glazing panels with a vision area greater than 1.0 square meters (10.8 square feet) but less than or equal to 3.0 square meters (32 square feet). Loads shall be applied to the surface of the glazing and frame.
- Design supporting elements and their connections based on their ultimate capacities. In addition, because the resulting dynamic loads are likely to be dissipated through multiple mechanisms, it is not necessary to account for reactions from the supporting elements in the design of the remainder of the structure.
- Where the minimum standoff distances cannot be met, provide glazing and frames that will provide an equivalent level of protection to that provided by the glazing above and in Tables 2-1 and 2-2 (shown in ATFP Appendix D) for the applicable explosive weight in Table B-1.

Standard 11 – Building Entrance Layout

- Ensure the main entrance does not face an installation perimeter or other uncontrolled vantage points with direct lines of sight to the entrance.

- For buildings (or functional areas) where the main entrance faces an installation perimeter, either use a different entrance as the main entrance or screen the entrance to limit the ability of potential aggressors to target people entering and leaving the building (or functional area).

Standard 12 – Exterior Doors

- Ensure all exterior doors into inhabited areas open outwards. By doing so, the doors will seat into the door frames in response to an explosive blast, increasing the likelihood that the doors will not enter the building (or functional area) as hazardous debris.

Standard 13 – Mail rooms

- Locate the mailroom on the perimeter of the building. By locating the mailroom on the building perimeter there is an opportunity to modify it in the future if a mail bomb threat is identified.
- Locate mailrooms as far from heavily populated areas of the building and critical infrastructure as possible. This measure will minimize injuries and damage if a mail bomb detonates in the mailroom. Further, it will reduce the potential for wider dissemination of hazardous agents. These apply where the mailroom is not specifically designed to resist those threats.
- To limit migration into buildings of airborne chemical, biological, and radiological agents introduced into mailrooms, ensure that mailrooms are well sealed between their envelopes and other portions of the buildings in which they are located. Ensure the mailroom walls are of full height construction that fully extends and is sealed to the undersides of the roofs, to the undersides of any floors above them, or to hard ceilings (i.e. gypsum wallboard ceiling.) Sealing should include visible cracks, the interface joints between walls and ceilings/roofs and all wall and ceiling/roof penetrations. Doors will have weather stripping on all four edges.

Standard 14 – Roof Access

- Ensure access to roofs is controlled to minimize the possibility of aggressors placing explosives or chemical, biological, or radiological agents there or otherwise threatening building (or functional area) occupants or critical infrastructure.
- Eliminate external roof access where possible and/or secure external stairways or ladders with locked cages or similar mechanisms.

Standard 15 – Overhead Mounted Architectural Features

- Ensure overhead mounted features weighing 14 kilograms (31 pounds) or more are mounted to minimize the likelihood that they will fall and injure building (or functional areas) occupants. Mount all such systems so that they resist forces of 0.5 times the component weight in any direction and 1.5 times the component weight in the downward direction. This standard does not preclude the need to design architectural feature mountings for forces required by other criteria such as seismic standards.

Standard 16 – Air Intakes

- Ensure all air intakes are located 3 meters above the ground.

Standard 17 – Mailroom Ventilation

- To ensure airborne chemical, biological, and radiological agents introduced into mailrooms do not migrate into other areas of buildings in which the mailrooms are located, provide separate, dedicated air ventilation systems for mailrooms.
- Building heating and cooling systems such as steam, hot water, chilled water, and refrigerant, may serve mailrooms as long as the airflow systems for the mailrooms and other areas of the building in which they are located remain separate.
- Provide a dedicated exhaust system within mailrooms to maintain slight negative air pressures with respect to the remainder of the building in which the mailrooms are located so that the flow of air is into and contained in the mailrooms. Though the airflow into the mailrooms will not eliminate the potential spread of contamination by personnel leaving the mailroom, it will limit the migration of airborne contaminants through openings and open doorways.
- Provide mailroom ventilation system outside air intakes and exhausts with low leakage isolation dampers that can be closed to isolate mailrooms.
- Provide separate switches or methods of control to isolate mailrooms in the event of a suspected or actual chemical, biological, or radiological release.

Standard 18 – Emergency Air Distribution Shutoff

- Provide an emergency shutoff switch in the HVAC control system that can immediately shut down air distribution throughout the building (or functional area), except where interior pressure and airflow control would more efficiently prevent the spread of airborne contaminants and/or ensure the safety of egress pathways.
- Locate the switch (or switches) to be easily accessible by building (or functional area) occupants. Providing such a capability will allow the facility manager or building security manager to limit the distribution of airborne contaminants that may be introduced into the building (or functional area).

Standard 19 – Utility Distribution and Installation

- Route critical or fragile utilities so that they are not on exterior walls or on walls shared with mailrooms.
- Where redundant utilities are required in accordance with other requirements or criteria, ensure that the redundant utilities are not collocated or do not run in the same chases. This minimizes the possibility that both sets of utilities will be adversely affected by a single event.
- Where emergency backup systems are required in accordance with requirements or criteria, ensure that they are located away from the system components for which they provide backup.

Standard 20 – Equipment Bracing

- Ensure all overhead utilities and other fixtures weighing 14 kilograms (31 pounds) or more are mounted to minimize the likelihood that they will fall and injure building (or functional area) occupants. Design all equipment mountings to resist forces of 0.5 times the equipment weight in any direction and 1.5 times the equipment weight in the downward direction. This standard does not preclude the need to design equipment mountings for forces required by other criteria such as seismic standards.

Standard 21 – Under Building Access

- Limit opportunities for aggressors placing explosives underneath buildings (or functional areas); ensure that access to crawl spaces, utility tunnels, and other means of under building (or functional area) access is controlled.

Standard 22 – Mass Notification

- Ensure buildings (or functional areas) have a timely means to notify occupants of threats and instruct them what to do in response to those threats.
- Ensure the capability of providing real-time information to building (or functional area) occupants or personnel in the immediate vicinity of the building during emergency situations. The information relayed must be specific enough to determine the appropriate response actions. Any system, procedure, or combination thereof that provides this capability will be acceptable under this standard.

ATFP Appendix C

Included below is a brief overview of the Appendix C of the DoD Minimum Antiterrorism Standards for Buildings(UFC 4-010-01). This overview is intended to be used as reference, not as the governing document, when comparing a building against the additional recommendations. For the complete version of Appendix C and the entire UFC 4-010-01 document, see https://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf.

If the recommendation is met, select the **Compliant** radio button in the "Anti-Terrorism/Force Protection (ATFP) Wizard" on page 131. If recommendation is not met, select the **Non-Compliant** radio button in the ATFP Wizard. If a recommendation does not apply to the building (or functional area), select the **N/A** radio button.

Appendix C - Recommended Additional Antiterrorism Measures for New and Existing Buildings

Recommendation 1 – Vehicle Access Points

- Keep the number of vehicle access points to the minimum necessary for operational and safety purposes.

Recommendation 2 – High-Speed Vehicle Approaches

- To facilitate reductions in vehicle speed, ensure there no unobstructed vehicle approaches perpendicular to inhabited buildings (or functional areas) at the required parking and roadway standoff distances.

Recommendation 3 – Vantage Points

- Eliminate or provide means to avoid exposure to vantage points outside the control of personnel in the targeted building (or functional area).

Recommendation 4 – Drive-Up/Drop-Off

- Locate drive-up/drop-off points away from large glazed areas of the building (or functional area) to minimize the potential for hazardous flying glass fragments in the event of an explosion.
- Coordinate the drive-up/drop-off points with the building (or functional area) geometry to minimize the possibility that explosive blast forces could be increased due to being trapped or otherwise concentrated.

Recommendation 5 – Building Location

- Maximize separation distance between inhabited buildings and areas with large visitor populations.

Recommendation 6 – Railroad Location

- Avoid sites for inhabited buildings that are close to railroads. Where railroads are in the vicinity, provide standoff distances between the railroads and inhabited buildings based on Table B-1.

Recommendation 7 – Access Control for Family Housing

- Provide space for controlling access to the perimeter of family housing areas so that a controlled perimeter can be established there if the need arises in the future.

Recommendation 8 – Standoff for family Housing

- Maintain a minimum standoff distance of 25 meters from installation perimeters and roads, streets, or highways external to family housing areas.

Recommendation 9 – Minimize Secondary Debris

- Eliminate unrevetted barriers and site furnishings in the vicinity of inhabited structures that are accessible to vehicle traffic. Revet exposed barriers and site furnishings near inhabited buildings with a minimum of 1 meter of soil or equivalent alternative techniques to prevent fragmentation hazards in the event of an explosion.

Recommendation 10 – Building Separation

- Ensure all adjacent, inhabited buildings are separated from billeting and primary gathering by at least 10 meters or provide hardening building components to mitigate.

Recommendation 11 – Structural Redundancy

- Utilize highly redundant structural systems, detail connections to provide continuity across joints equal to full structural capacity of connected members, and detail members to accommodate large displacements without complete loss of strength.

Recommendation 12 – Internal Circulation

- Circulation within the building (or functional area) should provide detection and monitoring of unauthorized personnel approaching controlled areas or spaces.

Recommendation 13 – Visitor Control

- Keep locations where visitor access is controlled away from sensitive or critical areas, areas where high-risk or mission-critical personnel are located, or other areas with large population of DoD personnel.

Recommendation 14 – Asset Location

- Located critical assets and high-risk or mission-critical personnel away from the building exterior.

Recommendation 15 – Room Layout

- In rooms adjacent to the building exterior, position personnel and critical equipment to minimize exposure to direct blast effects and potential impacts from hazardous glass fragments and other potential debris.

Recommendation 16 – External Hallways

- Avoid exterior hallway configurations for inhabited structures.

Recommendation 17 - Windows

- Minimize the size and number of windows for new construction.

ATFP Appendix D

Included below is a brief overview of the Appendix C of the DoD Minimum Antiterrorism Standards for Building (UFC 4-010-01). This overview is intended to be used as reference, not as the governing document, when comparing a building against the standards. For the complete version of Appendix D and the entire UFC 4-010-01 document, see https://www.wbdg.org/ccb/DOD/UFC/ufc_4_010_01.pdf.

To determine if each standard is met, check if all of the requirements for each standard is met. If all of the requirements of the standard are met, mark the **Compliant** radio button next to the standard in the "Anti-Terrorism/Force Protection (ATFP) Wizard" on page 131. If one or more of requirements of the standard are not met, mark the **Non-Compliant** radio button next to the standard in the ATFP Wizard. If a standard does not apply to the building (or functional area), mark the **N/A** radio button.

Appendix D - DoD Minimum Antiterrorism Standards for Expeditionary and Temporary Structures

Shown below is Table 2-2, taken from the DoD Minimum Antiterrorism Standards for Buildings,

Table 2-2 Levels of Protection – Expeditionary and Temporary Structures

Level of Protection	Potential Structural Damage	Potential Injury
Below AT Standards	Severely damaged. Frame collapse/massive destruction. Little left standing.	Majority of personnel suffer fatalities.
Very Low	Heavily damaged. Major portions of the structure will collapse (over 50%). A significant percentage of secondary structural members will collapse (over 50%).	Majority of personnel suffer serious injuries. There are likely to be a limited number (10% to 25%) of fatalities.
Low	Damaged – unrepairable. Some sections of the structure may collapse or lose structural capacity (10 to 20% of structure).	Majority of personnel suffer significant injuries. There may be a few (<10%) fatalities.
Medium	Damaged – repairable. Minor to major deformations of both structural members and non-structural elements. Some secondary debris will be likely, but the structure remains intact with collapse unlikely.	Some minor injuries, but no fatalities are likely.
High	Superficially damaged. No permanent deformation of primary and secondary structural members or non-structural elements.	Only superficial injuries are likely.

which shows the levels of protection for expeditionary and temporary structures and the potential structural damage and injuries associated with each level of protection. The table can be used as a reference when determining if the requirements of the standards are met.

Standards 1 and 2 – Minimum Standoff Distances and Structure Separation

Table D-1 shows the minimum required standoff distances and structure separation

Table D-1 Minimum Standoff Distances and Separation for Expeditionary and Temporary Structures

Location	Structure Category	Standoff Distance or Separation Requirements			
		Applicable Level of Protection	Fabric Covered Structures (m)	Other Expeditionary and Temporary Structures	Applicable Explosive Weight[1]
Controlled Perimeter or Parking and Roadways without a Controlled Perimeter	Billeting	Low	31 m (102 ft)	71 m (233 ft)	I
	Primary Gathering Structure	Low	31 m (102 ft)	71 m (233 ft)	I
	Inhabited Structure	Very Low	24 m (79 ft)	47m (154 ft)	I
Parking and Roadways within a Controlled Perimeter	Billeting	Low	14 m (46 ft)	32 m (105 ft)	II
	Primary Gathering Structure	Low	14 m (46 ft)	32 m (105 ft)	II
	Inhabited Structure	Very Low	10 m (33ft)	23 m (75 ft)	II
Trash Containers	Billeting	Low	14 m (46 ft)	32 m (105 ft)	II
	Primary Gathering Structure	Low	14 m (46 ft)	32 m (105 ft)	II
	Inhabited Structure	Very Low	10 m (33ft)	23 m (75 ft)	II
Structure Separation[2]	Billeting	Low	18 m (59 ft)	18 m (59 ft)	III[3]
	Primary Gathering Structure	Low	9 m (30 ft)	9 m (30 ft)	III[3]
	Inhabited Structure	Very Low	3.5 m (12 ft)	3.5 m (12 ft)	III[3]

- See UFC 4-010-02 for the specific explosive weights (kilograms or pounds of TNT).
- Applies to billeting and primary gathering structures only.
- Explosive for building separation is an indirect fire (mortar) round at a standoff distance of half the separation distance.

Standard 3 – Unobstructed Space

- Keep areas within 10 meters (33 feet) of all expeditionary and temporary structures free of items other than those that are part of the utilities and other supporting infrastructure.

FA ATFP Notes

Note 1 – Building Types with Full FP Exemption:

- Family housing unit with fewer than 12 units
- Gas stations and car care centers
- Recruiting stations in leased spaces
- Other building types as dictated by DoD component

Note 2 – Building Types with Standoff to Parking/Roadway Exemption:

- Stand-alone franchise food operations
- Stand-alone shopettes, mini marts, and similarly sized commissaries
- Medical transitional structures and spaces
- Other transitional structures and spaces
- Other building types as dictated by DoD component

Note 3 – All questions must be answered yes to meet the leased building criteria:

- Is the building leased for DoD use or where DoD receives a space assignment from another government agency?
- Does DoD personnel occupy leased or assigned space constituting at least 25% of the net interior usable space?
- If a lease is in place, is the current lease a first time original lease that was executed after 01 Oct 2005 or is the current lease a renewal or extension in the renewal was executed after 01 Oct 2009?

Appendix K: Egress Checklist

Included below is a checklist of the major requirements of the 2003 International Building Code (IBC) Chapter 10 "Means of Egress." This checklist is intended to be used as a reference, not as the governing document, when comparing a building (or functional area) against egress requirements. For the complete text and requirements of the chapter, see the 2003 IBC.

To answer each of the questions in the checklist, check if each requirement of each question (described below) is met. If all of the requirements are met, mark the **Compliant** radio button next to the question in the Egress Wizard. If one or more of requirements are not met, mark the **Non-Compliant** radio button next to the question in the Egress Wizard. If a question does not apply to the building (or functional area), mark the **N/A** radio button.

In some of the questions below, the IBC occupancy classification, or type, is referenced. Below is a table that describes the type of buildings belonging to each type. Care should be taken when determining the occupancy type of the building you are assessing. Consult the latest copy of IBC if you are unsure.

Occupancy Type	Building Description
A	Assembly
B	Business
E	Educational
F	Factory and Industrial
H	High Hazard
I	Institutional
M	Mercantile
R	Residential
S	Storage
U	Utility and Miscellaneous

Some of the occupancy types have multiple sub-occupancy types (ex: A-1, A-2, A-3, A-4, & A-5 for occupancy type A), which are referenced below. If necessary, consult the 2003 IBC to determine the specific sub-occupancy type of your building (or functional area).

Exits to the Exterior of the Building (or Functional Area)

Exits/Question 1 - Are there an appropriate number of exits to the exterior of the building (or functional area) for the occupant load of the building (or functional area)?

- All rooms and spaces within each building (or functional area) shall be provided with and have access to the minimum number of approved independent exits as shown in the table below.

Occupant Load	Minimum Number of Exits
1-500	2
500-1,000	3
More than 1,000	4

- One exit is allowed for building types (or functional areas) meeting the requirements of the table below.

Occupancy	Stories Above Grade Plane	Maximum Occupant Load	Maximum Travel Distance to Exit (ft)
A, B, E, F, M, U	1	50	75
H-2, H-3	1	3	25
H-4, H-5, I, R	1	10	75
S	1	30	100
B, F, M, S	2	30	75
R-2	2	4	50

- Where two or more exits are required, the exits should be a distance apart equal to not less than one-half the length of the maximum overall diagonal dimension of the building (or functional area) to be served measured in a straight line between exits.

Exits/Question 2 - Do exits to the exterior of the building (or functional area) lead directly to a safe place?

- Exits shall discharge directly to the exterior of the building (or functional area) and shall be at grade or provide direct access to grade.
- Exit discharge shall provide a direct and unobstructed access to a public way.
- Exit discharge shall not reenter the building (or functional area).
- An exit shall not be used for any purpose that interferes with its function as a means of egress.

Egress Routes

Routes/Question 1 - Are there an appropriate number of accessible egress routes?

- All rooms and spaces within each building (or functional area) shall be provided with and have access to the minimum number of approved independent egress routes as shown in the table below.

Occupant Load	Minimum Number of Egress Routes
1-500	2
500-1000	3
More than 1000	4

- One egress route is allowed for building types (or functional areas) meeting the requirements of the table below.

Occupancy	Stories Above Grade Plane	Maximum Occupant Load	Maximum Travel Distance to Exit (ft)
A, B, E, F, M, U	1	50	75
H-2, H-3	1	3	25
H-4, H-5, I, R	1	10	75
S	1	30	100
B, F, M, S	2	30	75
R-2	2	4	50

Routes/Question 2 - Are the dimensions of egress routes adequate?

- The egress route shall have a ceiling height of not less than 7 feet.
- The egress route width shall not be less than the total occupant load served by the egress route multiplied by the factors shown in the table below, but not less than 44 inches.

Egress Width Per Occupant Served				
Occupancy	Without Sprinkler System		With Sprinkler System	
	Stairways (in./occupant)	Other egress components (in./occupant)	Stairways (in./occupant)	Other egress components (in./occupant)
Occupancies other than listed below	0.3	0.2	0.2	0.15
Hazardous: H-1, H-2, H-3, and H-4	0.7	0.4	0.3	0.2
Institutional: I-2	NA	NA	0.3	0.2

- The maximum length of an egress route, measured from the most remote point within a story to the entrance of the exit along a natural and unobstructed path shall not exceed the distances given in the table below.

Maximum Egress Route Travel Distance		
Occupancy	Without Sprinkler System (ft)	With Sprinkler System (ft)
A, E, F-1, I-1, M, R, S-1	200	250
B	200	300
F-2, S-2, U	300	400
H-1	Not Permitted	75
H-2	Not Permitted	100
H-3	Not Permitted	150
H-4	Not Permitted	175
H-5	Not Permitted	200
I-2, I-3, I-4	150	200

- Exit access shall be arranged so that there are no dead ends in any corridors off an egress route more than 20 feet long.

Routes/Question 3 - Are egress routes clear, free of protrusions, and available for use?

- Protruding objects are permitted to reduce the minimum ceiling height provided a minimum headroom of 80 inches is provided. Not more than 50% of the ceiling area of an egress route shall be reduced in height by protruding objects.
- Free-standing objects mounted on a post or pylon shall not overhang the post or pylon more than 12 inches where the lowest point of the leading edge is more than 27 inches and less than 80 inches. Where a sign or other obstruction is mounted between posts or pylons and the clear distance between the posts or pylons is greater than 12 inches, the lowest edge of the protrusion shall be 27 inches maximum or 80 inches minimum above the floor or ground.
- Structural elements, fixtures, or furnishings shall not project horizontally from either side more than 4 inches between the heights of 27 inches and 80 inches above the floor or ground.
- Protruding objects shall not reduce the minimum clear width of the egress route.
- Doors opening into the egress route shall not reduce the required width to less than one-half during the course of the swing. When fully open, the door shall not project more than 7 inches into the required width.

Routes/Question 4 - Are egress routes continuous?

- The egress route shall not be interrupted by any building (or functional area) element other than a means of egress component. This includes passing through adjoining or intervening rooms or areas.

Routes/Question 5 - Is the surface of all egress routes slip-resistant and securely attached?

- Walking surfaces of the egress route shall have a slip-resistant surface and be securely attached.
- Outdoor egress routes shall be designed so that water will not accumulate on the walking surface.

Routes/Question 6 - Are elevators, escalators, and moving walkways not used as a required means of egress along an egress route?

- Elevators, escalators, and moving walkways shall not be used as a component of an egress route from any part of the building (or functional area).

Routes/Question 7 - Do egress routes have adequate guards where necessary?

- Guards shall be located along open-sided egress routes that are located more than 30 inches above the floor or grade below. Guards shall also be located along glazed sides of egress routes that are located more than 30 inches above the floor or grade below where the glazing does not meet the strength and attachment requirements (See IBC 1607.7 for strength and attachment requirements).
- Guards shall form a protective barrier not less than 42 inches above the egress route surface.

- Open guards shall have balusters or patterns such that a 4-inch-diameter sphere cannot pass through any opening up to a height of 34 inches above the egress route surface. For a height of 34-42 inches above the egress route surface, a sphere 8 inches in diameter shall not pass.

Routes/Question 8 - Do egress routes have an acceptable fire rating?

- Egress routes shall be fire-resistance rated in accordance with the table shown below.

Egress Route Fire-Resistance Rating			
Occupancy	Occupant Level Served by Egress Route	Required Fire-Resistance Rating (Hours)	
		Without Sprinkler System	With Sprinkler System
H-1, H-2, H-3	All	Not Permitted	1
H-4, H-5	Greater than 30	Not Permitted	1
A, B, E, F, M, S, U	Greater than 30	1	0
R	Greater than 30	1	0.5
I-2, I-4	All	Not Permitted	0
I-1, I-3	All	Not Permitted	1

Egress Doors

Doors/Question 1 - Are there an adequate number of egress doors?

- All rooms and spaces within each building (or functional area) shall be provided with and have access to the minimum number of approved independent egress doors as shown in the table below.

Occupant Load	Minimum Number of Egress Routes
1-500	2
500-1000	3
More than 1000	4

- One egress door is allowed for building types (or functional areas) meeting the requirements of the table below.

Occupancy	Stories Above Grade Plane	Maximum Occupant Load	Maximum Travel Distance to Exit (ft)
A, B, E, F, M, U	1	50	75
H-2, H-3	1	3	25
H-4, H-5, I, R	1	10	75
S	1	30	100
B, F, M, S	2	30	75
R-2	2	4	50

Doors/Question 2 - Are egress doors easily distinguishable?

- Egress doors shall be readily distinguishable from the adjacent construction and finishes.
- Mirrors or similar reflecting materials shall not be used on egress doors.

- Egress doors shall not be concealed by curtains, drapes, decorations, or similar materials.

Doors/Question 3 - Are the dimensions of egress doors adequate?

- The minimum width of each egress door opening shall be sufficient for occupant load and shall provide a clear width of not less than 32 inches.
- The height of egress doors shall not be less than 80 inches.
- There shall be no projections into the clear width lower than 34 inches above the floor or ground. Projections between 34-80 inches above the floor or ground shall not exceed 4 inches.
- Space between two egress doors in a series shall be 48 inches minimum plus the width of the door swinging into the space.

Doors/Question 4 - Are egress doors side-hinged and swing in the direction of travel?

- Egress doors shall be side-hinged swinging.
- Egress doors shall swing in the direction of travel where serving an occupant load of 50 or more persons or a Group H occupancy.
- Egress doors in series should swing in the same direction or away from the space between the egress doors.

Doors/Question 5 - Do egress doors have adequate landings where necessary?

- There shall be a floor or landing on each side of an egress door.
- Floor or landing shall be at the same elevation on each side of the egress door.
- Landings shall be level except for exterior landings, which are permitted to have a maximum slope of 2%.

Doors/Question 6 - Do egress doors have adequate thresholds?

- Thresholds at egress doorways shall not exceed 0.75 inch in height for sliding doors in housing units or 0.5 inch in height for other egress doors.
- Raised thresholds greater than 0.25 inch shall be beveled with a slope no greater than 50%.

Doors/Question 7 - Are egress door operations adequate?

- All egress doors shall be readily openable from the egress side without the use of a key or special knowledge or effort. Interior stairway egress doors shall be openable from both sides without the use of a key or special knowledge or effort.
- Egress door handles, pulls, latches, locks, and other operating devices shall not require tight grasping, tight pinching, or twisting of the wrist to operate.
- The opening force for interior side-swing egress doors without closers shall not exceed a 5-pound force applied to the latch side. For other side-swinging, sliding, and folding egress doors, the door latch shall release a 15-pound force is applied to the latch side.
- The egress doors shall be set in motion when a 30-pound is applied to the latch side.

- The egress door shall swing to a fully open position a 15-pound force is applied to the latch side.
- Egress door handles, pulls, latches, locks, and other operating devices shall be installed between 34-48 inches above the floor or ground. Locks used only for security purposes and not used in normal operation are permitted at any height.
- Manually operated flush bolts or surface bolts are not permitted.
- The unlatching of any leaf shall not require more than one operation.
- Turnstiles or similar devices that restrict travel to one direction shall not be placed so as to obstruct any required means of egress.

Doors/Question 8 - Are egress doors not specialty door types (revolving, sliding, or overhead, etc.)?

- Special doors and grilles shall not be used as egress doors unless they comply with IBC Sections 1008.3.1 - 1008.3.5.

Egress Stairways

Stairways/Question 1 - Are the dimensions of the stairways adequate?

- The egress stairway width shall not be less than the total occupant load served by the egress stairway multiplied by the factors shown in the table below, but not less than 44 inches.

Egress Width Per Occupant Served				
Occupancy	Without Sprinkler System		With Sprinkler System	
	Stairways (in./occupant)	Other egress components (in./occupant)	Stairways (in./occupant)	Other egress components (in./occupant)
Occupancies other than listed below	0.3	0.2	0.2	0.15
Hazardous: H-1, H-2, H-3, and H-4	0.7	0.4	0.3	0.2
Institutional: I-2	NA	NA	0.3	0.2

- Egress stairways shall have a minimum headroom of 80 inches measured vertically from a line connecting the edge of the nosings.
- Riser heights shall be between 4-7 inches.
- Tread depths shall be a minimum of 11 inches.
- Treads and risers shall be of uniform size and shape, with a tolerance of 0.375 inch allowed between the largest and smallest treads/risers in a flight.
- The radius of curvature at the leading edge of the tread shall not be greater than 0.5 inch.
- Beveling of nosings shall not exceed 0.5 inch.
- Risers shall be vertical or sloped from the underside of the leading edge of the tread above at an angle not more than 30%.
- Treads shall not be sloped greater than 2% in any direction.
- A flight of egress stairways shall not have a vertical rise of greater than 12 feet between floor levels or landings.

Stairways/Question 2 - Are egress stairways clear, free of protrusions, and available for use?

- The leading edge of the treads shall project not more than 1.25 inches beyond the tread below and all projections shall be of uniform size.
- Protrusions into the required width at each handrail shall not exceed 4.5 inches at or below the handrail height.

Stairways/Question 3 - Do egress stairways have adequate landings where necessary?

- There shall be a floor or landing at the top and bottom of each egress stairway.
- The landing shall not be sloped greater than 2% in any direction.
- The width of the landings shall not be less than the width of the stairway they serve, which does not need to exceed 48 inched where the stairway has a straight run.

Stairways/Question 4 - Are the egress stairway surfaces slip resistant and securely attached?

- Egress stairway risers and treads shall have a solid surface.
- Walking surfaces of the egress stairway shall have a slip-resistant surface and be securely attached.
- Outdoor egress stairways shall be designed so that water will not accumulate on the walking surface.

Stairways/Question 5 - Do egress stairways have adequate handrails where necessary?

- Egress stairways shall have handrails on each side and be adequate in strength and attachment (see IBC Section 1607.7).
- Handrail height, measured above the stair tread nosings, shall be uniform and between 34-38 inches.
- Intermediate handrails are required so that all portions of the egress stairway width are within 30 inches of a handrail.
- Handrails with a circular cross section shall have an outside diameter of at least 1.25 inches and not greater than 2 inches or shall provide equivalent graspability. If the handrail is not circular, it shall have a perimeter of at least 4 inches and not greater than 6.25 inches with a maximum cross-section dimension of 2.25 inches. Edges shall have a minimum radius of 0.01 inches.
- Handrail-gripping surfaces shall be continuous.
- Handrails shall return to a wall, guard, or the walking surface or shall be continuous to the handrail of an adjacent flight. Where handrails are not continuous between flights, the handrails should extend horizontally at least 12 inches beyond the top riser and continue the slope for a depth of one tread beyond the bottom riser.
- Clear space between a handrail and a wall or other surface shall be a minimum of 1.5 inches and shall be free of any sharp or abrasive elements.

Stairways/Question 6 - Do egress stairways have adequate guards where necessary?

- Guards shall be located along open-sided egress stairways that are located more than 30 inches above the floor or grade below. Guards shall also be located along glazed sides of egress stairways that are located more than 30 inches above the stair tread nosing where the glazing does not meet the strength and attachment requirements (See IBC 1607.7 for strength and attachment requirements).
- Guards shall form a protective barrier not less than 42 inches above the stair tread nosing.
- Open guards shall have balusters or patterns such that a 4-inch-diameter sphere cannot pass through any opening up to a height of 34 inches above the stair tread nosing. For a height of 34-42 inches above the stair tread nosing, a sphere 8 inches in diameter shall not pass.

Stairways/Question 7 - Do egress stairways have an acceptable fire rating?

- Interior egress stairways shall be enclosed in fire barriers with a fire rating of not less than 2 hours when connecting four or more stories and not less than 1 hour when connecting less than four stories. The number of stories connected by the shaft enclosure shall include basements but not mezzanines.

Egress Ramps

Ramps/Question 1 - Are the dimensions of the egress ramps adequate?

- Egress ramps shall have a running slope no greater than 8%.
- Egress ramps shall have a cross slope no greater than 2%.
- The maximum rise of any ramp run shall be no greater than 30 inches.
- The egress ramp width shall not be less than the total occupant load served by the egress ramp multiplied by the factors shown in the table below, but not less than 44 inches.

Egress Width Per Occupant Served				
Occupancy	Without Sprinkler System		With Sprinkler System	
	Stairways (in./occupant)	Other egress components (in./occupant)	Stairways (in./occupant)	Other egress components (in./occupant)
Occupancies other than listed below	0.3	0.2	0.2	0.15
Hazardous: H-1, H-2, H-3, and H-4	0.7	0.4	0.3	0.2
Institutional: I-2	NA	NA	0.3	0.2

- The clear width of the egress ramp and the clear width between handrails, if provided, shall be 36 inches minimum.
- The minimum headroom in all parts of the egress ramp shall not be less than 80 inches.

Ramps/Question 2 - Are egress ramps clear, free protrusions, and available for use?

- Projections into the egress ramp and landing width are prohibited.

Ramps/Question 3 - Do egress ramps have adequate landings where necessary?

- Egress ramps shall have landings at the bottom and top of each ramp.
- Landings shall have a slope no greater than 2% in any direction.
- The landing width shall be at least as wide as the widest ramp run adjoining the landing.
- The landing length shall be 60 inches minimum.
- Where changes in direction of travel occur at landings provided between ramp runs, the landing shall be a minimum of 60 inches by 60 inches.

Ramps/Question 4 - Are egress ramp surfaces slip resistant and securely attached?

- The egress ramp surface shall be of slip-resistant materials that are securely attached.
- Outdoor egress ramps shall be designed so that water will not accumulate on the walking surface.

Ramps/Question 5 - Do egress ramps have adequate handrails where necessary?

- Egress ramps with a rise greater than 6 inches shall have handrails on each side and be adequate in strength and attachment (see IBC Section 1607.7).
- Handrail height, measured above the egress ramp slope surface, shall be uniform and between 34-38 inches.
- Intermediate handrails are required so that all portions of the egress ramp width are within 30 inches of a handrail.
- Handrails with a circular cross section shall have an outside diameter of at least 1.25 inches and not greater than 2 inches or shall provide equivalent graspability. If the handrail is not circular, it shall have a perimeter of at least 4 inches and not greater than 6.25 inches with a maximum cross-section dimension of 2.25 inches. Edges shall have a minimum radius of 0.01 inches.
- Handrail-gripping surfaces shall be continuous.
- Handrails shall return to a wall, guard, or the walking surface or shall be continuous to the handrail of an adjacent ramp. Where handrails are not continuous between ramps, the handrails should extend horizontally at least 12 inches beyond the top of the ramp and the bottom of the ramp.
- Clear space between a handrail and a wall or other surface shall be a minimum of 1.5 inches and shall be free of any sharp or abrasive elements.

Ramps/Question 6 - Do egress ramps have adequate edge protection?

- Edge protection shall be provided on each side of egress ramps and egress ramp landings.
- A rail shall be mounted below the handrail 17 to 19 inches above the egress ramp landing surface.
- A curb or barrier shall be provided that prevents the passage of a 4-inch-diameter sphere, where any portion of the sphere is within 4 inches of the floor ground or surface.

Ramps/Question 7 - Do egress ramps have adequate guards where necessary?

- Guards shall be located along open-sided egress ramps that are located more than 30 inches above the floor or grade below. Guards shall also be located along glazed sides of egress stairways that are located more than 30 inches above the egress ramp slope surface where the glazing does not meet the strength and attachment requirements (See IBC 1607.7 for strength and attachment requirements).
- Guards shall form a protective barrier not less than 42 inches above the egress ramp slope surface.
- Open guards shall have balusters or patterns such that a 4-inch-diameter sphere cannot pass through any opening up to a height of 34 inches above the egress ramp slope surface. For a height of 34-42 inches above the egress ramp slope surface, a sphere 8 inches in diameter shall not pass.

Ramps/Question 8 - Do egress ramps have an acceptable fire rating?

- Interior egress ramps shall be enclosed in fire barriers with a fire rating of not less than 2 hours when connecting four or more stories and not less than 1 hour when connecting less than four stories. The number of stories connected by the shaft enclosure shall include any basements but not mezzanines.

About BuilderRED

Acknowledgements

We would like to thank the **SMS**[1] Governance, Configuration, and Support Panel, its members, and its constituent working committees for their support and guidance during development of the Sustainment Management System™ (SMS), of which BUILDER™, BuilderRED™, and ROOFER™ are a part.

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[1] Sustainment Management System

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External Libraries

JetEntityProvider (https://jetentityframeworkprovider.codeplex.com), Licensed under MS-PL

History

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[1]U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory

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ERDC-CERL[2] makes no guarantee as to the precision of the predictive elements of the BUILDER™ software used in conjunction with BuilderRED. ERDC-CERL shall not be held responsible for damages or losses which are due to facility mismanagement decisions based upon predicted outcomes of facility asset performance from the BUILDER™ software.

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[1]U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory
[2]U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory

Information Re-Use Restrictions

End Users are strictly forbidden from re-using any information from the BUILDER system (compiled code or stored data) to provide similar capabilities in other tools. End Users may use the report outputs and may access their own inventory data, as stored in the database, to facilitate their own organization's business management practices. Any other use of or access to the data is strictly forbidden.

Glossary

B

BCCI
Building Component Condition Index

BCI
Building Condition Index - a condition rating for the overall building.

BFI
Building Functionality Index - computed from the results of a functionality assessment.

BPI
Building Performance Index - a measure of a building's overall performance, derived from the BCI and BFI.

BRED
BUILDER Remote Entry Database (BuilderRED)

BUR
Built-up Roofing

C

CCI
Coating Condition Index

CI
Condition Index

CM
Corrective Maintenance

CSCI
Component-Section Condition Index - a condition rating for the component section

E

EMS
Engineered Management System

ERDC-CERL
U.S. Army Engineer Research and Development Center, Construction Engineering Research Laboratory

ESC
Emergency Service Calls

F

FAFI
Functional Area Functionality Index

FCA
Facility Condition Assessment

FCI
Facility Condition Index - the total cost of necessary repairs divided by the replacement cost of the Building. This is a standard index in the industry.

FI
Functionality Index

H

HPSB
High Performance and Sustainable Building

K

KBCSI
Knowledge-Based Condition Survey Inspection

KBI
Knowledge-Based Inspection

M

M&R
Maintenance and Repair

M&R
Maintenance and Repairs

MDI
Mission Dependency Index - measures the relative importance of a Building

N

N/A
Not Applicable

P

PI
Performance Index. See also: BPI.

PM
Preventive Maintenance

PMI
Preventative Maintenance Inspection

R

RML
Remaining Maintenance Life

RSL
Remaining Service Life

S

SCCI
System Component Condition Index - a condition rating for the System component

SCI
System Condition Index - a condition rating for the building System.

SMS
Sustainment Management System

SP
Single Ply

SR
Shingle Roofing

SRM
Sustainment, Restoration, & Modernization

SUCI
Sample Unit Condition Index

Index

A

B

C

D

N

O

P

R