



# Substantial Damage Estimator (SDE) User Manual and Field Workbook

Using the SDE Tool to Perform  
Substantial Damage Determinations

FEMA P-784 / Tool Version 3.0 / August 2017



**FEMA**



The SDE is a tool to help local officials administer the Substantial Damage requirements of their floodplain management ordinances in keeping with the minimum requirements of the NFIP.

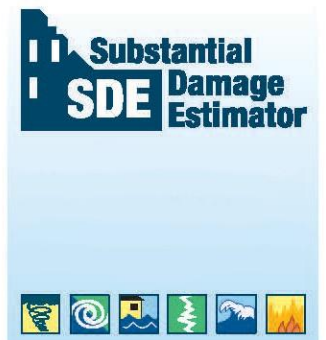


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# Substantial Damage Estimator (SDE) User Manual



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For technical assistance, consult your Regional Office of the Federal Emergency Management Agency (FEMA). The addresses and telephone numbers for the FEMA Regional Offices can be found at: <http://www.fema.gov/fema-regional-contacts>.

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### Acronyms and Abbreviations

ACV	Actual Cash Value
BCA	Benefit-Cost Analysis
BFE	base flood elevation
CID	(NFIP) Community Identification Number
CMU	concrete masonry unit
CSV	file extension for a file with comma separated values
DDF	depth-damage function
EIFS	exterior insulation finishing system
FAQs	Frequently Asked Questions
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GB	gigabyte
GHz	gigahertz
GIS	geographic information system
GPS	global positioning system
HVAC	heating, ventilation, and air-conditioning
ICC	Increased Cost of Compliance
ICF	Insulated Concrete Form
KML	Keyhole Markup Language
KMZ	Compressed KML file
MB	megabyte
MH	manufactured house
NFIP	National Flood Insurance Program
QA	Quality Assurance
SDE	Substantial Damage Estimator
SF	single-family
SFHA	Special Flood Hazard Area
WAAS	Wide Area Augmentation System
XLS	file extension for a Microsoft Excel spreadsheet file
XML	file extension for an extensible markup language file

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## SECTION 1 INTRODUCTION

The Substantial Damage Estimator (SDE) Version 3.0 Tool was developed by the Federal Emergency Management Agency (FEMA) to assist State and community officials in estimating Substantial Damage to residential and non-residential structures. Communities that participate in the National Flood Insurance Program (NFIP) are required to determine whether damage, of any origin, to structures within a mapped Special Flood Hazard Area (SFHA) meets the criteria for Substantial Damage. The SDE tool allows community officials with limited appraisal or construction backgrounds to develop reasonable estimates of structure values and structure-specific damages in accordance with the NFIP requirements.

### **Substantial Damage**

Substantial Damage is defined in the NFIP regulations as “Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before-damaged condition would equal or exceed 50 percent of the market value of the structure before the damage occurred.”

The SDE tool is based on the concept of using damage estimates for individual structure elements to determine whether the structure as a whole is substantially damaged. The SDE tool includes assessment options for residential structures (single-family homes, town or row houses, and manufactured homes) and common non-residential structures (e.g., office buildings, strip malls, restaurants). The SDE tool may be used in conjunction with an industry-accepted, residential construction cost-estimating guide.

Communities participating in the NFIP often have difficulty determining whether structures are substantially damaged. This difficulty is magnified after a major flood or other disaster in which a large number of structures have been damaged and there is a need to provide timely Substantial Damage determinations so that repair or other permits can be issued that allow reconstruction to begin.

### **Special Flood Hazard Area**

FEMA defines the SFHA as the land in the floodplain within a community subject to the 1 percent or greater chance of flooding in any given year (i.e., the 100-year flood).

Structures located in an SFHA that are determined to be substantially damaged or improved, must be brought into compliance with the minimum requirements of the community’s NFIP-compliant floodplain management laws or ordinances. This requirement applies to all structures in the SFHA, but is independent of the source of damage to the structure; damage as a result of flooding, high wind, fire, or any other source can trigger the requirement. The SDE tool should not be used for structures designated by State or Federal entities as historic structures because of their complex valuation.

Use of other FEMA tools or tool components to determine Substantial Damage may not be appropriate. Specifically, use of the depth-damage functions (DDFs) from the FEMA Benefit- Cost Analysis (BCA) tool are not appropriate because the DDFs were designed to be specific to a particular hazard and do not consider other sources of damage (fire, wind, earthquake, etc.).

### **Use of Other FEMA Tools**

Only the FEMA SDE tool can be used to make Substantial Damage determinations in accordance with the NFIP regulations.

The DDFs may underestimate the total structure damage. Furthermore, the BCA DDFs are designed to estimate future damage based on regional or national average damage data that do not consider site-specific factors, such as flood durations, and do not calculate damage that is specific to the structure under consideration.

### 1.1 Use of the SDE Tool to Manage Substantial Damage Responsibilities

The SDE tool provides a formalized methodology for collecting and organizing the data required to make defensible determinations that meet the NFIP criteria for Substantial Damage or Substantial Improvement. The data needed to make a determination are identified within the tool. Users can add photographs and latitude and longitude coordinates to the structure assessments within the tool to further define the structure being inspected.

The tool provides a single database for storage of data collected as part of the Substantial Damage determinations and allows users to import multiple records from an outside database (tax records, previous Substantial Damage determinations, geographic information system [GIS] data, etc.) at one time using the tool's *Enterprise Import* function. The tool also includes a data export feature, which allows users to create geo-referenced files that can be used to identify and locate properties in the SDE database.

Users are required to make judgment calls for three separate data fields: the initial construction quality, the depreciation rating of the structure prior to damage, and the percent damaged of each of 12 construction elements for residential structures or 7 elements for non-residential structures. After structure assessments are completed in the SDE tool, the community can begin to build a database of damaged structures for specific damage events. As other events cause damage, the community can add new assessments to existing properties from previous SDE inventories or add new assessments for structures not previously damaged. The SDE tool provides data management, recording, and organizing of the Substantial Damage data while also facilitating quality assurance (QA) reviews of the data entered into the tool.

Although the SDE tool was developed to assist State and community officials with Substantial Damage determinations, its use is not required. However, community officials are strongly encouraged to use the tool when evaluating damaged structures for Substantial Damage. Ultimately, local officials must make and defend Substantial Damage determinations. The data used in the SDE tool to make the determinations is only as accurate as the data collected.

#### **Non-Residential Structures**

Non-residential structures can vary considerably in construction materials structural elements, mechanical systems, and plumbing and electrical systems. The SDE tool uses a simplified approach to estimate damage for most non-residential structures. Some non-residential structures use more complex structure materials and construction methods, or have specific uses that may require a more detailed approach to estimating damage.

The tool includes two print options for structure-specific determinations. The user can print either a one-page summary report or a five-page detailed report that can be shared with structure owners and local officials while also providing a hard copy summary of the Substantial Damage determination for community files.

The SDE tool formalizes a FEMA-accepted approach for obtaining reasonable Substantial Damage/Improvement determinations for structures. The benefits and limitations of the SDE tool are summarized in Table 1-1.

**Table 1-1: Benefits and Limitations of Using the SDE 3.0 Tool**

Benefits	Limitations
<ul style="list-style-type: none"> <li>• A formalized and organized approach for estimating Substantial Damage and Substantial Improvement.</li> <li>• Reasonable and defensible structure-specific values and damage estimates.</li> <li>• Demonstration of compliance with the NFIP requirements for Substantial Damage determinations.</li> <li>• A FEMA-accepted method for determining Substantial Damage and Substantial Improvement.</li> <li>• Structure-specific summary reports that can be included with Substantial Damage determination letters sent to structure owners.</li> <li>• Summary reports that can be used in support of the Increased Cost of Compliance (ICC) claims.</li> </ul>	<ul style="list-style-type: none"> <li>• Does not provide exact values for the element percent damaged.</li> <li>• Because of the three options for determining structure value and damages, the determinations depend on local officials and not the SDE tool, to provide a consistent method for determining Substantial Damage or Substantial Improvement on a community-wide basis.</li> </ul>

#### **Substantial Damage and Substantial Improvement Resources**

Additional information regarding Substantial Damage and Substantial Improvement determinations, including the NFIP requirements and implementation guidance, is available on the FEMA website ([www.fema.gov](http://www.fema.gov)) at:

- FEMA Substantial Damage Best Practices (August 2017): <https://www.fema.gov/media-library/assets/documents/18692>
- FEMA Substantial Damage Estimator Tool Frequently Asked Questions (FAQs): <https://www.fema.gov/frequently-asked-questions-building-science>
- FEMA 213, Answers to Questions About Substantially Damaged Buildings (1991): <http://www.fema.gov/library/viewRecord.do?id=1636>
- FEMA P-784, Substantial Damage Estimator (SDE) Tool (August 2017): <https://www.fema.gov/media-library/assets/documents/18692>
- FEMA P-784, Substantial Damage Estimator (SDE) User Manual and Field Workbook, Using the SDE Tool to Perform Substantial Damage Determinations, Version 3.0 (August 2017) : <https://www.fema.gov/media-library/assets/documents/18692>
- FEMA P-758, Substantial Improvement/Substantial Damage Desk Reference (2010): <http://www.fema.gov/library/viewRecord.do?id=4160>

The desk reference provides practical guidance and suggested procedures to implement the NFIP requirements for Substantial Damage and Substantial Improvement.

### 1.2 Users of the SDE 3.0 Tool

**Under the NFIP, communities are responsible** for evaluating potential Substantial Damage, of any origin, for all structures located within the mapped SFHA. Consequently, the target users of the SDE tool are local officials with responsibility for community adherence to their NFIP-compliant floodplain management ordinance and State officials that provide guidance and technical assistance to communities on the implementation of the NFIP regulations. The SDE tool may also be used by other parties, such as contractors, lending agencies, and potential structure purchasers, to assess the overall percent damaged and determine a very general estimate of repair costs for the structure.

The SDE results are not a substitute for a professional appraisal, an insurance adjustment report, or a detailed cost estimate for repairs prepared by a qualified contractor.

### 1.3 Organization of the SDE 3.0 User Manual

This User Manual follows the basic organization below for using the SDE tool to make Substantial Damage or Substantial Improvement determinations:

- **Introduction** (Section 1) – Explains the purpose of SDE and who uses it.
- **Installation** (Section 2) – Provides guidance on the installation of the SDE tool on the host computer (via a download from the FEMA website).
- **Creating SDE Assessments** (Section 3) – Guides the use of the tool and the data required to provide a valid Substantial Damage assessment.
- **Exporting SDE Data** (Section 4) – Identifies which of the three export options is best for the intended use of the SDE data.
- **SDE Reports** (Section 5) – Provides guidance on the available SDE 3.0 Tool reports for the community files and structure owners.
- **SDE Field Workbook** (follows User Manual) – Provides guidance on field preparations for SDE data collection and damage assessments for residential and non-residential structure elements.
- **Appendices** (follows Field Workbook):
  - Appendix A – Locations and boundaries for the FEMA Regional Offices
  - Appendix B – Forms and checklists to be used in performing SDE damage inspections
  - Appendix C – Sample documents, including a letter of introduction for SDE inspections; notices of determination of Substantial Improvement, Substantial Damage, and No Substantial Damage for structure owners; and guidelines for contact with structure owners
  - Appendix D – Guidance for preparing a contractor or community cost estimate of repairs



- Appendix E – Guidance for estimating the element percent damaged for residential structures
- Appendix F – Guidance for estimating the element percent damaged for non-residential structures

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## SECTION 2      INSTALLATION

This section explains the system requirements to successfully install and run the SDE tool and provides instructions for computers running Microsoft operating systems Windows 7<sup>®</sup>, and Windows 8<sup>®</sup>, and Windows 10<sup>®</sup>.

The SDE tool can be installed from a zip (or compressed) file available on the FEMA website (refer to Section 2.2 for the web address). The installation from the website download includes all the files required to install and run the SDE 3.0 Tool. The SDE 3.0 Tool was developed using Microsoft .NET 4.6.1 Framework and should not interfere with other existing applications already on the host computer.

### 2.1 System Requirements

Users can avoid the requirement for full local administrative rights if the installation file is stored in and opened from the My Documents folder on the root directory on the host computer. If the installation file is stored in any other folder, administrative rights may be required. The need for administrative rights is set by the agency, community, or other entity that is responsible for the security and maintenance of the user's computer. Table 2-1 provides the minimum system requirements to run the SDE tool successfully.

**Table 2-1: Minimum System Requirements to Run the SDE 3.0 Tool**

<b>System Element</b>	<b>Recommendation</b>
Processor	32-bit processor, with a 1 gigahertz (GHz) or faster processor
Framework	.NET ("dot NET") Framework 4.6.1 If .NET Framework 4.6.1 is not already installed, the SDE installation routine will attempt to install it (refer to Step 3 below).
Operating system	Windows 7, 8, or 10
Memory	1 gigabyte (GB) minimum 2 GB or more recommended
Hard disk space	Approximately 300 megabytes (MB) of available hard-disk space If SDE is installed on a network drive, set up the tool in the standalone mode during installation.
Display	Super VGA (1,024x768 pixels) or higher resolution video adapter and Adobe Reader Version XI or higher
Monitor Companion tool	Other Adobe Reader versions or other programs may work to display the PDF files, but the recommended version of Adobe Reader should be used for the help links in the tool to work as intended.

System Element	Recommendation
Companion tool	Microsoft Office 2007 or later - or - Microsoft Office Access Database Engine 2007  If the user does not already have either of these software options installed, Microsoft Office Access Database Engine 2007 is included in the documentation folder within the directory where the SDE tool is installed. Locate the SDE3.0 directory; select the Documentation folder, then select Microsoft_2007_AccessDatabaseEngine.exe to start the install process.

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## 2.2 Installation Steps

Prior to installing the SDE 3.0 Tool, users are encouraged to export and save any existing SDE data from previous versions of the SDE tool. Although it is not required, FEMA recommends that users uninstall previous versions of the SDE tool from the host computer using the Windows Add/Remove Programs function to avoid confusion between past and current SDE inventories.

Installation steps may vary depending on the host computer setup and the utility program installed on the computer to unzip the SDE tool installation file downloaded from the FEMA website.

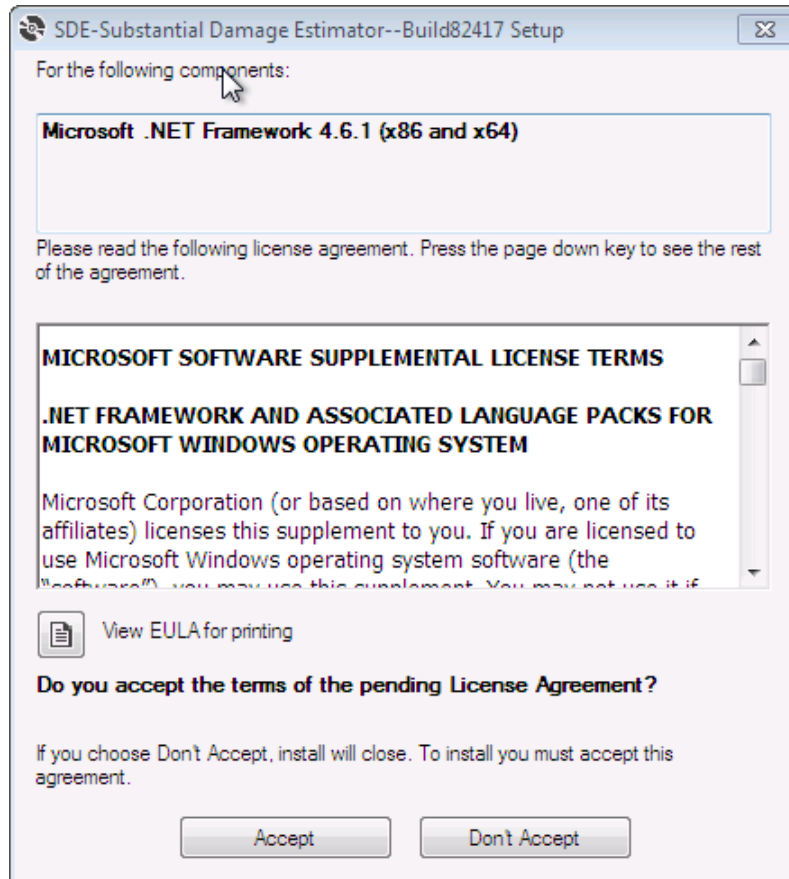
Use the following steps to install the SDE 3.0 Tool using a zip file downloaded from the FEMA website:

**USER NOTE:**

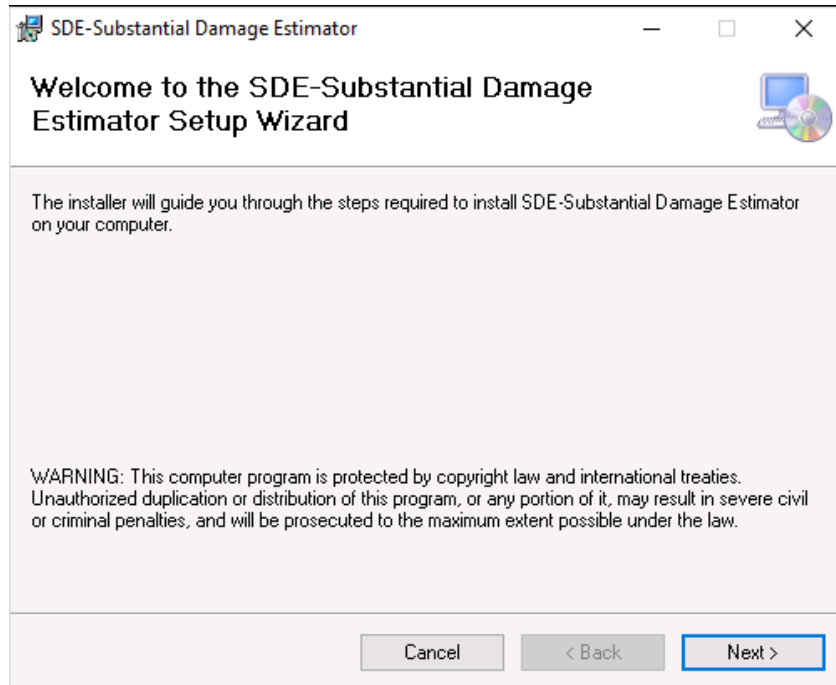
A host computer can only have one installation of the SDE tool.

1. After opening the FEMA website (<http://www.fema.gov>), search on “SDE” or use the SDE web page found at <https://www.fema.gov/media-library/assets/documents/18692> to locate the SDE tool download function.
2. Download the SDE installation file to the My Documents folder on the host computer and unzip the file. In many cases, users can unzip the folder by right-clicking on the file and selecting the option *Extract All...* from the list of options or by double-clicking the zip folder and selecting the option *Extract all files* from the list of choices displayed. Some users may have an unzip utility installed that activates automatically when they select a zipped folder or file.
3. If the .NET Framework 4.6.1 is not already installed, the SDE installation routine will attempt to search online for the Framework and install it on the host computer during the SDE 3.0 installation. Local administrative rights and an Internet connection are required to install the .Net Framework 4.6.1. The user will need to accept the Framework license agreement (Figure 2-1) for the installation to continue.
4. After the SDE file has been extracted, open the folder and double click on the “Setup.exe” file to start the tool installation process. The Setup Wizard window shown in Figure 2-2 will appear.
5. Select *Next* button to continue the installation.

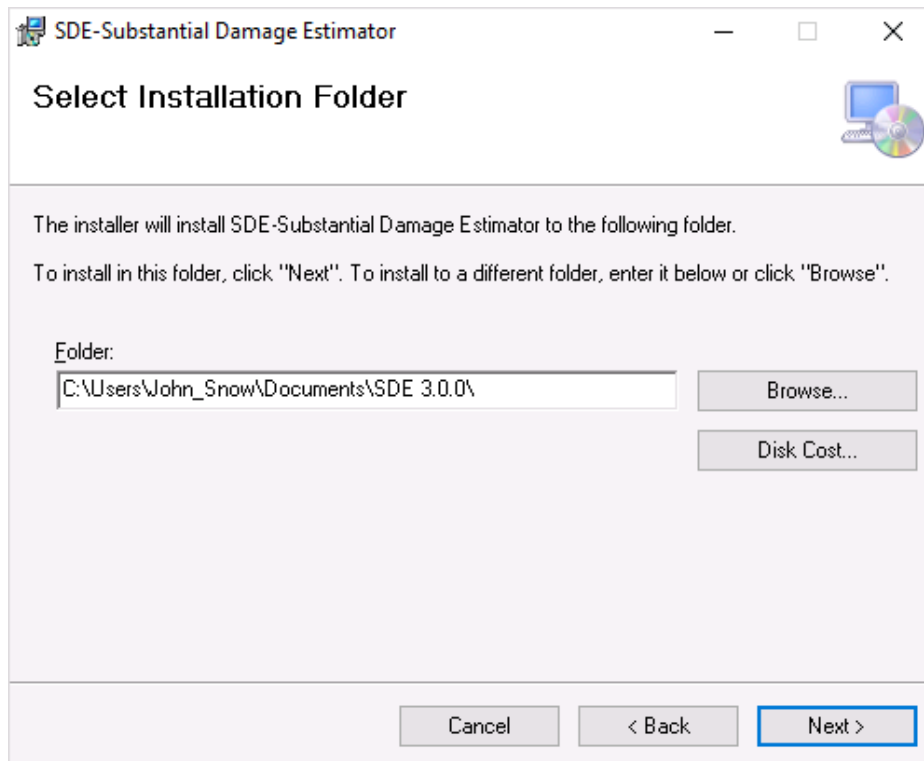
- The Select Installation Folder window (Figure 2-3) will appear next. This window allows the user to proceed with installation in the default location or change the destination folder. After the destination folder is identified, select **Next** to continue.



**Figure 2-1: .NET Framework 4.6.1 License Agreement**

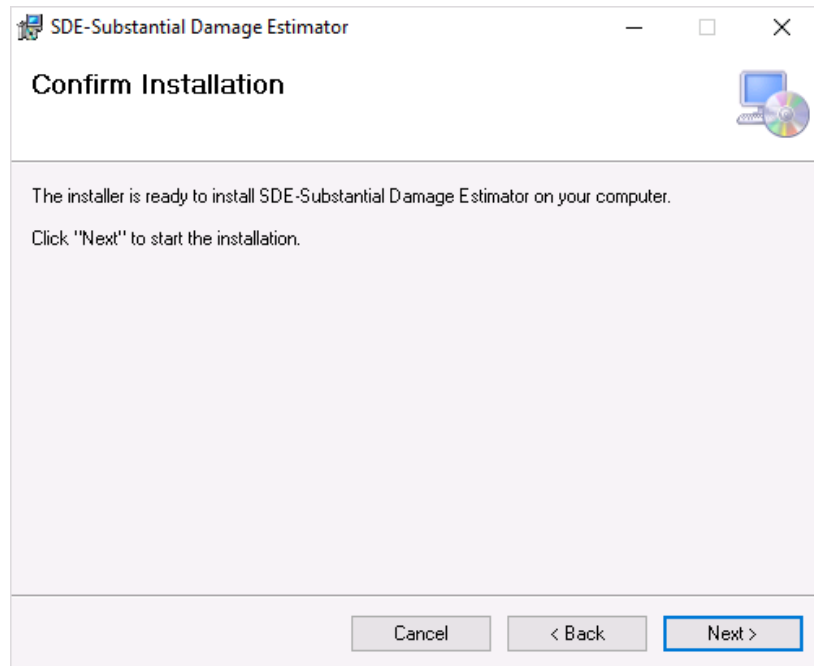


**Figure 2-2: SDE Setup Wizard**



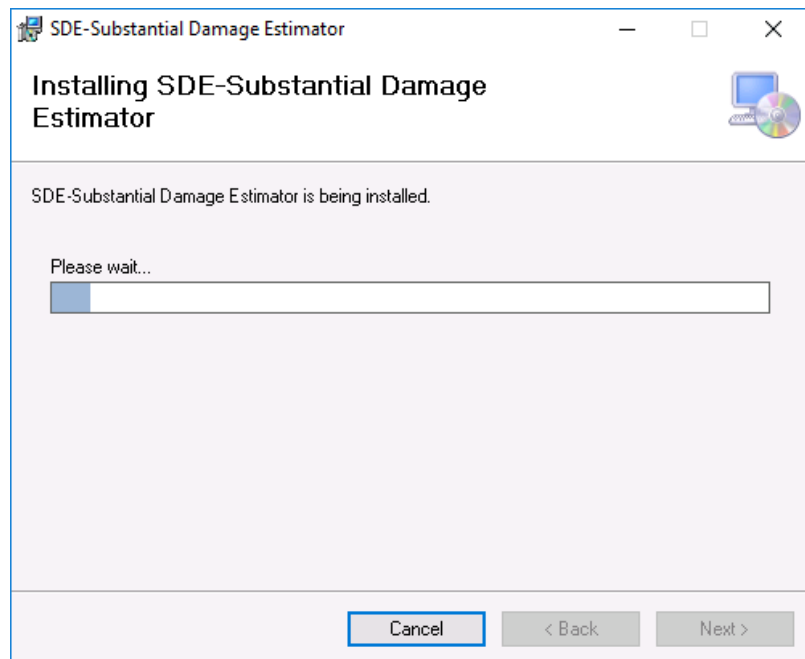
**Figure 2-3: Select Installation Folder**

- When the Confirm Installation window appears, the Setup Wizard is ready to proceed with the SDE installation on the host computer (Figure 2-4). Select **Next** to continue.



**Figure 2-4: Confirm Installation window**

- The installation status window (Figure 2-5) will show the status of the installation process. When the status bar reaches 100%, select **Next** to continue.

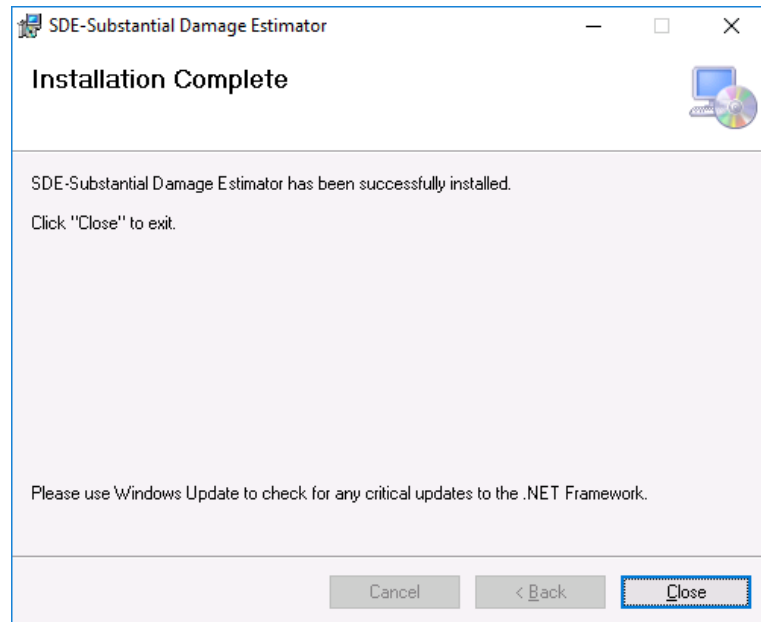


**Figure 2-5: Installation status window**

## Installation

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9. Once the installation is complete, select **Close** to end the installation process (Figure 2-6).



**Figure 2-6: Installation Complete window**

10. Upon completion of the installation, an SDE icon (Figure 2-7) will appear on the desktop of the host computer. Double-click the icon to run the SDE tool.



**Figure 2-7: The SDE icon**



## 2.3 Database Name and Type

The first time the tool is run on the host computer, the Database Information window (Figure 2-7) appears and prompts the user to select the database type (from the drop-down list) and add a name for the database.

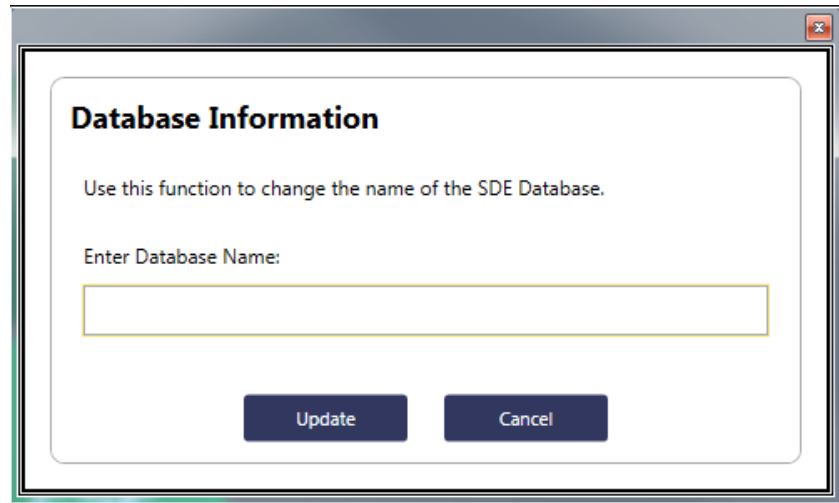
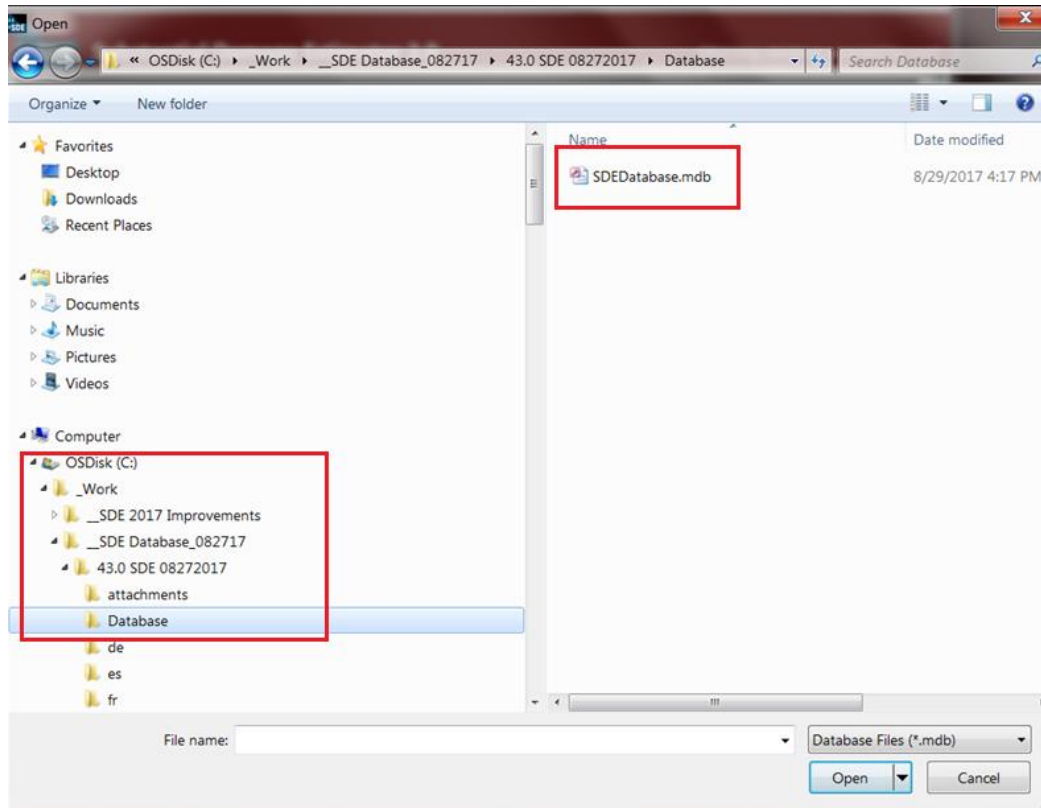


Figure 2-8: Enter the database name

There are two types of SDE databases: Stand-alone and Client/Server. Stand-alone versions are installed on a single host computer. Only the user of the host computer has access to a stand-alone SDE database. On a Client/Server or network installation, multiple users can access the same SDE database once they map the network drive from their computer to the network location where the database is stored. The advantage of a network location for the database is that all users have access to the same copy of the database.

To install a new SDE database on a network server, use the following steps:

1. Install the SDE tool on the host computer using the installation guidance from Section 2.
2. Locate the SDE folder on the host computer.
3. Open the SDE folder and copy the SDEDatabase.mdb file from the host computer and copy it to the destination folder on the network.
4. Go to the **Database Functions Menu** on the SDE **Main Toolbar** and open the **Set/Reset Server Database Location** function.
5. Locate the server location of the SDEDatabase.mdb that was placed on the network in Step 3 above. Select **OK**.
6. All users can map to the same database server location to access the same copy of the database.



**Figure 2-9: Location of SDE Database**

To share existing SDE databases with assessments and photographs, use the following steps. It is assumed that the SDE tool is already installed as a stand-alone version on the host computer.

1. Copy the SDEDatabase.mdb to a server location, using Steps 2 to 5 above.
2. Copy the Attachments folder to the server at one folder level above the SDEDatabase.mdb.

Additional users can map to the same database server location, which allows multiple users to work in a single copy of the database.

## SECTION 3 CREATING SDE ASSESSMENTS

Users can create assessments using three methods: (1) importing property data and adding assessment data, (2) importing existing assessments from another SDE database, or (3) creating properties and assessments in the SDE tool. Note that there is a difference between records and assessments (see text box at right).

Prior to developing any records or assessments, users should familiarize themselves with the use of the tool.

Note that Sections 3.1 to 3.11 provide general information and guidance for using the SDE tool to develop both residential and non-residential assessments. Sections 3.11.2 and 3.11.3 provide specific guidance for entering data for residential and non-residential assessments, respectively. Section 3.11.4 identifies the data fields required to be completed for all assessments.

**User Manual Formatting Explanation:** To allow readers to differentiate easily between the various elements of the tool, terms that indicate elements of the screen captures are formatted as follows:

- **Bold Lucinda Sans font** is used to indicate which of the seven standard SDE 3.0 menu tabs, as shown in Figure 3-1, should be selected (e.g., Address, Structure/Damage/NFIP Info, Cost, etc.).
- **Bold Italic Lucinda Sans font** is used to indicate SDE tool functions that can be selected (e.g., “Next,” “OK,” “Submit”), menus, and data fields.

**Records vs. Assessments**

**Records** refer to property data entered into the tool before adding the data collected in the field. A record is therefore a partial assessment.

**Assessments** refer to one or more records for a single structure and include property (which can be pre-loaded by importing the data into the tool) and data collected in the field. The term “assessment” is used to describe a complete entry and can be used for a Substantial Damage determination.

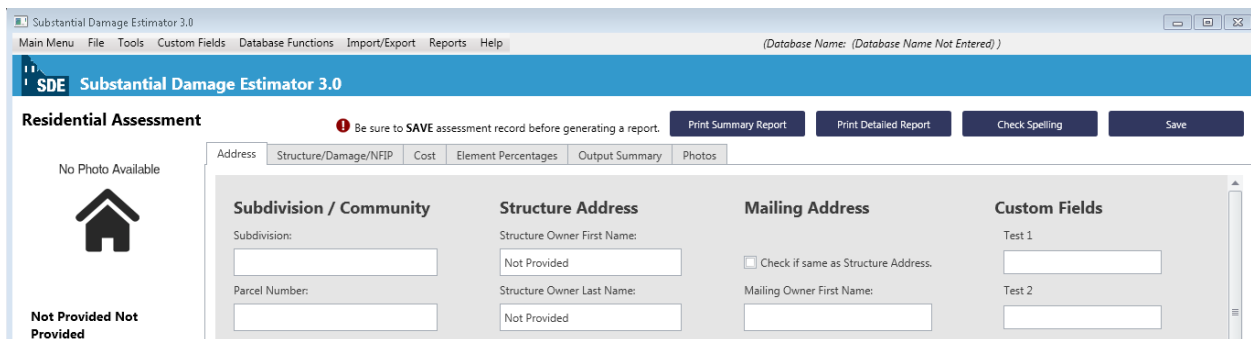


Figure 3-1: SDE Version 3.0 Tool menu tabs

## 3.1 Main Menu Options

Once the SDE tool is installed and the database type selected, the tool will open with the *Main Menu* as shown in Figure 3-2.

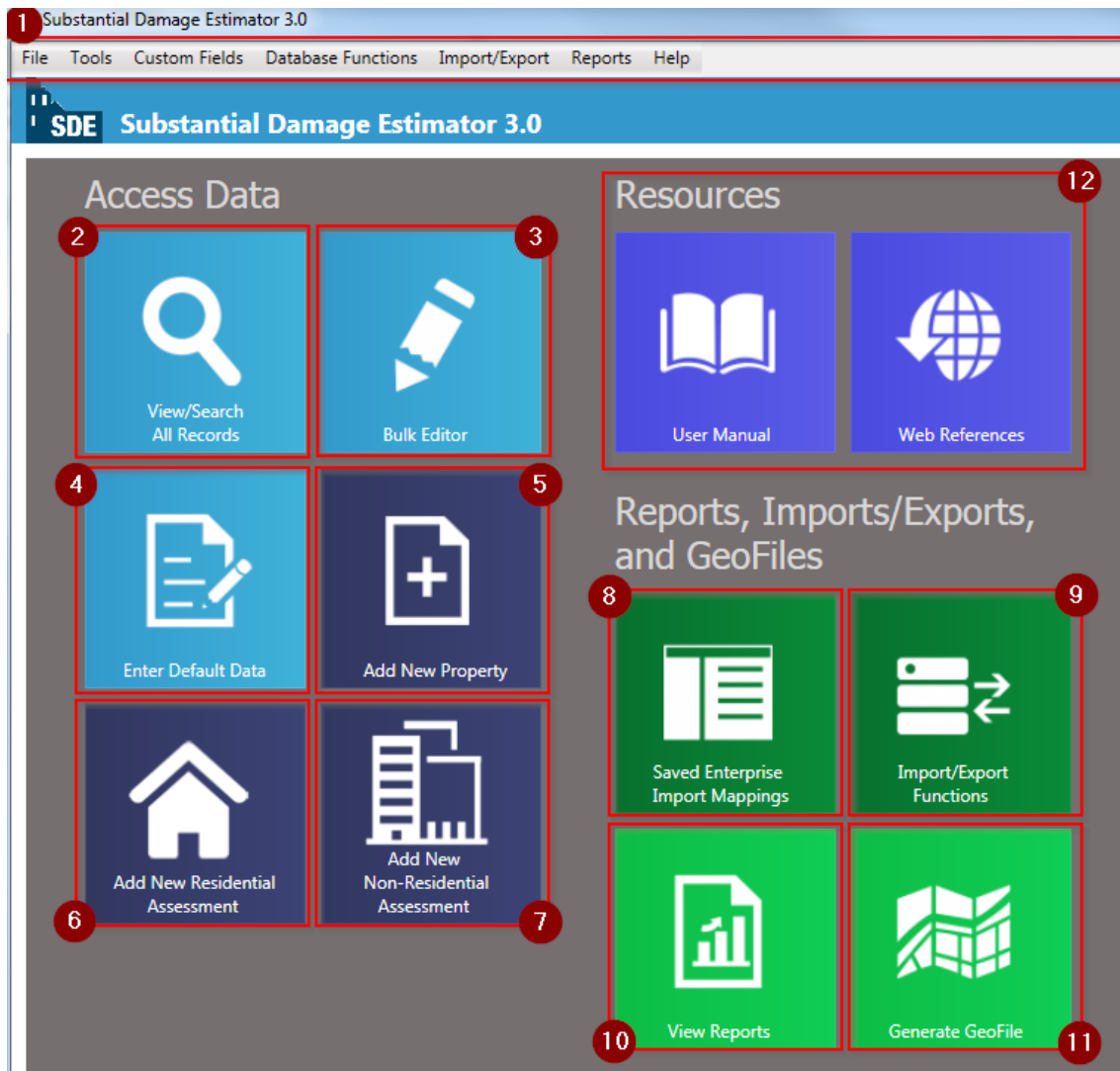


Figure 3-2: Main Menu for SDE Version 3.0 Tool

Figure 3-2 shows the *Main Menu* navigation options numbered according to the following list:

**1 Main Toolbar** – This toolbar can be accessed from any screen within the SDE tool, providing the user with access to both basic and specific functions. Many functions in the *Main Toolbar* can also be accessed from the *Main Menu*.

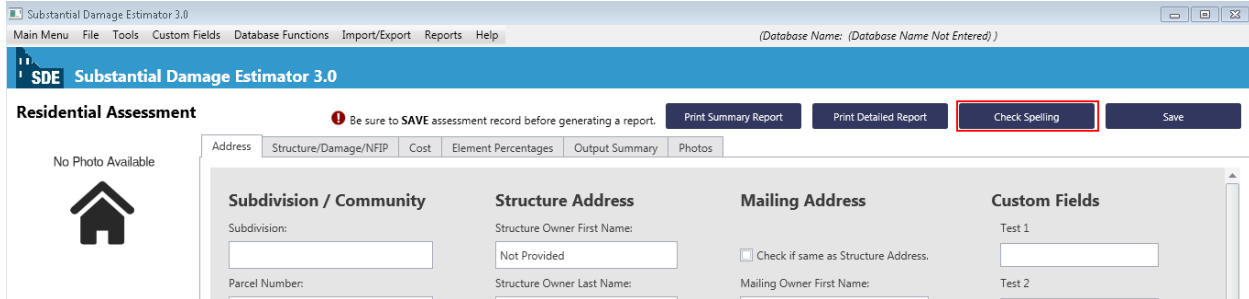
- **File**
  - Add new property
  - Add new residential or non-residential assessment
  - Access and open recent assessments
  - Save the current assessment
  - Access the *Main Menu*
  - View or search all records
  - Exit the tool
- **Tools**
  - Turn the latitude/longitude validation function on or off
  - SDE notes (refer to Section 3.3)
  - User preferences (refer to Section 3.4)
- **Custom Fields**
  - Add, edit, or delete custom fields
- **Database Functions**
  - Update database name
  - Bulk editor
  - Enter or edit default data
  - Set or reset server database location
  - Search and replace (refer to Section 3.5)
  - Delete all SDE data (refer to Section 3.6)
- **Import/Export**
  - Import or export SDE data
  - Enterprise import of property data
  - Export SDE data to Excel
  - Saved Enterprise Import Mappings settings
  - Generate GeoFile
  - Import or export latitude/longitude coordinate data
  - Import or export user settings (refer to Section 3.7.5)
- **Reports**
  - Community report
  - Structure and percent damage report
  - Community-wide one-page individual structure summary reports
- **Help**
  - Access the online *SDE 3.0 User Manual*

- 2 **View/Search all records** – This function allows the user to view or search all records or assessments within the tool based on selected filters for the search. Users can also open a record or assessment to edit or add data.
- 3 **Bulk Editor** – This function allows the user to edit and save multiple assessments within the tool based on selected filters. For more information, refer to Section 3.12.2.
- 4 **Enter Default Data** – This function allows the user to create or edit default values that can be quickly applied to records and assessments. Refer to Section 3.8 for information on using the default data function.
- 5 **Add New Property** – This function allows the user to create a new property.
- 6 **Add New Residential Assessment** – This function allows the user to add a residential assessment to an existing property.
- 7 **Add New Non-Residential Assessment** – This function allows the user to add a non-residential assessment to an existing property.
- 8 **Saved Enterprise Import Mappings** – Users can create or edit multiple import mappings to be used in the Enterprise Import Setting within the tool. Refer to Section 3.9 for information on using the mappings function.
- 9 **Import/Export Functions** – This function allows the user to import and export SDE data, select import and export user settings, perform an enterprise import, and export files to Excel. For more information on importing and exporting, refer to Sections 3.7 (importing data) and 4 (exporting data).
- 10 **View Reports** – This function allows the user to generate fixed, pre-defined Community, Structure & Percent Damaged, or Summary Reports for assessments in the SDE database. For more information on reports, refer to Section 5.
- 11 **Generate GeoFile** – This function generates a georeferenced file for export to geographic or spatial mapping programs. The file is a KMZ file which is a Keyhole Markup Language (KML) file that has been compressed (or zipped) to reduce the file size. For more information, refer to Section 4.4.
- 12 **Resources (User Manual and Web References)** – Help documentation references the *SDE 3.0 User Manual* and applicable online references (Web References) to assist the user in the assessment process and use of the SDE tool.

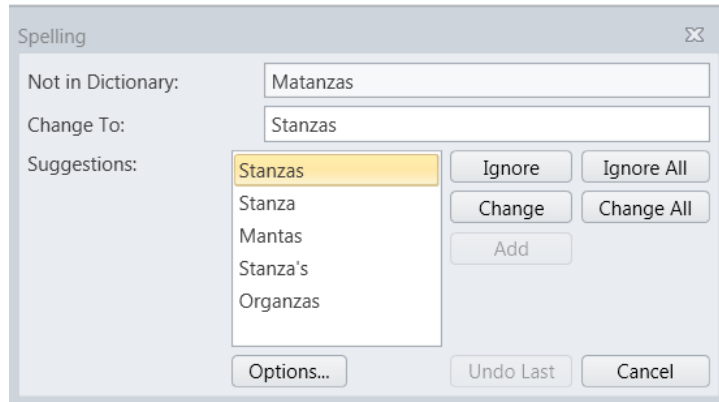
### 3.2 Spell Check

The *Spell Check* function in the SDE 3.0 Tool allows users to perform a spell check on text fields for any Property, Assessment, or Default Data screen that is currently opened. Note that it only works for these screens and will not perform a spell check on the Export to Excel or the Bulk Editor screens.

Users have two options for using spell check. Option 1 is when a record, assessment, or the Default Data screen is open. The user can select **Check Spelling** near the upper right corner of the screen to check the spelling of the open record (Figures 3-3 and 3-4). For the second option, the user can go to the **Main Menu**, select the **Tools** menu and then select **User Preferences**. Under **User Preferences** (refer to Section 3.4), the user can turn **Auto Spell Check** on or off. When **Auto Spell Check** is on, the spell check function is run every time a record, assessment, or default data is saved.



**Figure 3-3: Opening Check Spelling**



**Figure 3-4: Review window for both Check Spelling and Spell Check**

## 3.3 SDE Notes

The *SDE Notes* function allows users to create, edit, and delete reusable notes. To open the *SDE Notes* window, select *Tools* from the *Main Menu* and then select *SDE Notes* (Figure 3-5).

The *SDE Notes* can be accessed at any time within the *SDE Tool*. Once a user has selected the *SDE Notes* option from the *Tools* menu, the window for accessing their *SDE Notes* will open (Figure 3-6).

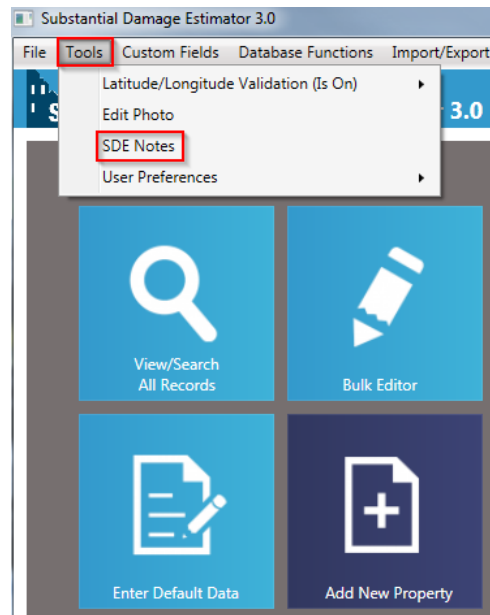


Figure 3-5: Opening SDE Notes

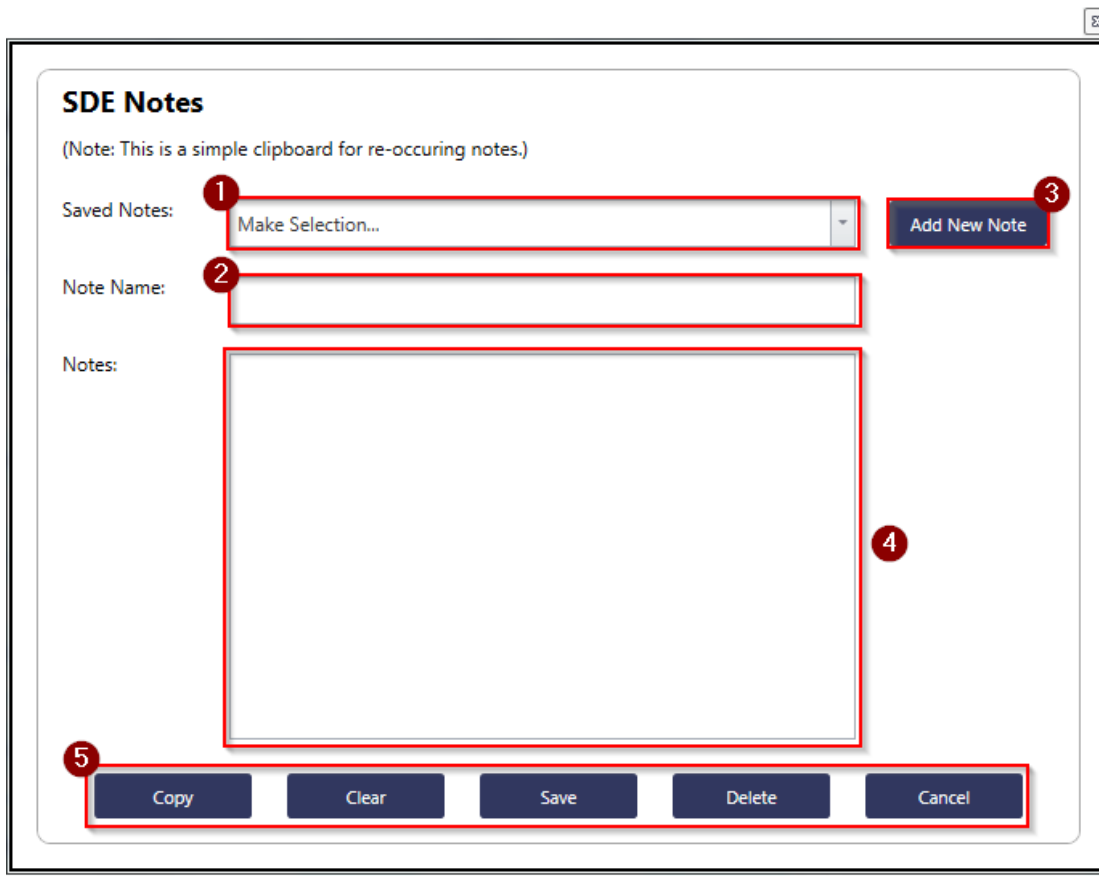


Figure 3-6: SDE Notes window

Figure 3-6 shows the SDE Notes window options numbered according to the following list:



- 1 **Saved Notes** – Previously saved SDE Notes already in the tool can be selected from a drop-down list in this data field. When a saved note is selected, the name of that note will populate the text field for the note name (number 2) and the text of that note will populate the text field for the note contents (number 4).
- 2 **Note Name** – This data field allows users to revise the name of either a previously saved or a newly created note.
- 3 **Add New Note** – This button allows users to create a new SDE Note. When the user selects this option, they will be able to enter a new name for the notes that will populate the text field for the note name (number 2) and enter new text that will populate the text field for the note (number 4).
- 4 **Note Text** – This data field allows users to see and revise a selected note or add content for a new note.
- 5 **Copy/Clear/Save/Delete/Cancel** – These options allows users to copy the contents of a note and paste the selection in any text field within the SDE tool.
  - The *Copy* button copies the entire text value to the host computer clipboard.
  - The *Clear* button will remove the note name and note text.
  - The *Save* button saves the notes.
  - The *Delete* button deletes the contents in the Notes field.
  - The *Cancel* button cancels all actions and closes the SDE Notes window.

Note that users can import (refer to Section 3.7.5) and export (refer to Section 4.3) their SDE Notes for reuse for later assessments in the current database or in a different database.

### 3.4 User Preferences

The *User Preferences* function allows users to set their own preferences to overwrite the following:

- Settings for the *Auto Check Default Values* function. The SDE tool does not automatically populate with the Default Values when creating a new Property or Assessment. By setting this selection to *On*, the tool will automatically check the **Load Default Values** button for each new Property or Assessment selection screen.
- Settings for the *Auto Spell Check* function. By default, the *Spell Check* will automatically run when a user closes a screen where the spell check is active. A user may change this selection from *On* to *Off* to prevent a spell check from automatically running. Note that even if a user turns this feature off, they can still perform a spell check by manually selecting it from the menu (refer to Section 3.2).

## Creating SDE Assessments

To adjust either setting, select **Tools** from the **Main Menu** bar, select **User Preferences**, and then choose either **Auto Check Default Values** or **Auto Spell Check** to turn on or off (Figure 3-7).

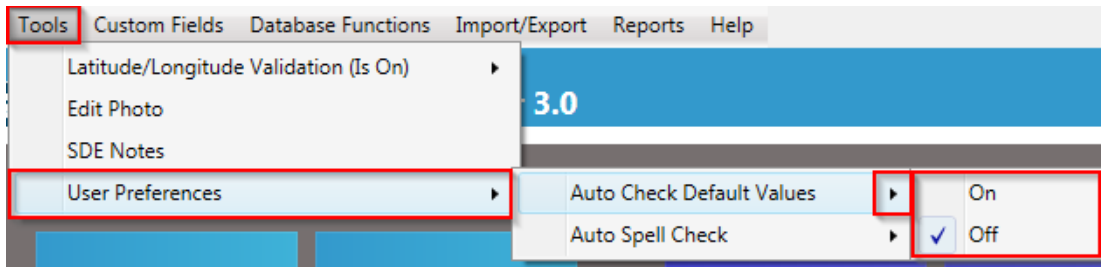


Figure 3-7: Options for User Preferences

### 3.5 Search and Replace

The **Search and Replace** function in the SDE 3.0 Tool allows users to perform a simple search and replace on text fields for any record. Note that the function only works for the text field specified. To run the search and replace, select **Database Functions** from the **Main Menu** bar and then select **Search and Replace** (Figure 3-8). The window to enter the **Search and Replace** values will open (Figure 3-9).

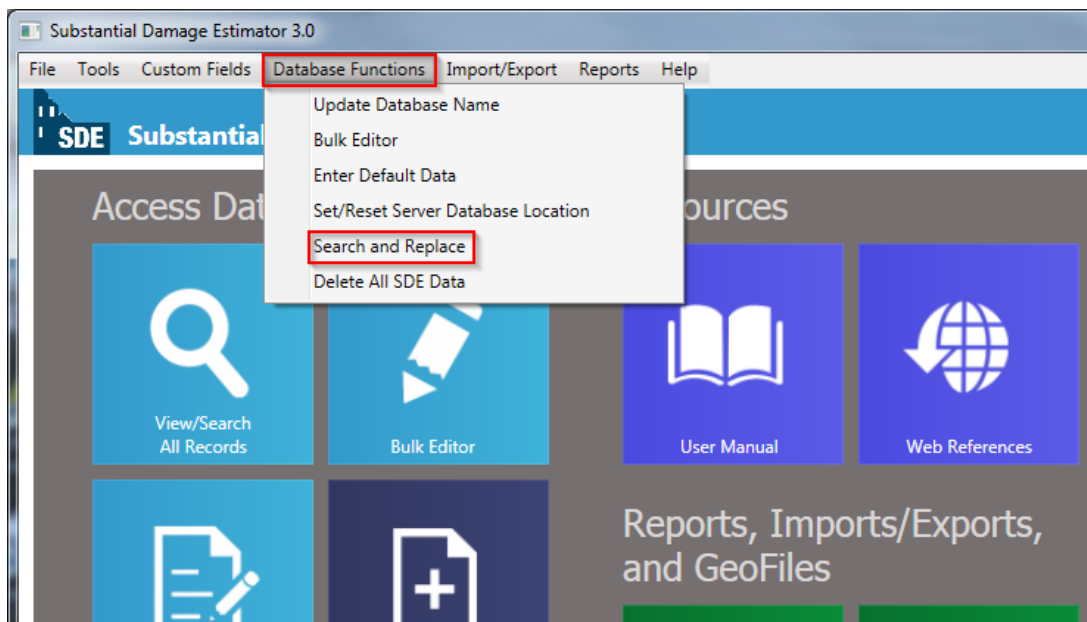
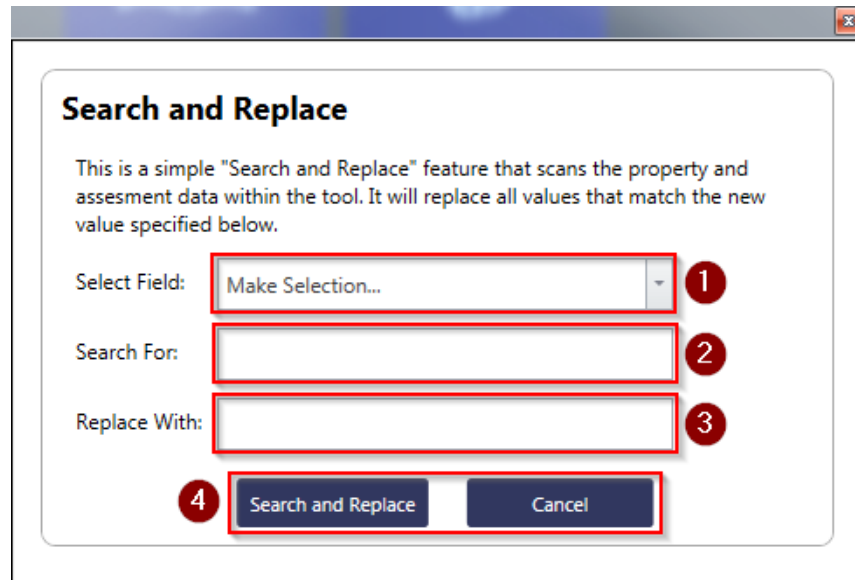


Figure 3-8: Opening Search and Replace function



**Figure 3-9: Search and Replace window**

Figure 3-9 shows the Search and Replace window options numbered according to the following list:

- 1 Select Field** – This function allows users to select an eligible field to perform a search and replace. When the user selects a field from the drop-down list, the text value entered into the search text field (number 2) will be replaced by the text value from that of the replace text field for the note (number 3).
- 2 Search For** – This function allows users to enter the text value for a search based on the selected field from the drop-down list (number 1).
- 3 Replace With** – This function allows users to enter the replacement text based on the selected field from the drop-down list (number 1). It will replace whatever text value the user has entered into the search text field (number 2) with the revised value.
- 4 Search and Replace or Cancel** – The user can either complete the search and replace function or cancel the function. When a search and replace command has been completed, a confirmation window with the number of records revised will appear.

### 3.6 Delete All SDE Data

The *Delete All SDE Data* function (Figure 3-10) allows users to clear all records or assessments, default values, enterprise import settings, and SDE Notes from the SDE tool. Users may want to delete all SDE data prior to entering data for a new inspection day, inspection team, community, county/parish, or new damage event.

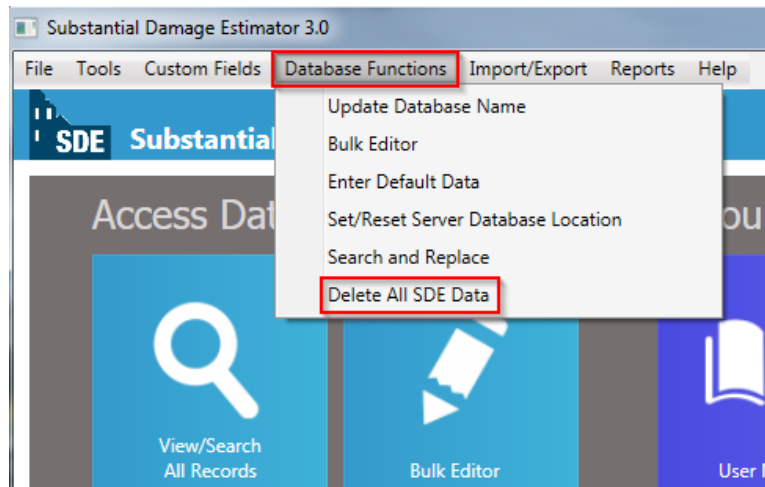


Figure 3-10: Opening Delete All SDE Data function

Once the *Delete All SDE Data* command is selected, a window with the delete options will open (Figure 3-11). After the data selected for deletion is checked, the user can select the *Delete* button at the bottom of the window. This will trigger the appearance of a Database Delete warning window (Figure 3-12), giving the user an opportunity to avoid inadvertent deletion of data.

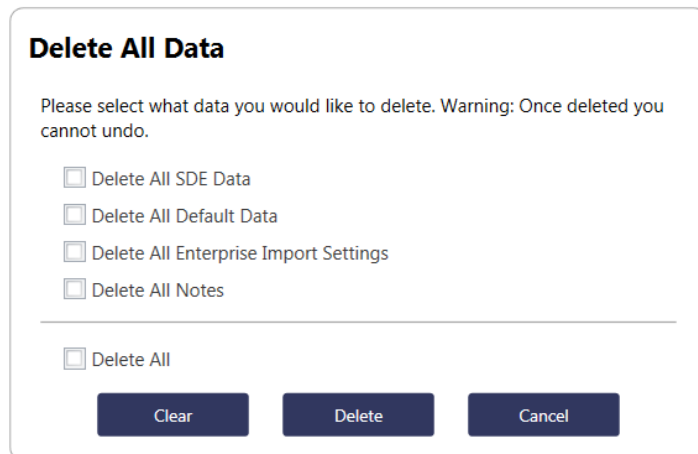


Figure 3-11: Delete SDE Data selection window

When the *Delete All SDE Data* option is selected, all data in the active SDE database will be permanently deleted and cannot be recovered. Consequently, users are strongly encouraged to save existing data by exporting any records and assessments that may be needed in the future prior to selecting “Yes” in the Database Delete warning

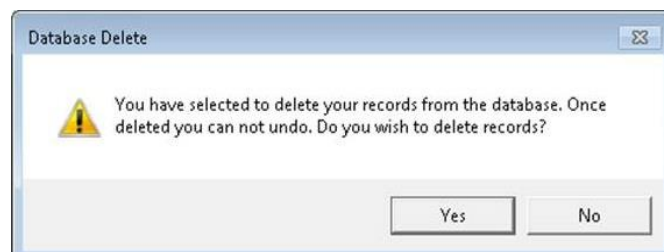


Figure 3-12: Deleting records warning window

window.

### 3.7 Importing Data

There are four options available for adding data to the tool:

- Importing SDE data from another SDE database
- Importing non-SDE property data, such as tax information, property lists, or appraisal data from community databases or Excel files, using the *Enterprise Import* function
- Importing latitude and longitude coordinate data
- Importing user settings, such as Default Values, Enterprise Import Settings, or SDE Notes that were previously created in SDE 3.0

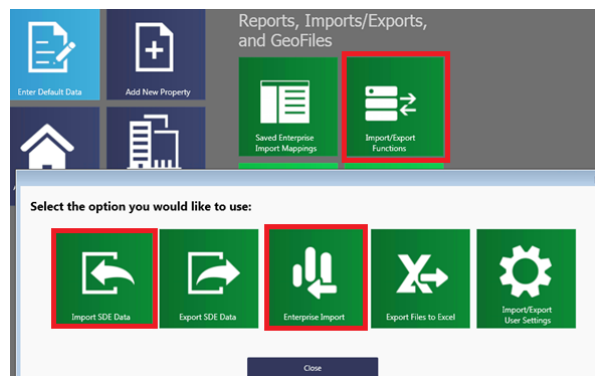
**Importing SDE Data**  
Only data from SDE Versions 2.0 and later can be imported into SDE Version 3.0.

The type of import to use depends on the types of data and databases available. The import of data from an SDE database is straightforward. Data from a non-SDE database or an Excel file must be imported using the *Enterprise Import* function built into the tool.

Note that only user settings created in SDE 3.0 can be imported and used in the tool. Settings developed in earlier versions of SDE cannot be imported.

#### 3.7.1 Importing SDE Data

The purpose of the *Import SDE Data* and *Export SDE Data* functions is to allow SDE data to be imported and exported from multiple computers to create a large inventory of SDE records on a single computer. To import data, the user must select the *Import/Export Functions* button on the SDE *Main Menu* and then select the *Import SDE Data* button (Figure 3-13).



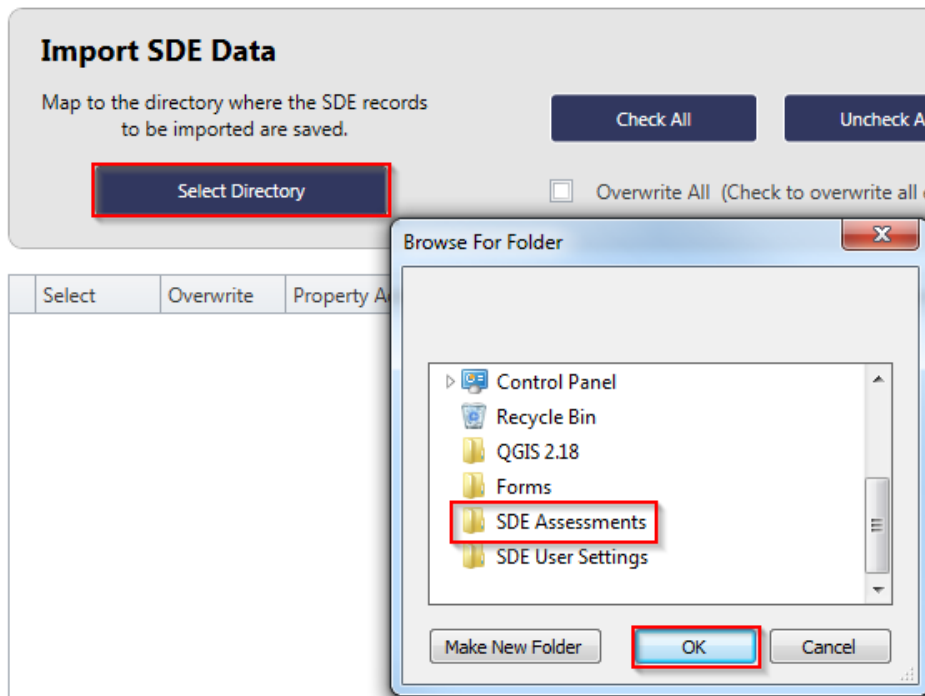
**Figure 3-13: Import SDE Data functions**

The Import SDE Data screen will appear. The user must select the *Select Directory* button to open the Browse For Folder window to select a directory from the location of the files (Figure 3-14). Data that have been exported using the SDE tool will be located in a folder titled “SDE Assessments” (usually located on the root directory of the computer). This folder contains

## Creating SDE Assessments

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subfolders with the individual properties and assessments. Select the root folder to import the data from all the subfolders.



**Figure 3-14: SDE Import directory**

Once a folder location is selected and the user selects **OK**, the assessments will be listed as rows in the table shown on the Import SDE Data screen (Figure 3-15). The user can select the assessments to be imported by either selecting **Check All** or checking the box next to each desired property or assessment. Users also have the option of checking **Overwrite All (Check to overwrite all existing records)** to automatically overwrite any duplicate properties or assessments during the import process. Once the desired options have been checked, the user can select **Import**.

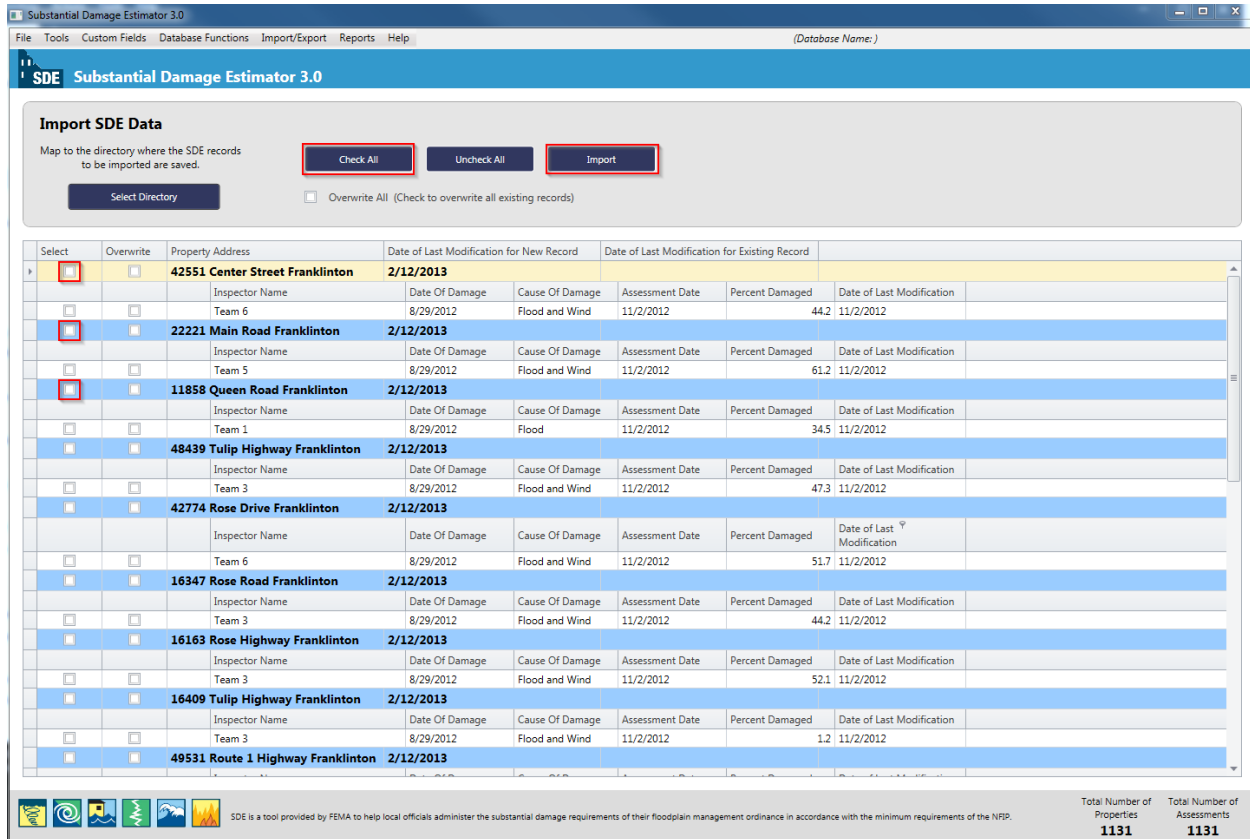


Figure 3-15: Import of individual or all SDE assessment data

Once the import is complete, a window will appear indicating that the files have been successfully imported (Figure 3-16). After importing separate databases from the same inventory, the user should review the data and delete any duplicate or unwanted records or assessments.

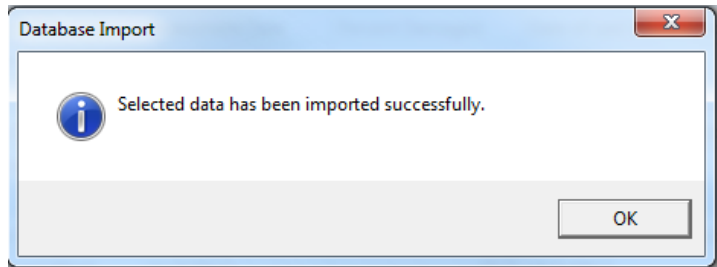


Figure 3-16: Import confirmation

### 3.7.2 Enterprise Import of Non-SDE Data

The *Enterprise Import* function is used to import multiple properties at one time from non-SDE databases. This can be a very useful function for a large number of assessments, and any number of the available fields may be selected for import.

The *Enterprise Import* function can only import data from tables saved in an .xls (Microsoft Excel) or .csv (Comma

#### USER NOTE:

Only property-level data can be imported using the *Enterprise Import* function. Assessment data cannot be imported from non-SDE databases.

## Creating SDE Assessments

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Separated Value) format. By creating an XLS or CSV file outside of the tool, the user may list fields for multiple properties. The process is easier if column headers describing the fields are inserted into the file. If users have access to pre-existing databases of property data, these databases can often be easily adapted for import to the SDE tool. The user may choose to import any or all of the fields identified in Table 3-1. An electronic copy of the database to be imported into the SDE tool must be copied to the host computer prior to importing.

Once the user has created the file to import and has populated it with the desired fields and data, the ***Enterprise Import*** function may be run.

**Table 3-1: SDE Fields for Enterprise Import**

1. Owner's First and Last Names	15. Community Name
2. Lot Number	16. Community NFIP ID
3. Parcel Number	17. FIRM Panel
4. Address Lines 1 and 2	18. FIRM Zone
5. Street Suffix	19. BFE
6. Cardinal (N, E, S, W) or quadrant directions (NW, SW, NE, SE) either preceding or following the street name	20. Suffix
7. Apartment, Unit, etc.	21. Residential or Non-Residential (structure type)
8. City	22. Inspector Phone Number
9. State	23. Date of FIRM Panel
10. County/Parish	24. Regulatory Floodway (Yes, No, or Possible)
11. Zip (code)	25. Subdivision
12. Year of Construction	26. Lowest Floor Elevation
13. Longitude	27. Datum
14. Latitude/longitude	28. Total Square Footage

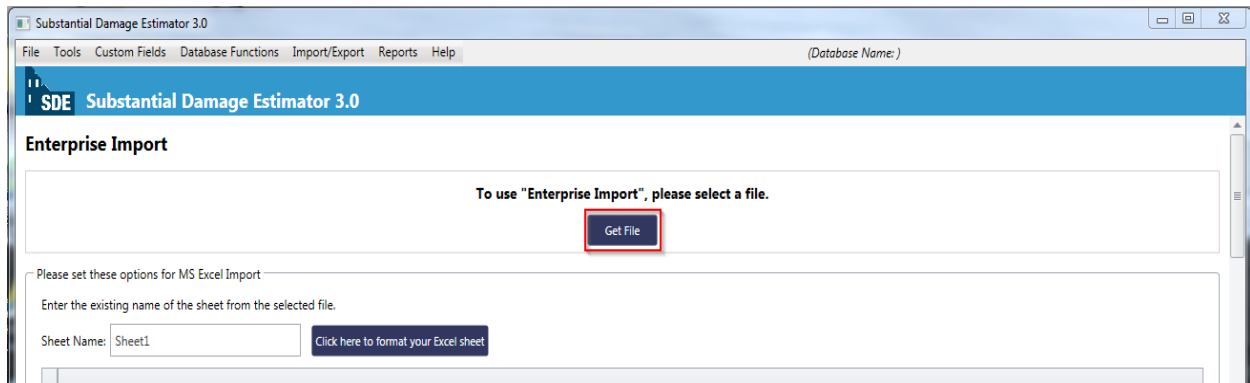
NFIP = National Flood Insurance Program

FIRM = Flood Insurance Rate Map

BFE = base flood elevation

After selecting the ***Import/Export Functions*** button on the SDE ***Main Menu*** and then the ***Enterprise Import*** button (refer back to Figure 3-13), the user will see a new window for selecting the file to be used for importing the non-SDE data (Figure 3-17).





**Figure 3-17: Enterprise Import *Get File* screen**

After selecting the *Get File* button, the user will be prompted to browse and select the appropriate import file from the host computer directories. After the file has been selected, a button will appear allowing the user to proceed with file formatting. The tool will prompt the user with specific questions regarding the type of file selected for import. For example, if an XLS file is used, the tool will ask the user whether the file contains column headers. Once these and other questions have been answered, the user will be prompted to select the *Use table above to map the data* button to begin the data mapping process.

The user will then see a function to select a *Saved Enterprise Import Column Mappings*. If a preconfigured mapping file of data to be imported has been prepared and the file is available on the host computer, the user will be able to apply the mapping by selecting it from the drop-down list. If no preconfigured mappings exist, then this option will be disabled. (For more information regarding the *Saved Enterprise Import Column Mappings*, refer to Section 3.9.)

**USER NOTE:**

When importing data from an Excel file to the SDE tool, column headers that are improperly named (e.g., two columns that have the same header or name) or other incorrect data will cause errors in the import process and the property data.

If a *Saved Enterprise Import Column Mappings* is not selected, the user is then required to map (or identify the relationship between) the data fields in the import file to the corresponding data fields in the SDE tool. Each field in the import file that will be imported must be tied to an SDE data field via the drop-down lists for each field on the Enterprise Import screen.

If a field in the file requires parsing (i.e., separation of data from one field in the import file into two fields in SDE), the method of parsing must also be selected from a drop-down list. For example, if the import file contains the full name for the owner in one field, the tool requires the user to identify the parsing as “[First] [Last]” in either the *Owner’s First Name* or *Owner’s Last Name* fields, so that the data may be imported properly into the SDE tool.

If the *Structure Type* information (residential or non-residential) is imported, the user must specify the naming convention for residential versus non-residential structures in the *Residential* or *Non-Residential* fields of the *Enterprise Import* screen. The labels for residential and non-residential must be consistent throughout the source file. If labels are different for different

properties in the source document and do not match the data string(s) entered into the SDE tool, the *Enterprise Import* function will not be able to assign a structure type for each property or assessment imported.

Once all the desired fields have been mapped and, if applicable, parsed, the user should select the *Import Data* button to finalize the import. The tool will display a message indicating the success of the import, after which the SDE tool will prompt the user to save the current mappings for future use (if not already saved within the tool), then return to the *Main Menu*. After importing data from separate databases into the SDE tool, the user should review the data within the SDE tool to ensure that the imported data was placed within the correct fields and then delete any duplicate or unwanted records.

Additional guidance on pre-populating the SDE database and the use of available community data can be found in the *FEMA Substantial Damage Estimator Best Practices* document (August 2017) at <https://www.fema.gov/media-library/assets/documents/18692>.

### 3.7.3 Importing Latitude and Longitude Coordinate Data

Latitude and longitude coordinate data can be imported into the tool using the *Import Spreadsheet* function in the *Latitude/Longitude Import/Export* menu under the *Tools* menu. This function will direct users to a screen where they can select *Map to Excel* to choose the spreadsheet with the data to be imported. This screen will show all of the records in the spreadsheet and allow users to check each property they wish to import. After selecting the desired properties, the user should select the *Import Data* button to execute the command and import the desired data into the tool.

### 3.7.4 Guidance for Obtaining GPS Coordinate Data

There are no specific requirements for the level of accuracy of global positioning system (GPS) coordinates obtained during SDE inspections. The general guidance is that the coordinate data (latitude and longitude) must be accurate enough so that someone other than the original SDE inspector can locate the structure in the field or on a GIS map based on the GPS coordinates in the assessment.

The recommended level of accuracy for GPS coordinate data is five (5) decimal places and 10 feet (or 3 meters) horizontally, with a 95 percent level of accuracy. This will facilitate importing and plotting the data on local maps, shareware maps, or fee-based maps available from commercial sources. This level of accuracy is necessary so that the recorded GPS data are valid for only one structure. Less accurate coordinate data may encompass larger areas that include multiple lots and structures even though the data were obtained on an individual lot.

#### Wide Area Augmentation System (WAAS)

Motor vehicle GPS units, and some hand-held navigation systems, smart phones, or digital cameras with a GPS receiver, may not be WAAS-enabled. Local officials and inspectors should not attempt to use such GPS units to record lot-specific coordinate data.

The GPS data obtained from non-WAAS units have been found to be limited, inconsistent, and sometimes unreliable, resulting in GPS coordinate data varying from one lot to several thousand feet away from the actual data collection point.

The inspectors should not be concerned about elevation data even if the GPS unit includes it because obtaining accurate elevation data (i.e., data that can be easily replicated) normally requires higher-end GPS units (costing \$1,000 or more).

To achieve the above-mentioned level of accuracy, the GPS data should be collected using a Wide Area Augmentation System (WAAS)-enabled, high-sensitivity GPS unit. This type of unit can correct GPS signal errors caused by ionospheric disturbances, timing, and satellite orbit errors.

The following steps are recommended for daily calibration of the GPS unit to verify the accuracy of the data for WAAS and other GPS units.

To verify the calibration of the GPS units:

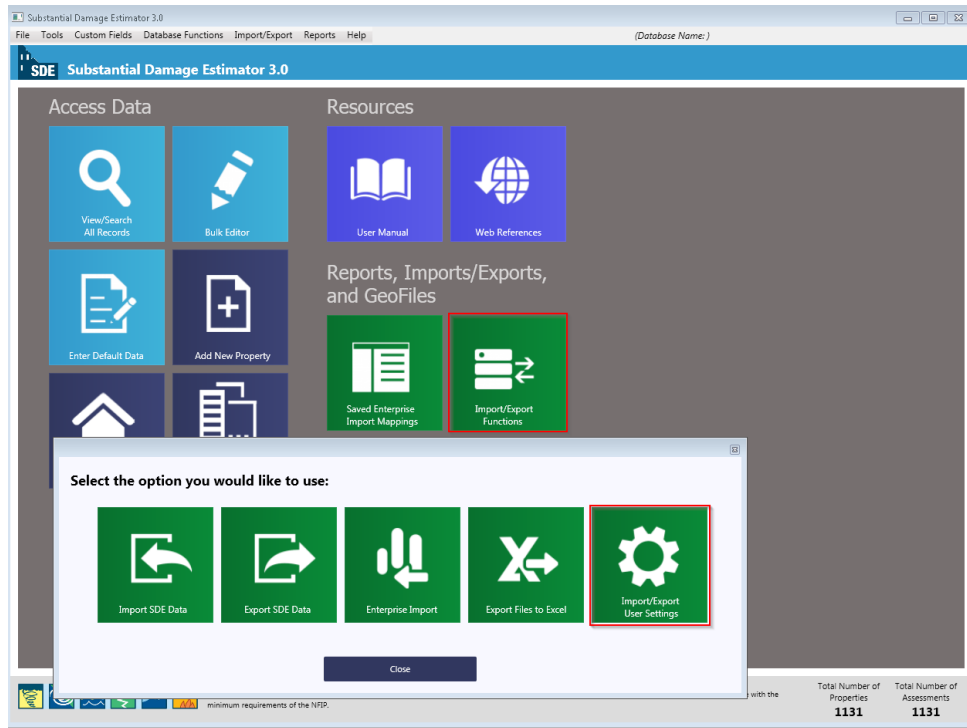
- All inspectors should gather in one location at the start of the inspection day to obtain and verify GPS coordinates for that location on each GPS unit.
- GPS readings should agree within four decimal points for the same location.
- GPS units that do not match the coordinates obtained by other GPS units during the daily test should be recalibrated.

A potential reception issue can occur when capturing GPS coordinate data in an area of dense foliage or where a thick tree canopy exists near or over a structure. The foliage may limit the reception of the GPS unit and impair the accuracy of the GPS data. When dense foliage or a thick tree canopy is present, inspectors should either move to a part of the property with a clear line-of-sight to the sky to obtain the GPS data, or obtain multiple GPS readings at various locations around the structure (possibly at the four corners) to verify that the readings are consistent for the same structure and lot.

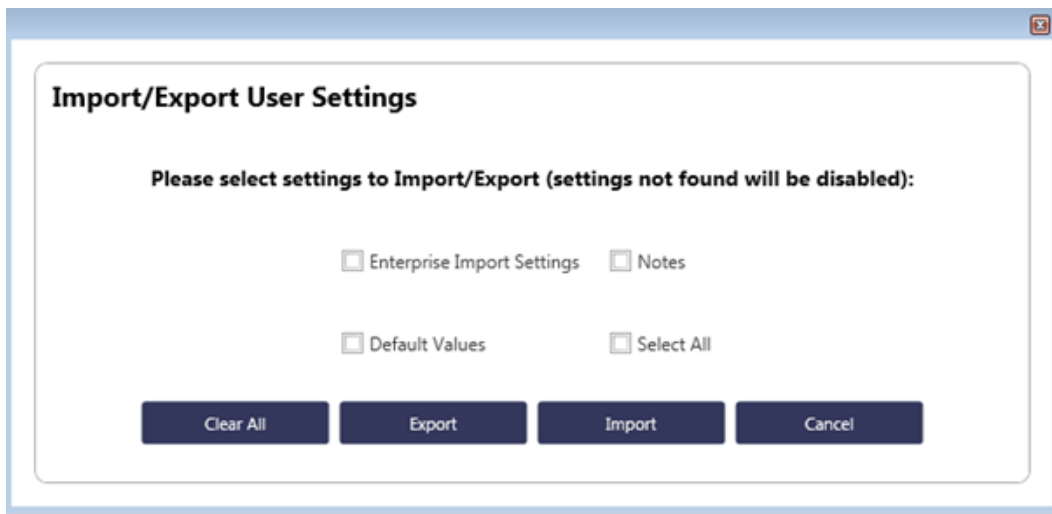
### 3.7.5 Import/Export User Settings

In order for users to import and export their settings, they will need to select the **Import/Export Function** option on the **Main Menu** and then select the **Import/Export User Settings** button (Figure 3-18). The Import/Export User Settings window will appear, prompting the user to select either **Import** or **Export** (Figure 3-19). The import/export options include **Enterprise Import Settings**, **Default Values**, **Notes** (referring to SDE Notes), or **Select All**.

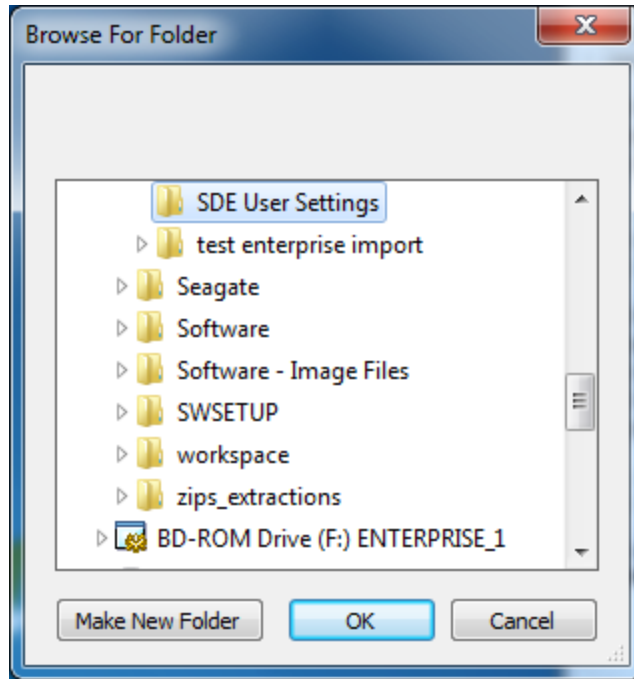
If the user selects **Import**, they will then need to select the parent directory of the file(s) to import (Figure 3-20). This is similar to the process used for importing SDE assessment data.



**Figure 3-18: Import/Export User Settings function**

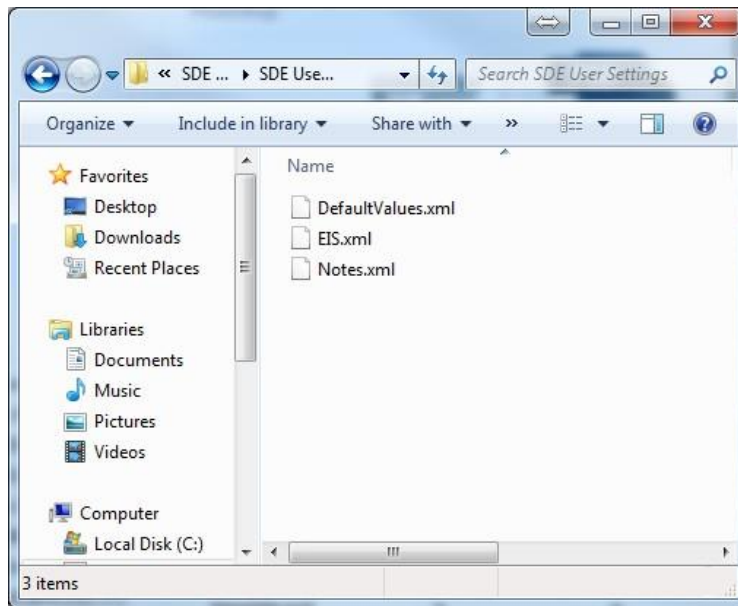


**Figure 3-19: Import/Export User Settings window**



**Figure 3-20: User Settings Select Folder window**

Note that the user will only be able to import user settings that were created and exported from the SDE tool. The SDE tool only reads the files that were generated when users have elected to export their settings. Figure 3-21 shows an example of SDE-generated user setting files that a user would find in the parent directory.

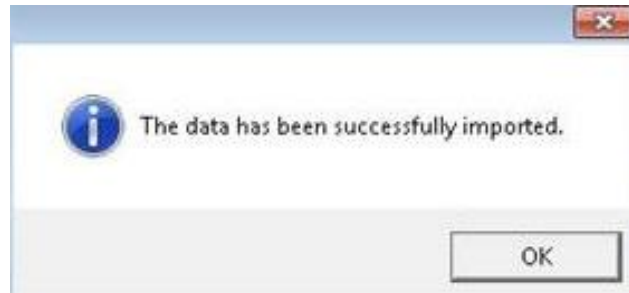


**Figure 3-21: Sample files for Import of SDE User Settings**

## Creating SDE Assessments

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After the settings to be imported have been selected, the user can select the **Import** button. Once the SDE tool has finished importing the settings, the user will see a confirmation screen (Figure 3-22).

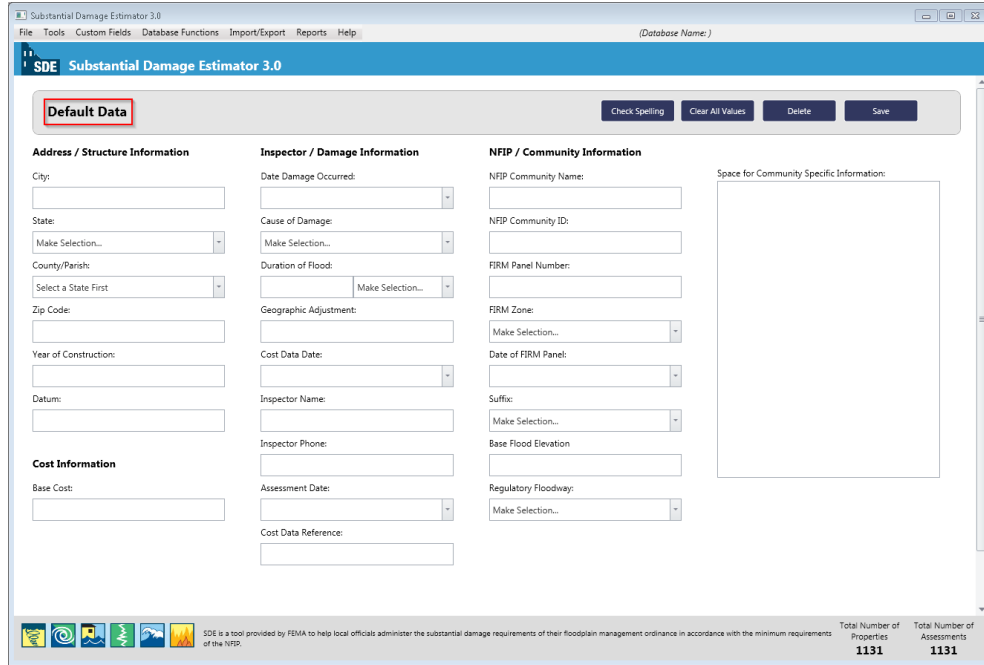


**Figure 3-22: Confirmation of Import/Export User Settings**

### 3.8 Using Default Data

A useful function in the SDE 3.0 Tool is the **Enter Default Data** function. This function provides users with the option to pre-populate up to 24 commonly used data fields for each new assessment created in the SDE tool. This will reduce typographic and consistency errors as well as the amount of data the user must enter for a valid assessment. This function is limited to new assessments only and cannot be used for imported records and assessments.

The **Enter Default Data** function is accessed from the **Main Menu** (Figure 3-23). The user may enter data for any combination of the 24 data fields (Table 3-2). Once entered, the default data remain intact and are available for new assessments until the user opens the default window to change any or all of the data fields (refer to Section 3.11.2). After adding the default data to a new assessment, the user can overwrite any of the pre-populated data fields. Default data can also be set to automatically populate new assessments (refer to Section 3.4).



**Figure 3-23: Default Data window**

Table 3-2 identifies the data options for the *Enter Default Data* function.

**Table 3-2: SDE 3.0 Tool Default Data Fields**

Information Type	Contents	
Address/Structure Information	<ul style="list-style-type: none"> <li>• City</li> <li>• State</li> <li>• County/Parish</li> </ul>	<ul style="list-style-type: none"> <li>• Zip</li> <li>• Year of Construction</li> <li>• Datum</li> </ul>
Damage Cost Information	<ul style="list-style-type: none"> <li>• Date Damage Occurred</li> <li>• Cause of Damage</li> <li>• Duration of Flood and Time Units (hours or days)</li> <li>• Geographic Adjustment</li> <li>• Cost Data Date</li> </ul>	<ul style="list-style-type: none"> <li>• Inspector's Name</li> <li>• Inspector's Phone</li> <li>• Date of Inspection</li> <li>• Cost Data Reference</li> </ul>
NFIP Information	<ul style="list-style-type: none"> <li>• NFIP Community Name</li> <li>• NFIP Community Identification Number (CID)</li> <li>• FIRM Panel Number</li> <li>• Suffix</li> <li>• FIRM Zone</li> </ul>	<ul style="list-style-type: none"> <li>• Date of FIRM Panel</li> <li>• BFE</li> <li>• Regulatory Floodway</li> <li>• Community Specific Information (text box)</li> </ul>

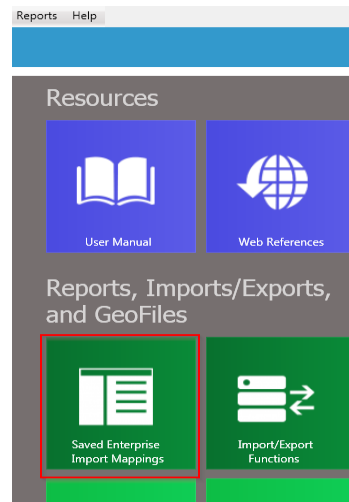
NFIP = National Flood Insurance Program

FIRM = Flood Insurance Rate Map

BFE = base flood elevation

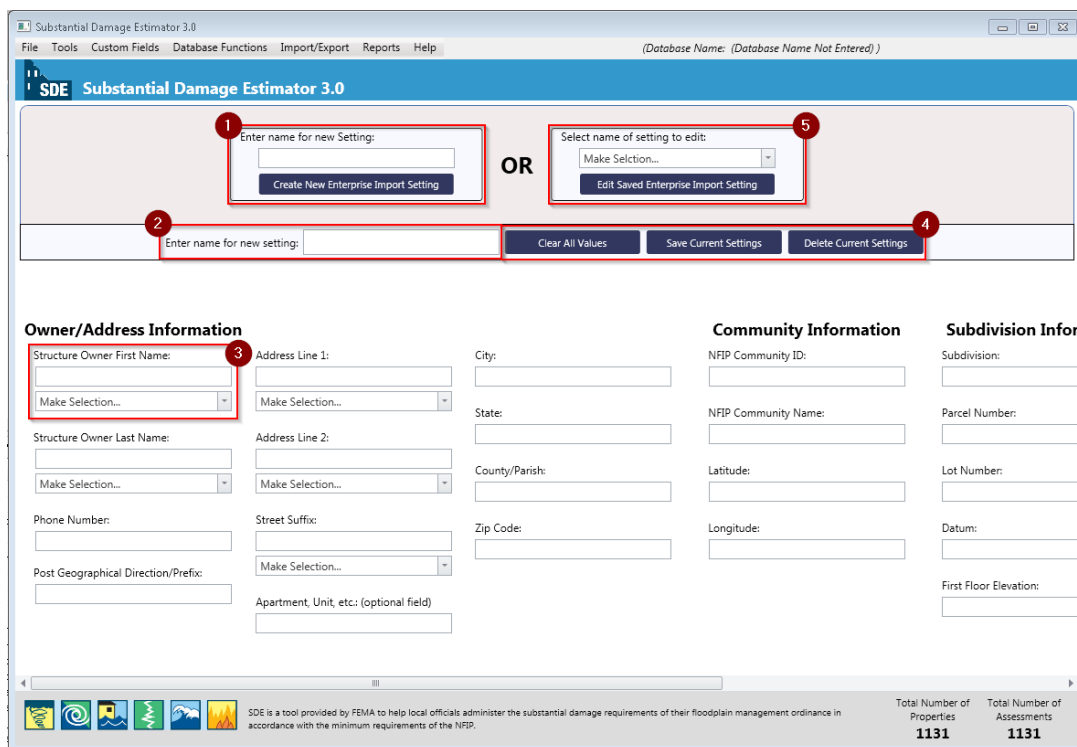
## 3.9 Using Enterprise Import Mappings Settings

The *Saved Enterprise Import Mappings* function in the tool allows users to create or edit and save column mappings for future non-SDE data imports via the *Enterprise Import* option (Figure 3-24). This function is intended to assist users in speeding up the *Enterprise Import* process, particularly when there are multiple imports of the same types and formatted data. With this feature, users can create mappings one time and reuse them as often as needed for the same data format (i.e., column names do not change when the records are updated).



**Figure 3-24: Saved Enterprise Import Mappings function**

After selecting the *Saved Enterprise Import Mappings* button on the *Main Menu*, the *Saved Enterprise Import Mappings* opens (Figure 3-25). Users can create (and name) a new enterprise import mappings setting or edit an existing setting from a list of saved settings.



**Figure 3-25: Enterprise Import Mappings Settings window**



The *Enterprise Import Mappings* window also contains the following options for creating new or editing saved import column mapping settings:

- 1 **Enter Name for New Setting** – users can enter the name of the new setting in this data field and then select the *Create New Enterprise Import Setting* button just below the field to save the setting name.  
  
These buttons allow users to clear all mapping values, save the current settings, or delete the current mappings settings. Once the mapping settings have been saved, the user will be able to use the settings during the Enterprise Import function to pre-populate the mappings for the current and future import of property data (refer to Section 3.7.2).
- 2 **Name of Mappings Setting In Use** – the name of the new or saved setting will be shown in this data field.
- 3 **Column Mapping** – These fields allow users to enter the column names from the import data to match the column names of the SDE data fields. For some of the values, users can select the parsing feature to match the format of the import data. For example, if the import data has three columns called, “fname”, “lname”, and “phone”, the user would need to enter those names into their corresponding SDE fields to set the mapping.
- 4 **Clear All Values, Save Current Settings, and Delete Current Settings Buttons** - these buttons allow users to clear all mapping settings values, save the current settings, or delete the current mappings settings. Once the mappings settings have been saved, the user will be able to use the settings during the Enterprise Import function to pre-populate the mappings settings for the current and future import of property data (refer to Section 3.7.2).
- 5 **Edit Saved Enterprise Import Setting** – users can select the name of a saved setting for editing from a drop-down list in this data field.

### 3.10 Differences between Residential and Non-Residential Assessments

For purposes of the SDE data collection, Table 3-3 notes the differences between residential and non-residential assessments. The differences between these two types of structures are not based on use or appearance, but on the design and building materials used to build the structures. There are structures that look like residential structures but are actually non-residential structures and vice-versa. Therefore, when determining which type of assessment form to use, the inspectors should consider the original or planned use of the structure. If it appears to be a residence, then a residential assessment form should be used.

**Table 3-3: Residential vs. Non-Residential Assessments**

Residential Assessments	Non-Residential Assessments
<ul style="list-style-type: none"> <li>• Single-family (SF), stick-built structures</li> </ul>	<ul style="list-style-type: none"> <li>• Non-residential structures such as office buildings, factories, schools, hospitals, etc.</li> </ul>
<ul style="list-style-type: none"> <li>• Row or town houses, duplexes</li> </ul>	<ul style="list-style-type: none"> <li>• Apartment buildings</li> </ul>

## Creating SDE Assessments

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Residential Assessments	Non-Residential Assessments
<ul style="list-style-type: none"><li>• Manufactured houses (MHs)</li></ul>	<ul style="list-style-type: none"><li>• Condominiums with single floor units above or below</li></ul> <p><b>Note:</b> Condominiums with multiple floors, but without separate units above or below should be evaluated as a town house and data should be entered using a residential assessment form.</p>

Businesses located in a traditional SF home or MH do not change the original use of the structure. Therefore, those structures are still considered residential structures based on the design and construction materials. Finding small-sized professional businesses, such as accountants, doctors, engineers, hair salons, lawyers, surveyors, tax preparers, etc. located in structures that were originally built and used as SF homes is not uncommon.

Similarly, MHs used as construction site offices, school classrooms, sales offices, or other types of businesses using small office spaces are still MHs and must be assessed in SDE as a residential structure with a type as MH.

In addition, there are newer, professional offices and businesses that are located in structures that were designed to look like residential construction, including structures that resemble small homes, duplexes, or town houses. When determining whether to use a residential or non-residential assessment form, consider the age of the structure, the original use and building materials, and the interior layout (lack of separate rooms, only one bathroom, lack of residential furniture, a full kitchen, etc.).

If an inspector uses the incorrect assessment form, such as using the residential form for an apartment building, a new assessment using the correct form will need to be prepared and all data will need to be entered. A new function in the SDE 3.0 Tool allows users to change the assessment type from residential to non-residential and vice versa without the previously required need to delete the incorrect assessment type and replace it with the proper assessment.

### 3.11 Creating an Assessment

This section describes the steps required to create an assessment within the SDE tool. Assessments can be created for new or existing properties. Assessments can also be imported in large quantities from other SDE databases using the *Import SDE Data* function within the tool. Properties can be imported from non-SDE data sources such as tax records or other community resources using the SDE *Enterprise Import* function. Users have the option to either use properties in the existing database or enter a new property for a new assessment. A single property may have multiple assessments to record damages from multiple events.

#### 3.11.1 Creating a New Property

The SDE tool allows users to create property records that can be selected later to add field-collected data to develop assessments. The user should select *Add Property* from the *Main Menu* (Figure 3-26). A property can be added for either a residential or a non-residential structure.

As noted previously, records and assessments are different. Records contain only basic structure information such as address, community, county/parish, and State. Assessments involve the addition of field-collected data to property records. The structure type will be determined when the user selects either *Add Residential Assessment* or *Add Non-Residential Assessment* on the *Main Menu* and then selects the property from the list of available properties. A Property Details screen will appear with fields for the property data and NFIP information (Figure 3-27). A scroll bar is located at the bottom of the screen to scroll horizontally to access all fields.

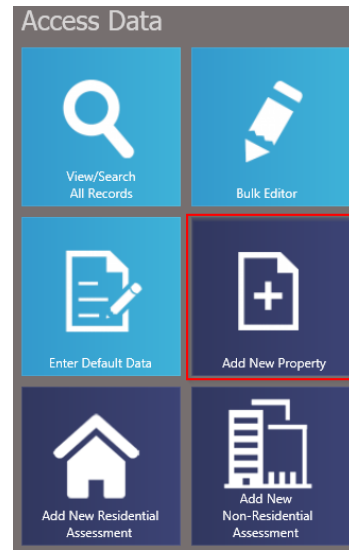


Figure 3-26: Add New Property

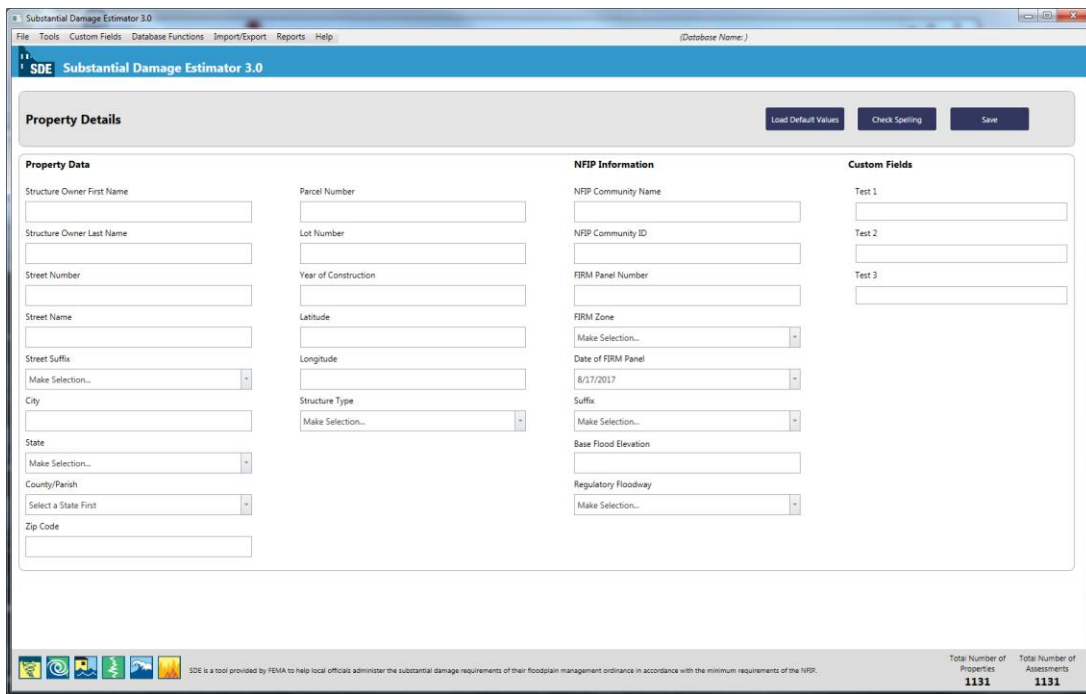


Figure 3-27: Add Property – Property Details window

### 3.11.2 Creating a New Residential Assessment

Six separate SDE tabs are available within the tool for developing an assessment of a new property, and seven tabs are available for an existing property. The first six tabs (Figure 3-28, from left to right) contain the same assessment information for both new and existing properties.

## Creating SDE Assessments

The first four tabs contain fields for key information. The fifth tab provides the results of the Substantial Damage determination plus options for determining Substantial Damage via other methods. The sixth tab is an interface that allows users to attach documents and photographs to the assessment. If previous assessment data are available, the seventh tab (*Assessment of MM/DD/YYYY*) contains a read-only summary of the inspection data collected for the previous assessment. Edits to the data may only be made on the first six tabs.

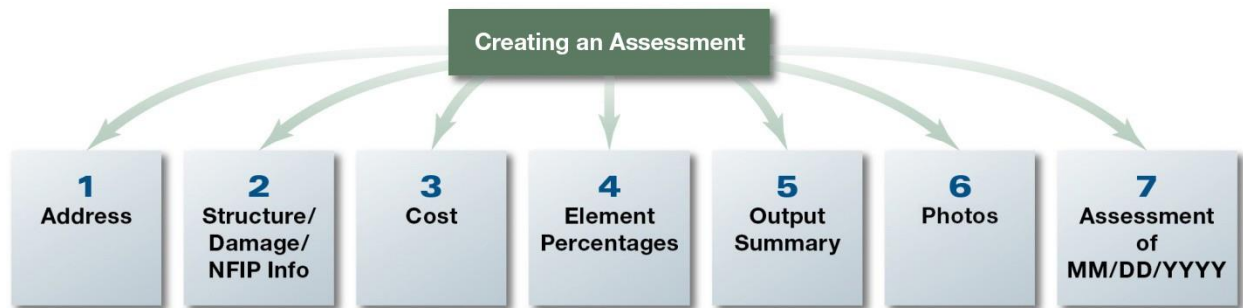


Figure 3-28: SDE 3.0 Tool tabs for residential and non-residential assessments

To create an assessment, the user should select the *Add Residential Assessment* button on the *Main Menu* (Figure 3-29). A property selection window will appear listing available properties (Figure 3-30). If an existing property is selected, the **Address** tab in the new assessment will be automatically populated with available data (primarily address, owner name, and NFIP data). If *New Property* is selected to add a property, the user must fill out the **Address** tab when creating the assessment. If default data has been entered into the tool, the user will have the option of using that default data to pre-populate specific data fields within the assessment.

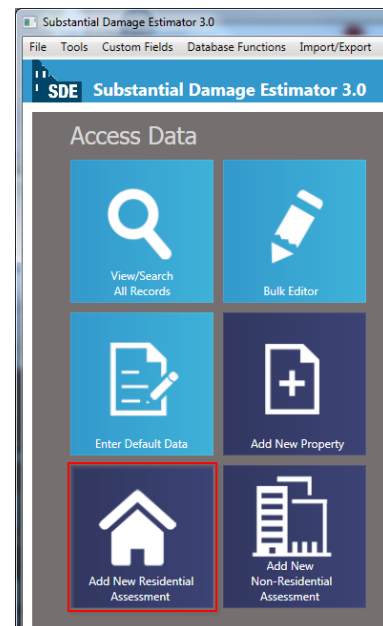


Figure 3-29: Add New Residential Assessment function

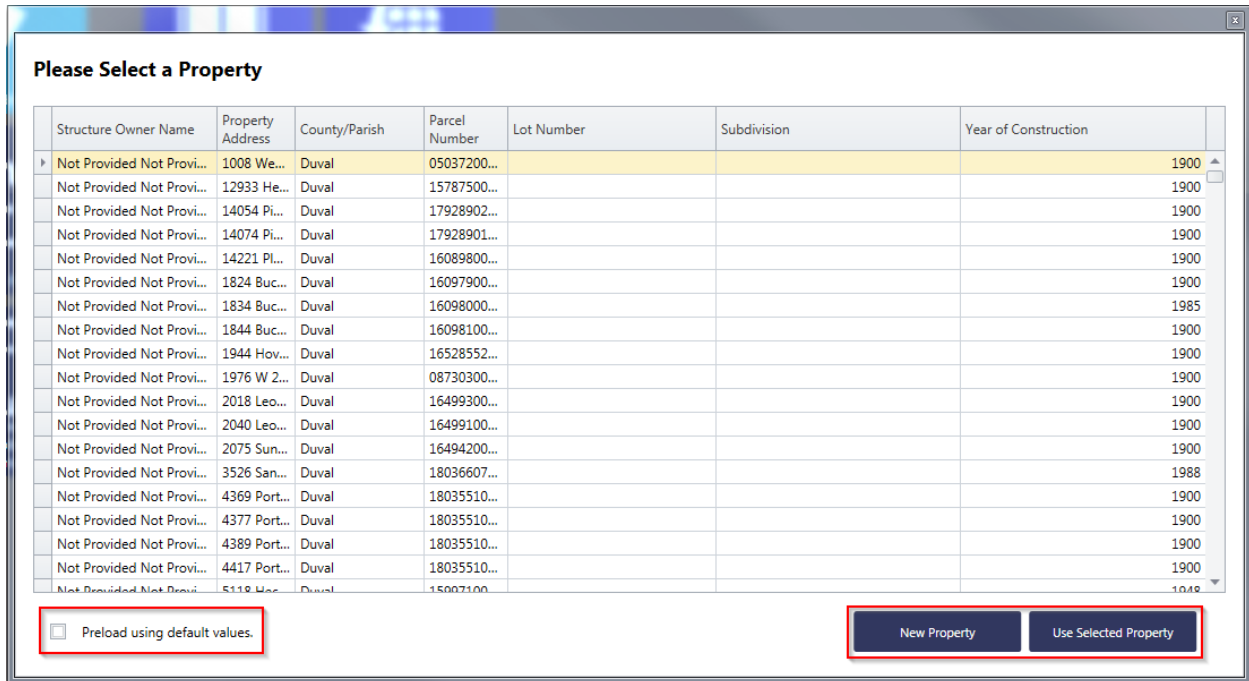


Figure 3-30: Add Residential Assessment – select a property window

The property selection window has updated and enhanced search features in the SDE 3.0 Tool. As shown in Figure 3-30, there are seven columns of property data. Users can access the search features by selecting the column header for any of the columns. All columns in the property selection window have multiple options to facilitate searching for a specific property. The search options include:

- **Sort Ascending** – sorts records in alphabetical from A to Z or numerical order starting with the lowest first digit.
- **Sort Descending** – sorts records in reverse alphabetical from Z to A or reverse numerical order starting with the highest first digit.
- **Clear Sorting** – clears all previous sorts.
- **Group By This Column or Show Group Panel** – these features provide options for sorting records based on the selected column; double left-clicking the column to the left of a specific entry (i.e., row) will show the property data.
- **Show Column Chooser** – this feature allows record sorts using multiple columns; the user right-clicks on the column header and drags it to the column chooser window.
- **Best Fit** – widens the selected column to show all text.
- **Best Fit (all columns)** – widens all columns to show all text.

## Creating SDE Assessments

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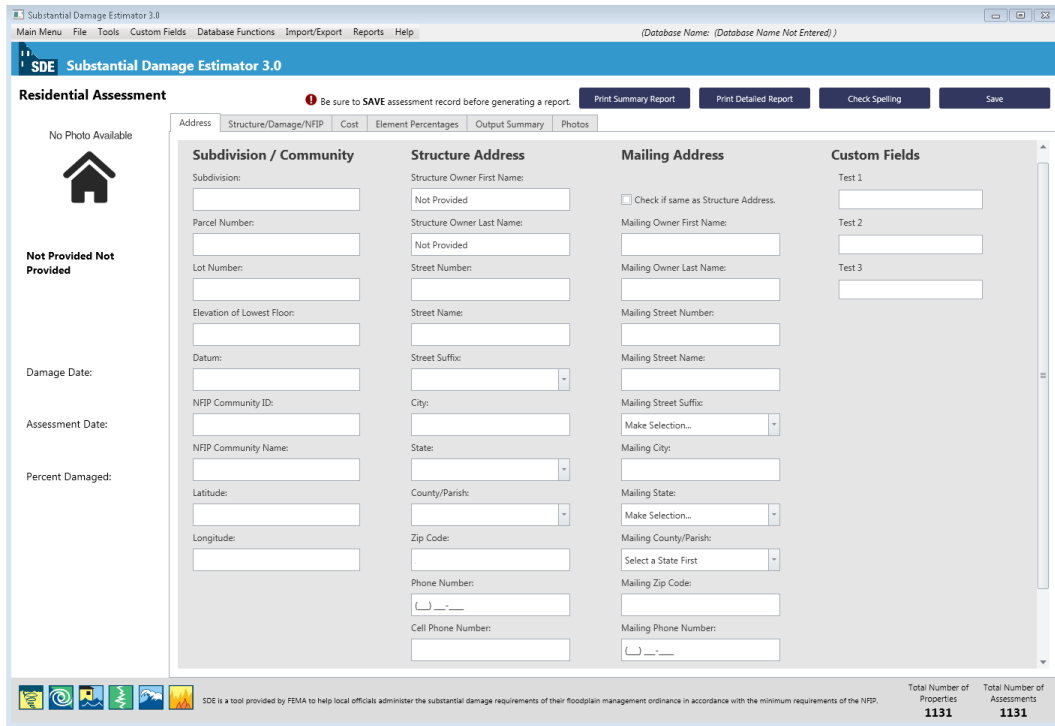
- **Filter Editor** – allows a search on specific data, such as the owner first name or the first few letters of an owner or street name.
- **Show Search Panel** – this opens a data field where users can search on data types from any of the seven columns.

When a new assessment is created for an existing property, the property data is pre-populated for the new assessment. These data can be revised as part of the new assessment. The user also has the option to add a new property when creating the new assessment. The data fields on the **Address** tab not populated by the property data and the **Cost** and **Element Percentages** tabs must be completed for a valid assessment.

### **3.11.2.1 Address Tab**

The data fields in the **Address** tab (Figure 3-31) are the same for both residential and non-residential assessment forms. The **Address** tab includes:

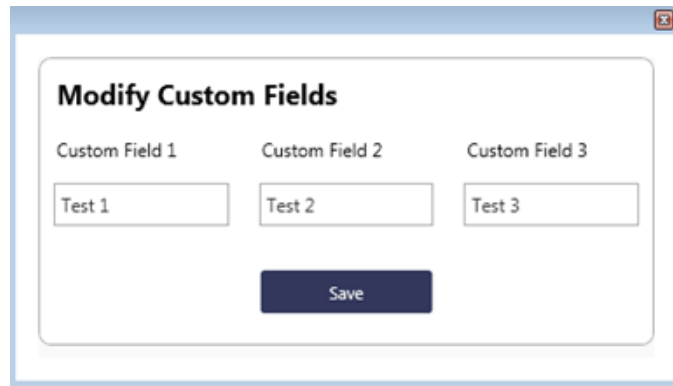
- **Subdivision/Community** – subdivision name, parcel number, lot number, elevation of the lowest floor (i.e., the estimated height of the lowest floor above or below ground), elevation datum, NFIP CID, NFIP community name, and coordinates for latitude and longitude.
- **Building Address** – homeowner first and last name, address information, county/parish, zip code, and homeowner phone number. Note that the address data is divided into three separate data fields for street number, street name, and street suffix.
- **Mailing Address** – same fields as Building Address, with the additional field *Care of*.
- **Custom Data Fields** – located on the far right of the **Address** tab (use is optional).



**Figure 3-31: Address tab and custom fields**

Default data can also be used to pre-populate this and other tabs for a new property or assessment. Custom fields can be used to create fields that are not standard inputs in the tool. For example, if Substantial Damage assessments are being performed after a hurricane, the user may wish to create a custom field for “Hurricane Name” so that all assessments for that particular storm are tagged with the name of the storm.

The user can create a maximum of three custom fields through the *Custom Fields* menu either on the *Main Toolbar* or at the far right of the **Address** tab. When the user opens *Custom Fields* from the toolbar at the top of the *Main Menu* and then selects *Add/Edit/Delete Custom Field*, the tool displays a window (Modify Custom Fields) in which the user can select an existing custom field to edit or add a new custom field (Figure 3-32). Prior to use, the three custom fields are named Test 1, Test 2, and Test 3. After adding or editing a selected custom field, a confirmation window appears and the new or revised field name is shown in the upper right corner of the **Address** tab.



**Figure 3-32: Modify Custom Fields window**

If the *Latitude and Longitude Validation* function (accessed through the *Tools* menu) is turned on, the tool will check the latitude and longitude upon input to determine whether the data entered are within the State where the structure is located.

### **3.11.2.2 Residential Structure/Damage/NFIP Info Tab**

This tab includes data fields for structure attributes and information, inspector information, NFIP and community information, and damage event information (Figure 3-33). There are different data fields for structure attributes and information for residential and non-residential assessments (refer to Section 3.11.3 for non-residential assessments). The other data fields on this tab are the same for both types of assessments. The **Structure/Damage/NFIP Info** tab includes these data fields:

- **Structure Attributes/Information** – drop-down lists for the types of residence; foundation; superstructure; roof covering; exterior finish; heating, ventilation, and air conditioning (HVAC) system; number of stories; quality (of initial construction); and data fields for the year of construction and residence information comments.
- **Inspector/Damage Information** – inspector name and phone number, date of inspection, date damage occurred, cause of damage, drop-down list for damage undetermined, duration of flood (in hours or days), estimated depth of flood above ground, and the estimated depth of flood above lowest floor.
- **NFIP/Community Information** – NFIP CID (carried over from the **Address** tab), Flood Insurance Rate Map (FIRM) panel number, FIRM panel suffix, date of FIRM panel, FIRM zone, base flood elevation (BFE), regulatory floodway (yes, no, possible), and a community-specific information comment box for information, such as the name or number of the declared disaster, use of best available flood data in-place of an outdated Flood Insurance Study data, etc.

#### **USER NOTE:**

Section 10 contains additional information and details on residential and non-residential structure attributes.



Residential assessments (Figure 3-33) require the user to select a *Residence Type*, after which the number of stories and each element type (*Foundation*, *Superstructure*, *Roof Covering*, etc.) must be chosen. The available attributes are based on the residence type selected.

The screenshot shows the 'Substantial Damage Estimator 3.0' application window. The title bar includes 'Main Menu', 'File', 'Tools', 'Custom Fields', 'Database Functions', 'Import/Export', 'Reports', and 'Help'. The main window has a blue header with 'SDE Substantial Damage Estimator 3.0' and a sub-header 'Residential Assessment'. A red warning icon indicates 'Be sure to SAVE assessment record before generating a report.' Buttons for 'Print Summary Report', 'Print Detailed Report', 'Check Spelling', and 'Save' are visible. The interface is divided into several sections:

- Structure Attributes / Information:** Includes dropdowns for Structure Type (Residential), Story (One Story (Standard)), Residence Type (Single Family Residence), Foundation (Slab - on - Grade), Superstructure (Stud-framed (Standard)), Roof Covering (Shingles - Asphalt, Wood (Standard)), Exterior Finish (Siding or Stucco (Standard)), HVAC System (None), and Year of Construction.
- Inspector / Damage Information:** Includes fields for Inspector Name, Inspector Phone, Assessment Date, Date Damage Occurred, Cause of Damage (Flood), and Duration of Flood (12.00 Hours).
- NFIP / Community Information:** Includes fields for NFIP Community ID, FIRM Panel Number, Suffix, Date of FIRM Panel, FIRM Zone (AE), Base Flood Elevation, Regulatory Floodway (No), and Space for Community Specific Information.

At the bottom right, there are statistics: 'Total Number of Properties: 1131' and 'Total Number of Assessments: 1131'. A footer note states: 'SDE is a tool provided by FEMA to help local officials administer the substantial damage requirements of their floodplain management ordinance in accordance with the minimum requirements of the NFIP.'

**Figure 3-33: Residential Structure/Damage/NFIP Info tab**

**Number of Stories:** The SDE tool includes options for residential structures with either one story or two or more stories. There is no option for one-and-a-half-story residences. However, these structures can be included in the SDE inventory based on the following methodology.

**One-and-a-half story structures:** A typical one-and-a-half-story structure includes a full aboveground lower (or first) level with the main living space (kitchen, bathroom, and bedroom) and a partial upper level with less usable square footage than the lower level. This structure type may or may not have a basement. The upper level may be finished with bedrooms and a bathroom or left unfinished as an attic for storage.

For the upper floor, the ceilings are lower, and the floor-to-ceiling height varies because the upper level is built directly under the roof, which slopes downward from the peak toward the walls (and forms part of the slanted ceiling). Although the usable floor space of the upper level depends on the floor plan, it generally has about two-thirds of the floor space as the lower level.

Users should select *Two or More Stories* on the **Structure/Damage/NFIP Info** tab. This is because the additional floor space and features (electrical, HVAC, insulation, drywall, and plumbing) will

## Creating SDE Assessments

be closer to those of a two-story structure than a one-story structure. Users should use the following approach for determining total square footage and base cost of the structure:

1. Select **Two or More Stories** in the **Story** data field in the Structure Attributes portion of the **Structure/Damage/NFIP Info** (or second) tab of the SDE.
2. On the **Cost** tab (refer to Section 3.11.2.3), enter the dimensions of the lower floor and use 1.5 for the number of stories in the SDE square footage calculator. Using a value of 1.5 instead of 2 for the number of stories will yield a total square footage that is closer to the true square footage for a one-and-a-half-story residence.

**Construction Quality:** The user must also select the initial (not current) construction quality for the residence from a drop-down list. The five quality levels range from low to excellent, with excellent including higher-end or custom-built elements. If the initial construction quality is difficult to determine based on depreciation or damage, the inspector should select between budget, average, and good, unless he or she observes elements that would suggest that the quality level should be either low or excellent. Table 3-4 provides guidance on the quality-level options for residential construction.

The initial construction quality level does not have a direct effect on the Substantial Damage determination, but it does determine which base cost table should be used for determining the base cost of the structure on the **Cost** tab. Most industry-accepted, residential cost-estimating guides have multiple base cost tables, based on the initial construction quality. Users should compare the quality level descriptions in Table 3-4 to the quality levels in the cost-estimating guide being used to verify that the appropriate base cost tables are used for structure costs.

**Table 3-4: Initial Construction Quality for Residential Construction**

Initial Construction Quality	Method of Production		Interior Finishes	Exterior Finishes	Architectural Interior Elements	
	Mass	Custom			Mass	Custom
<b>Low</b>	X		Plain, inexpensive, no attention to detail	Plain, inexpensive, no attention to detail	X	
<b>Budget</b>	X		Plain	Limited ornamentation on front elevation	X	
<b>Average</b>	X		Average finish	Some ornamentation on front elevation	X	
<b>Good</b>	X	X	Well finished, paneling, wallpaper	Ornamentation and adjustments throughout	X	X
<b>Excellent</b>		X	Unique, high quality	Well detailed and refined with custom ornamentation		X

<sup>1</sup> Quality of construction types used in most homes in subdivisions

**Use of Additional Comments:** The user may enter additional comments in two areas of the **Structure/Damage/NFIP Info** tab. The *Residence Information* comment box for residential assessments (and the similar *Structure Information* comment box for non-residential assessments) can be used to enter any information or commentary specific to the property being assessed. The *Space for Community Specific Information* comment box can be used to enter community-specific information.

For example, the user could include an explanation about the current structure or flood event. This may include information such as “Flood was estimated by city engineer to be between a 50-year and 100-year event based on the community’s Flood Insurance Study.” Information on the type of mitigation performed within the community in the past or for the structure in question could also be included.

**Damage Undetermined:** When the *Damage Undetermined* checkbox is selected, a drop-down list located directly below the checkbox is opened. If needed, users must select one of the following options:

- No Physical Damage Sustained
- Vacant Lot/Property
- Resident Refused Inspection
- Address Does Not Exist
- Other – If *Other* is selected, an instructional pop-up screen will appear requesting that the user enter information in the *Residence Information* text field regarding the reason for selecting *Other*. (The request is a recommendation and not required.)

Users can select *No Physical Damage Sustained* for structures that have no apparent damage or are elevated above the high water mark of the damage event for an area. This option can be used to provide a complete inventory of structures for the community, particularly when there are areas of no damage that are adjacent to or surrounded by areas with varying levels of damage.

Selecting this option reduces the amount of data required to save a valid assessment and the structure will be identified with 0 percent damaged in any SDE reports or exports.

### 3.11.2.3 Cost Tab

Although the *Cost Adjustments* portion of the tab varies a little, the data fields in the **Cost** tab (Figure 3-34) are similar for residential and non-residential assessments. On this tab, the user can enter the square footage, the base cost per square foot for the structure, the geographic adjustment factor for the base cost used, unit or lump-sum costs for cost adjustments (when applicable), and an estimated depreciation rating to determine the replacement value and actual cash value (ACV) of the structure.

**USER NOTE:**

For the purposes of the SDE tool, **ACV** is considered to be the market value of the structure.

The screenshot shows the 'Cost' tab of the SDE Substantial Damage Estimator 3.0. The interface is divided into several sections:

- Square Footage:** Contains fields for Base Cost (\$135.00), Total Square Footage (2,000.00), and Geographic Adjustment (1.00). A calculator icon is present for calculation.
- Cost Adjustments:** A table with columns for Adjustments, Quantity, Unit, Unit Cost, and Adjustment Cost. Rows include Roofing, Heating / Cooling, Appliances, Fireplaces, Porch / Breezeways, and Garage, all with zero values.
- Additional Adjustments:** A table with columns for Adjustments, Quantity, Unit Cost, and Adjustment Cost, currently empty.
- Computed Actual Cash Value:** Shows Total Adjustments (\$0.00), Replacement Cost (\$270,000.00), Replacement Cost Per Sq Ft (\$135.00), and a Depreciation Rating of 4 - Average Condition.

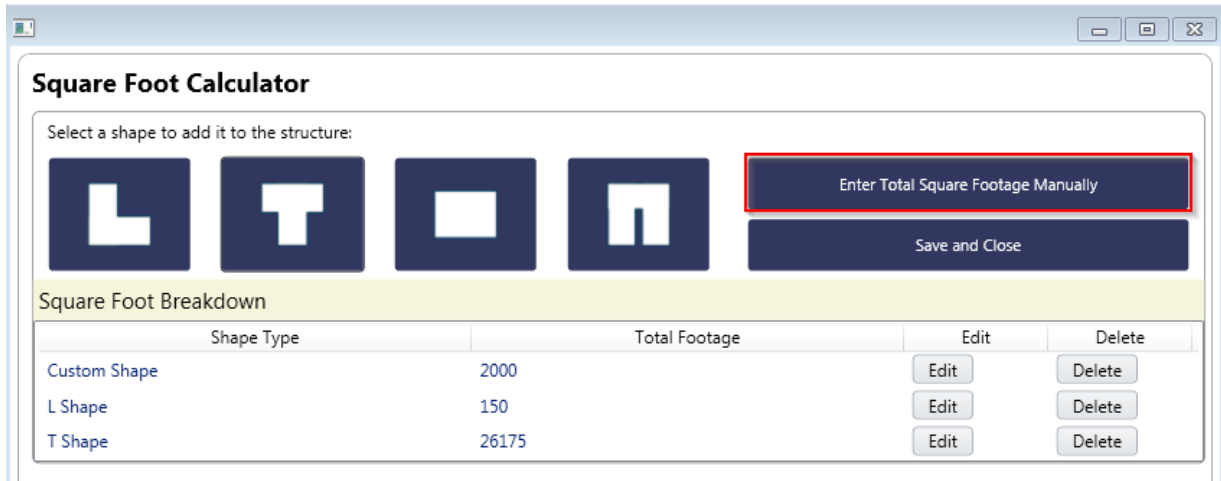
**Figure 3-34: Cost tab**

Information regarding structure base costs and adjustments, as well as appropriate descriptions, can be found in industry-accepted, residential cost-estimating guides among other sources, such as locally or regionally developed cost data.

The *Cost* tab includes:

- **Square Footage** – square footage (using either the calculator or direct entry method), base cost per square foot, and the geographic adjustment factor for the base cost.
- **Cost Adjustments** – modify residence features and feature costs to match the structure being inspected.
- **Additional Adjustments** – for cost adjustments not covered in the cost adjustments above.
- **Depreciation Determination** – a depreciation rating between 1 (very poor condition) and 6 (excellent condition) or *Other* (if *Other* is selected, a text box will appear that requires an explanation for the depreciation; there is also a text box for the depreciation percentage used by the inspector). Inspectors are encouraged to use the available ratings of 1 through 6 whenever possible for the depreciation value (refer to text later in this section for additional depreciation guidance).
- **Computed ACV** – summation of base cost and all cost adjustments and depreciation percentage.

**Square Footage:** In the Square Footage section of the tab (Figure 3-34), the user has the option to calculate, directly input, or use the *Enterprise Import* function (refer to Section 3.7.2) to enter the square footage required to develop the computed ACV for the structure. To calculate the square footage based on structure dimensions, the user should select the *Click to Calculate or Enter Square Footage* button on the **Cost** tab, which will open the Square Foot Calculator window (Figure 3-35). In this window, the user can choose from four structure shapes (i.e., “L” shaped, “T” shaped, rectangular, and “U” shaped).



**Figure 3-35: Square Foot Calculator window**

When the user selects one of the four structure shapes, another window opens to allow the user to enter the estimated dimensions and the number of stories for the selected shape (Figure 3-36).

Once the dimensions are entered, the user should select the *Save* button to calculate the total square footage. Dimensions for additional areas for multi-section structures can be added to the previously calculated square footage to determine the total square footage for the structure. When the data entry is completed for all sections, the user should select the *Save and Close* button to return to the **Cost** tab. The *Total Square Footage* field on the tab will now show the calculated value.

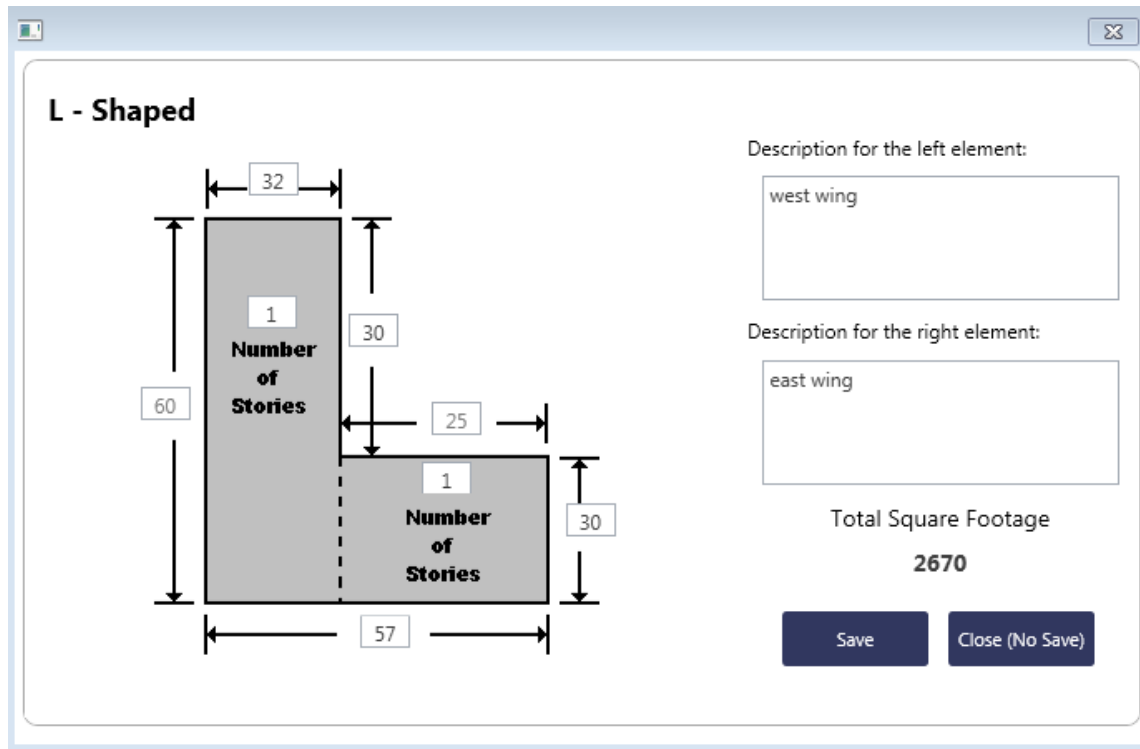


Figure 3-36: Data entry window for the Square Foot Calculator

To enter the total square footage directly, the user should select the *Calculate or Enter Square Footage* button and then select the *Enter Total Square Footage Manually* button to open the *Enter Total Square Footage* data field to enter the value for the total square footage from tax records, an appraisal, or another valid source of area data. After entering the square footage, the user should select the *Save* button and to return to the Square Foot Calculator window and select the *Save and Close* button to return to the *Cost* tab. Note that a structure shape selection is not available when entering the total square footage manually.

**Base Cost per Square Foot**

The **Base Cost** is the cost to replace the structure with a functionally equivalent structure of the same size, style, and construction quality, based on the current local cost of labor and materials.

Next, a unit or base cost per square foot value is entered for the structure. The base cost per square foot is entered in the **Base Cost** data field at the top of the **Cost** tab, just to the right of the *Click to Calculate or Enter Square Footage* button. The base cost can be obtained from an industry-accepted, residential cost-estimating guide, contractor’s estimates, and community estimates from local building and repair permits, or professional appraisers.

The structure cost requires a **Geographic Adjustment** factor. This factor can be found in industry-accepted, residential and non-residential cost-estimating guides and is a base cost multiplier with a value above or below 1.0. This recognizes that structures in some areas of the country are more expensive to build than in other areas. This factor equalizes labor and material costs

**USER NOTE:**

A **Geographic Adjustment** factor greater than 1.0 indicates higher than national average construction costs, whereas a factor below 1.0 indicates lower than average costs.

between areas of high and low construction cost around the country. For base costs developed from local data, the *Geographic Adjustment* value entered in this data field should be 1.0.

**Cost Adjustments:** In the Cost Adjustments section, some adjustments, such as the inclusion of fireplaces or porches, are in addition to costs included in the base cost of the structure. Other adjustments, such as upgraded roofing or floor covering, are added to the base cost (through adjustments) when the initial construction quality of the component exceeds what is normally found in the initial construction quality selected in the Structure Attributes/Information section of the **Structure/Damage/NFIP Info** tab. The components listed under the Cost Adjustments section should involve quantities and base costs for each adjustment. The adjustment cost reflects the cost in excess of the cost for standard features for the selected type of residence.

**Additional Adjustments:** In the Additional Adjustments section, adjustments not listed in the Cost Adjustments section can be entered into the fields provided. An industry-accepted, residential cost-estimating guide should be referenced to determine unit or lump-sum costs for additional adjustments.

**Depreciation Methodology**

The depreciation methodology described in this manual will only work in the SDE 2.0 or higher tools. Any assessments developed in either the SDE 1.0 or 1.1 Tool and imported into the SDE 2.0 or higher will retain their original depreciation values.

**Depreciation:** The **Cost** tab also requires the user to enter a depreciation rating for the structure. The SDE tool includes a depreciation methodology that is based on a U.S. Army Corps of Engineers’ methodology. A depreciation rating of 1 to 6 (with 1 being the lowest) is based on the condition of the structure prior to the damage event (Table 3-5).

The depreciation ratings for non-residential structures vary based on the number of stories and structure use. The *Other* option can be used to enter a specific depreciation value.

**Table 3-5: Depreciation Ratings – Residential Structures**

Depreciation Rating	Description	Depreciation Value
1	<b>Very Poor Condition.</b> The structure is dilapidated and deteriorating. The residence is uninhabitable and most likely abandoned.	88.9%
2	<b>Requires Extensive Repairs.</b> The residence can be inhabited, but is in need of extensive repairs and maintenance.	66.5%
3	<b>Requires Some Repairs.</b> The residence requires some repair and maintenance.	38.8%
4	<b>Average Condition.</b> There is normal wear on the house, but no signs of major repairs or maintenance needed.	24.2%
5	<b>Above Average Condition.</b> Little visible wear on the structure, but it is not considered “brand new.” Most functional value is remaining.	13.4%

## Creating SDE Assessments

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Depreciation Rating	Description	Depreciation Value
6	<b>Excellent Condition.</b> Structure was recently built (2 years old or less). There is no visible deterioration. This condition is rare in structure inventories and should be reserved for only brand new structures that have all functional value remaining.	2.9%
<b>Other</b>	Determined by inspector (must provide a reason in pop-up Depreciation Explanation window).	Value defined by user

**Computed ACV:** After the user enters the data below, an ACV will be computed with the tool and shown on the **Cost** tab:

- Square footage
- Base cost
- Geographic adjustment factor
- Cost adjustments

The name and publication date of the source of the base cost, professional appraisal, locally developed and vetted cost data, or other acceptable cost data used as the basis for the determinations should be entered in the **Cost Data Reference** and **Cost Data Date** fields. Some industry-accepted, residential cost-estimating guides include cost and geographic factor updates on a quarterly or annual basis. Consequently, the publication date is vital when specifying the document used as source material.

### **3.11.2.4 Residential Element Percentages Tab**

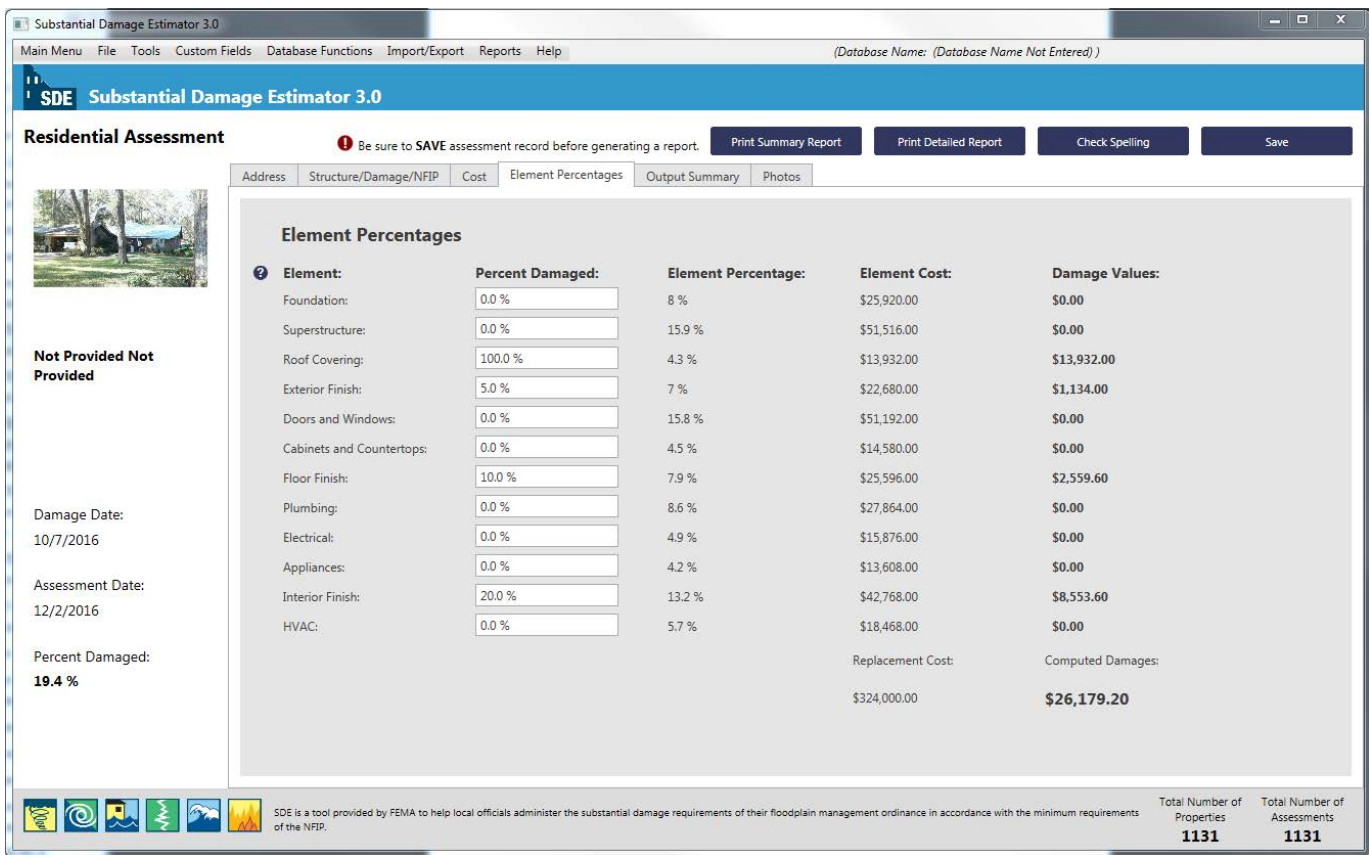
The fields in this tab are different for residential and non-residential assessments (refer to Section 3.11.3). The **Element Percentages** tab (Figure 3-37) is used by the inspector to enter the percent damaged values, based on a rapid, visual evaluation for each of the 12 residential elements. Table 3-6 lists the 12 elements and their individual components for residential structures in the SDE tool.

For estimating purposes, a structure is divided into general construction categories (e.g., plumbing, foundations, appliances, etc.). The SDE tool uses pre-determined, fixed element percentages for each of the categories based on the attributes selected for the structure being inspected. The Element Percentages in the third column of this tab are fixed and based on the attribute options on the **Structure/Damage/NFIP Info** tab selected for the structure under inspection.

Once the user has completed the information on the **Structure/Damage/NFIP Info** and the **Cost** tabs, the Element Percent for each item is calculated within the tool and populated on the **Element Percentages** tab. The Item Cost is the result of the Element Percentage multiplied by the **Total Replacement Cost** from the **Cost** tab. The monetary Damage Values for each item are determined



by multiplying the Item Cost by the user-entered **Percent Damaged** values. The sum of the individual damage values is equal to the Computed Damages value.



**Figure 3-37: Residential Element Percentages tab**

The input data on this tab require the inspector to enter the estimated **Percent Damaged** of each element listed. These data are determined based on the judgment of the inspector and should be defensible values. The values should be entered as whole numbers between 0 and 100, in 5 percent increments. The **Percent Damaged** values are the only values that must be provided by the user on this tab.

**Table 3-6: Residential Structure Elements**

Element	Description
<b>1. Foundations</b>	<ul style="list-style-type: none"> <li>• Continuous perimeter footings</li> <li>• Footings</li> <li>• Piers</li> <li>• Foundation-level components not included in other elements</li> </ul>

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<b>Element</b>	<b>Description</b>
<b>2. Superstructure</b>	<ul style="list-style-type: none"><li>• Wall support system extending from the foundation wall to the roof structure</li><li>• Exterior wall</li><li>• Sheathing panels</li><li>• Shear panels</li><li>• Bracing panels</li><li>• Structural members that support the roof deck, such as rafters and trusses, but not roof sheathing</li></ul>
<b>3. Roof covering</b>	<ul style="list-style-type: none"><li>• Covering material (shingles, tile, slate, metal roofing, built-up roofing)</li><li>• Roof sheathing</li><li>• Roof flashing</li><li>• Does not include structural framing members that support the roof deck</li></ul>
<b>4. Exterior finish</b>	<ul style="list-style-type: none"><li>• Wall covering system on top of the wall sheathing (e.g., stucco, vinyl or wood siding, brick veneer, stone veneer)</li><li>• Insulation and weather stripping</li></ul>
<b>5. Interior finish</b>	<ul style="list-style-type: none"><li>• Gypsum board, drywall, plaster, or paneling that makes up the wall and ceiling surfaces.</li><li>• Trim around door and window frames</li><li>• Baseboard</li><li>• Casings</li><li>• Chair rails</li><li>• Ceiling Moldings</li></ul>
<b>6. Doors and windows</b>	<ul style="list-style-type: none"><li>• All interior and exterior doors and windows</li><li>• Locks</li><li>• Hinges</li><li>• Frames</li><li>• Handles</li></ul>
<b>7. Cabinets and countertops</b>	<ul style="list-style-type: none"><li>• Built-in, wall-mounted, or isolated cabinets and countertops (kitchens and bathrooms)</li></ul>
<b>8. Floor finish</b>	<ul style="list-style-type: none"><li>• Carpet</li><li>• Hardwood</li><li>• Vinyl composition tile</li><li>• Sheet vinyl</li><li>• Ceramic tile</li><li>• Marble</li><li>• Does not include carpet or re-carpeting installed over finished flooring, such as wood or tile</li></ul>

Element	Description
<b>9. Plumbing</b>	<ul style="list-style-type: none"> <li>• Incoming water service (municipal water supply or well service)</li> <li>• Plumbing fixtures</li> <li>• Water heater</li> <li>• Water distribution system</li> <li>• Wastewater collection and removal system</li> </ul>
<b>10. Electrical</b>	<ul style="list-style-type: none"> <li>• Electrical wiring systems (junction boxes, circuit breaker panels, distribution wiring, outlets, switches, receptacles)</li> <li>• Lighting</li> <li>• Ceiling and exhaust fans</li> <li>• Electric baseboard heaters</li> </ul>
<b>11. Appliances</b>	<ul style="list-style-type: none"> <li>• All built-in, permanent appliances in the structure</li> </ul>
<b>12. HVAC</b>	<ul style="list-style-type: none"> <li>• The system with which conditioned air is distributed throughout the structure; a typical system in residential structures involves a forced-air heating system with duct work</li> <li>• Exterior air conditioning units</li> <li>• Heat pumps</li> <li>• Furnaces</li> </ul>

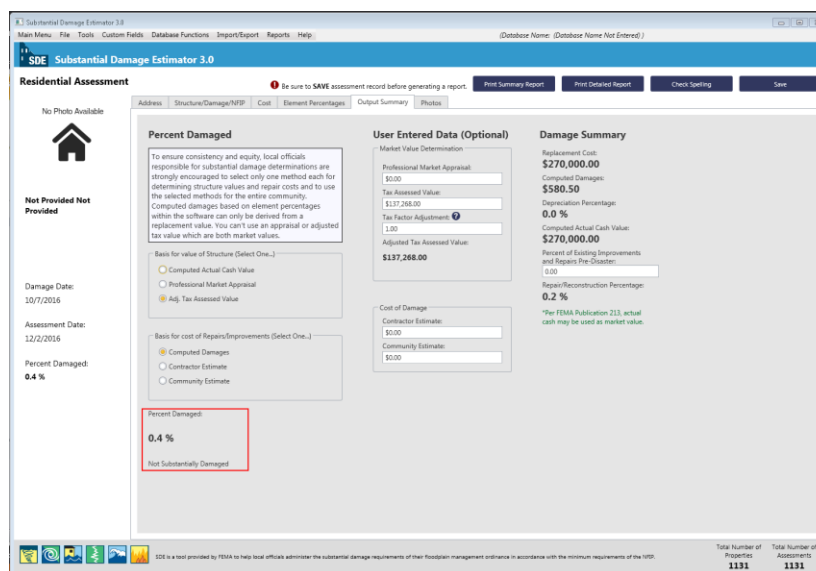
HVAC = heating, ventilation, and air conditioning

### 3.11.2.5 Output Summary Tab

This tab (Figure 3-38) summarizes the computations for structure value and damages as well as the calculated structure Percent Damaged. It also includes options that allow the user to select which of three structure values and three damage estimates to use in making the Substantial Damage determination. There are also two report-printing options at the bottom right of the **Output Summary** tab (refer to Section 5 for details on reports).

**Percent Damaged:** The Percent Damaged section of the **Output Summary** tab contains the *Value of Building* and *Cost of Repairs/Improvements* fields. Both of these can be calculated using three different methods. For *Value of Building*, these methods include *Computed Actual Cash Value* (as computed within the SDE tool), *Professional Market Appraisal* (usually obtained and paid for by the structure owner) for the structure value, and *Adj. Tax Assessed Value*. For *Cost of Repairs/Improvements*, these methods include *Computed Damages* (as computed within the SDE tool), *Contractor's Estimate*, and *Community's Estimate*.

The three options under the *Value of Building* and *Cost of Repairs/Improvements* permit the user to select the most appropriate sources of data for use in the Substantial Damage determination. The default selections are the *Computed Actual Cash Value* and *Computed Damages*. The calculated Percent Damaged is shown near lower left portion of the tab (outlined in red in Figure 3-38). If the structure has a Percent Damaged of 50 percent or higher, then the NFIP requirements for substantially damaged structures apply.



**Figure 3-38: Output Summary tab**

**Damage Summary:** The Damage Summary section carries over the Replacement Cost, Computed Damages, Depreciation Percentage, and Computed Actual Cash Value from previous tabs. If available, the user may enter an estimated value for a **Percent of Existing Improvements and Repairs Pre-Disaster**. This value should reflect the percent of the structure that has been renovated, repaired, or improved prior to the current damage event. The purpose of this field is to record pre-existing repair work or improvement work to the structure, so that the cumulative determination for the structure can be calculated outside of the tool as needed.

Community officials can use any combination of methods (one from each of the **Value of Building** and **Cost of Repairs** fields) to determine Substantial Damage. Optional data, including appraisal, adjusted tax assessed value, or non-SDE estimates of damages, are entered in the middle portion of the **Output Summary** tab in the section identified as User Entered Data (Optional). However, officials are strongly urged to be consistent when making Substantial Damage determinations by using the same cost and damage methods on a community-wide basis to ensure that Substantial Damage determinations are prepared and evaluated in a consistent and equitable manner.

### Critical Substantial Damage Range

Substantial Damage determinations between 35 percent and 65 percent are the most critical and these determinations are the ones most likely to be challenged by structure owners. Therefore, local officials may want to perform additional reviews of the field-collected data to ensure that the determinations are defensible.

**User-Entered Data (Optional):** When user-entered data are being considered, the accuracy of this data must be evaluated. This is especially true when the tool indicates that the structure is between 35 percent and 65 percent damaged. The closer the level of repair/improvement costs are to 50 percent of the value of the structure, the greater the precision needs to be in determining Substantial Damage. Situations in which the structure owner requests an administrative or

judicial review or appeal most likely will occur when the structure is declared substantially damaged and the *Percent Damaged* falls between 50 percent and 65 percent.

A professional market appraisal or an adjusted tax assessed value may be entered in lieu of the Computed ACV determined within the SDE tool. If the appraisal value is based on the value of the land and structure, the value of the land must be subtracted from the appraisal value because Substantial Damage is based on structure value only. These two valuation methods are discussed below.

The professional market appraisal involves the value of the structure without the land value, as determined by an appraiser licensed within the State where the structure is located. This can be used within the SDE tool in-place of the structure Computed ACV.

If the adjusted tax assessed value is based solely on the structure, a locally based adjustment factor may be required to increase the value to market value, because the tax assessed values tend to be less than Computed ACV or market value. This adjustment may be made by using a *Factor Adjustment* in the data field provided, and should be based on the normal adjustment procedures used in the county/parish or community where the structure is located. The factor likely will be higher than 1.00 and should be entered with two decimal places (trailing zeroes are dropped). For example, to increase the assessed structure value by 43 percent, input a value of 1.43.

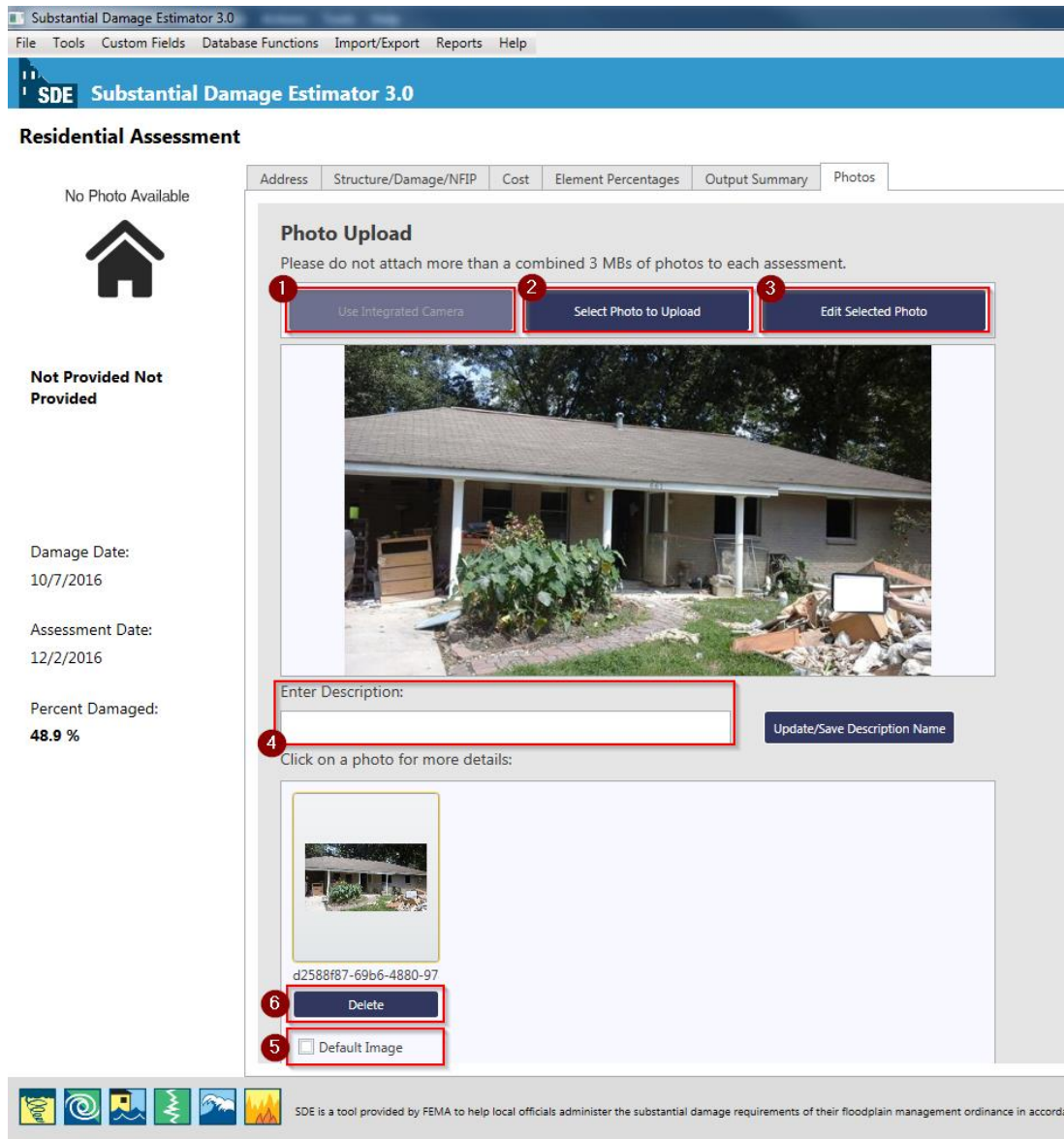
### Use of Unadjusted Tax Assessed Values

Use of tax values as structure values without a locally required adjustment factor or multiplier will generally skew the Substantial Damage determination upward (thereby increasing the percent damaged for the structure). This is because the denominator in the Substantial Damage equation (i.e., the pre-damage value of the structure) will typically be smaller than if the ACV was used to determine structure value.

Local officials may use a contractor's estimate or a community's estimate in lieu of the SDE-computed damages. These corresponding text fields are located in the Cost of Damage Determination section. Contractor estimates should be based on a specific structure and reflect all of the work and materials required to put the structure back to its pre-damaged state. The costs should reflect reasonable material and labor costs for the area. Donated or discounted materials and labor must be evaluated at fair market value for the area, because the Substantial Damage determination process requires use of the true cost of repairs. Communities can provide their own repair estimates if the estimates are complete and reflect the general cost of materials and labor for the area. A community providing its own repair estimate must be able to justify the estimates. Appendix D of the SDE Field Workbook contains a list of recommended construction elements to be included in either contractor or community estimates of repair costs.

### 3.11.2.6 Photos Tab

The primary function of *Photos* tab (Figure 3-39) is to upload and store digital photographs that verify the structure inspected for the Substantial Damage assessment.



**Figure 3-39: Photos tab**

Figure 3-39 shows the *Photos* tab options numbered according to the following list:

- 1 Use Integrated Camera** – This control allows users to take advantage of an available camera that is integrated on the laptop computer or tablet. This is ideal for adding digital photographs to the assessment while in the field. When photographs are obtained with the integrated camera, the digital file is stored in an attachments folder as part of the SDE tool. The user can use the *Select Photo* feature (below) to add the photograph to the assessment.
- 2 Select Photo to Upload** – This function allows the user to choose a photograph from the host computer or an external drive to be added to the assessment.

- 3 **Edit Selected Photo** – This section allows users to edit the current photo that is in the main view of this function.
- 4 **Update/Save Description Name** – This feature allows the user to enter and save the description or name of the selected photo.
- 5 **Default Image** – This option allows the user to set the default photograph to be displayed in an open assessment, the Summary Report, and the Community Report for that assessment.
- 6 **Delete** – This control allows the user to delete an existing image.

The *Edit Photo* function in the SDE 3.0 Tool has been updated from previous versions of the tool. This function can be accessed from the **Photos** tab in an open assessment and allows users to perform editing operations on digital photographs (Figure 3-40). This function can be accessed from the assessment **Photos** tab by selecting the *Edit Selected Photo* button.

Figure 3-40 shows the Edit Photo window options numbered according to the following list. The user should select the *Save* button after each function below is completed.

- 1 **Open, Undo, Redo and Save** – These functions allow a user to open a photograph located outside of the SDE tool, Undo/Redo one of the *Edit Photo* functions listed below, and save a photograph.
- 2 **Resize** – This function allows users to resize the photograph to either a larger or small size. The resize options are percentage based. As users resize the photograph, they will be able to preview the resulting photograph in the Image Preview window.
- 3 **Rotate 90 degrees or 180 degrees** – Photographs can be rotated to the right either 90 degrees (one quarter turn) or 180 degrees (one half turn).
- 4 **Crop** – This function allows users to crop or trim selected areas of a photograph using the mouse. After the user selects the *Crop* button to activate the tool, a box will appear on the photograph with a yellow outline. The cursor can be used to adjust the horizontal and vertical sides of the yellow outline to define the desired area to crop. **Note:** The area inside the yellow box will be retained after the crop function is completed. Once the boundaries of the area of the photograph to be retained have been set, selecting the *Save* function will complete the cropping. A small confirmation window will appear and the cropped photograph will be visible in the Image Preview window.



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- 5 **Draw Text** – This allows users to add text to a photograph. When this button is selected, a window opens and it contains a text box with the sample text “Your text here...” Text entered in this box will overwrite the sample text and be shown in the photograph visible in the Image Preview window. The default position for the text is the upper left corner of the photograph. The user can change the location of the text by adjusting the horizontal and vertical position slide bars. The user can also select the font size and color or rotate the text. The adjustments made will be shown directly in the photograph in the Image Preview window so the user can verify the adjustments prior to saving the revised photograph.
- 6 **Draw** – This button allows users to draw lines on the photograph to identify a high water mark that may not be visible in a photograph or point to significant damage on the structure.
- 7 **Shape** – This button allows users to select a predefined shape such as a square, rectangle, circle, etc. to highlight an area on the photograph. There is an option to have the shape with or without fill.
- 8 **Adjust** – The buttons in this area allow users to adjust color, saturation, contrast, and sharpness of the photograph.
- 9 **Image Preview Pane** – The pane is the viewing area where users will be able to preview the edits made to the current photograph before saving it.

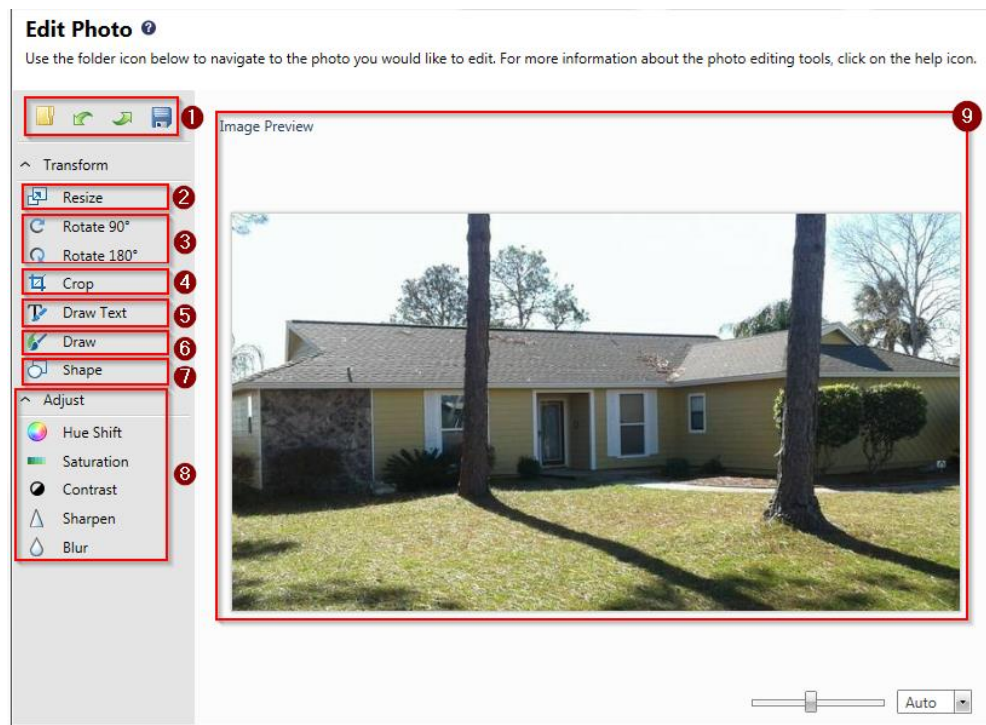
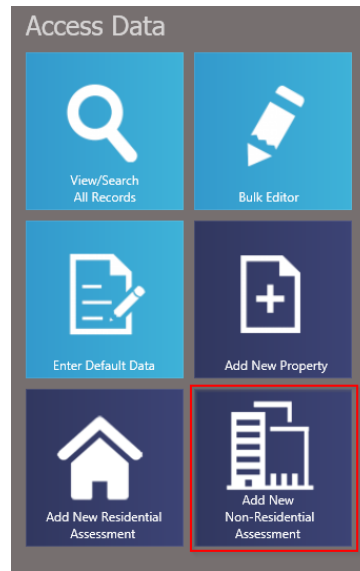


Figure 3-40: Edit Photo window



### 3.11.3 Creating a New Non-Residential Assessment

To create an assessment, the user should select the **Add Non-Residential Assessment** button on the **Main Menu** (Figure 3-41). If an existing property is selected, the **Address** tab in the new assessment will be automatically populated with available data. If a **New Property** is selected, the user must fill out the **Address** tab when creating the assessment. If default data has been entered into the tool, the user will have the option of using that default data to pre-populate certain data fields within the assessment.



**Figure 3-41: Add New Non-Residential Assessment function**

When a new assessment is created for an existing property, the property data and some of the assessment data are pre-populated for the new assessment. This data can be revised as part of the new assessment. The data fields on the **Cost** and **Element Percentages** tabs must be completed for a valid assessment.

The data fields required to complete a valid non-residential assessment are very similar to those required for a residential assessment (refer to Section 3.11.2). The data fields contained on the **Address**, **Cost**, and **Output Summary** tabs are nearly identical for the two assessment types. For the **Element Percentages** tab, a non-residential assessment requires a damage evaluation for 7 elements, while a residential assessment requires the evaluation of 12 elements. The differences between the data requirements for the two assessment types are limited to the **Structure/Damage/NFIP Info** and the **Element Percentages** tabs.

For non-residential structures, structure type is not directly used as the basis for determining the appropriate element percentage array within the tool. Instead, **Structure Use** and the **Number of Stories** are the determining factors for the array. For each **Structure Use**, the SDE tool uses representative structure types and their specific characteristics to determine the element percentage arrays. Therefore, although the user does not directly choose the superstructure type, foundation type, etc., these characteristics are assigned based on the representative structures for each use and are, therefore, built into the element percentage arrays. Table 3-7 shows the **Structure Uses** available within the SDE tool.

**Table 3-7: Non-Residential Structure Uses**

<b>Structure Use</b>	<b>1-Story</b>	<b>2 to 4 Stories</b>	<b>5 or More Stories</b>
Apartments	✓	✓	✓
Auditorium	✓		
Commercial retail	✓		
Convenience store	✓		
Courthouse	✓	✓	
Department store	✓	✓	
Fast food restaurant	✓		
Fire station	✓		
Grocery store	✓		
High school		✓	
Hospital	✓	✓	✓
Hotel			✓
House of worship	✓		
Industrial		✓	
Long-term care facility	✓	✓	
Mini-warehouse	✓		
Motel	✓	✓	
Municipal building	✓	✓	
Office building	✓	✓	✓
Police station	✓	✓	
Restaurants	✓		
Strip malls	✓		

### 3.11.3.1 Non-residential Structure/Damage/NFIP Info Tab

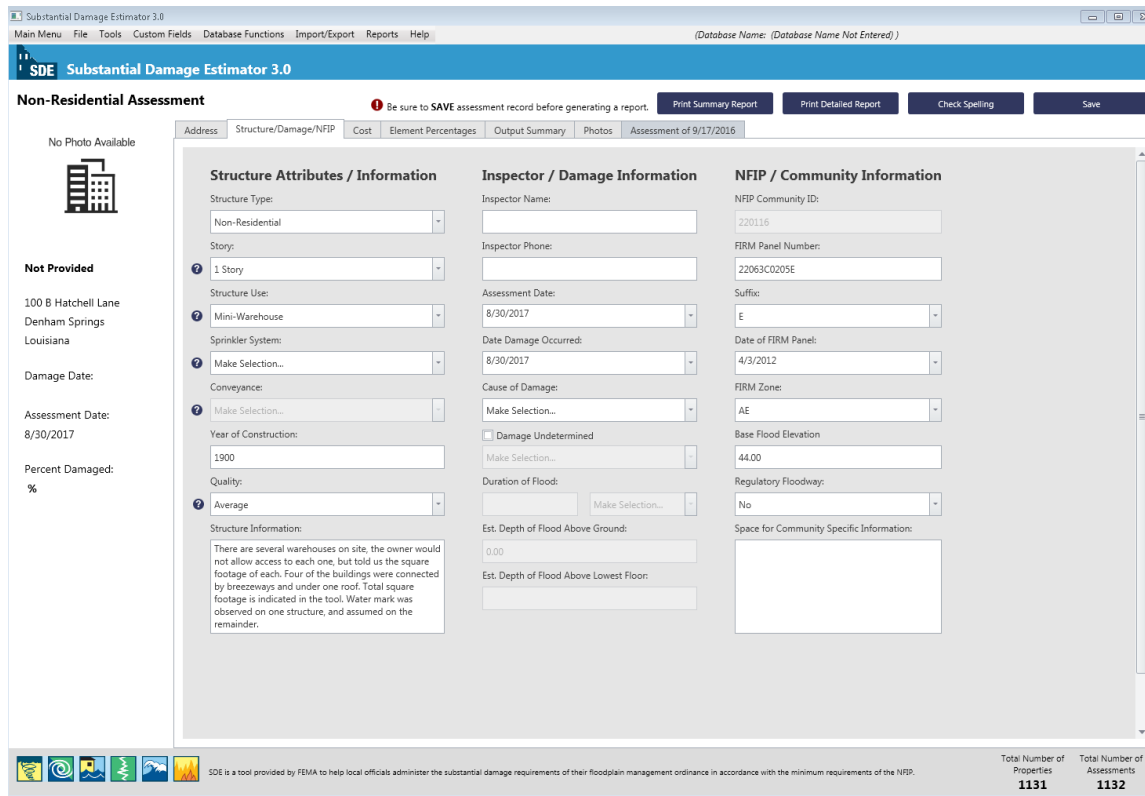
For non-residential structures, the user should first select the **Structure Type**, **Number of Stories** and **Structure Use**, and then complete the other data fields (Figure 3-42) on the **Structure/Damage/NFIP Info** tab. The first three data fields will determine the attribute options available in the other data fields. The list for non-residential structure uses is limited and based on the number of stories. Although the list could easily exceed 100 different non-residential structure uses, such a large list would be overwhelming and impractical for most SDE users. The current list strikes a balance for structure uses while offering a reasonable range of structure heights (number of stories) and functions. Furthermore, the list of elements and the element

**USER NOTE:**

Given the limited number of structure use options, users should select the non-residential structure use that best fits the structure being inspected.

percentages as part of the entire structure do not vary significantly for the non-residential structure uses beyond those contained on the current lists.

Consider the structure use (is it more like a factory, a warehouse, or an office building?), the building materials (schools and hospitals have different construction materials than a warehouse), and the variations in quality (warehouses and factories are usually of a lower quality construction than an office building or a house of worship). As an example, the list of non-residential structure uses includes the option of either a one-story elementary school or a two- to four-story high school. The best choice for a two-story middle school would be a high school due to the number of stories and activities that occur within the structure. Similarly, the best choice for a medical office building would be an office building rather than a hospital.



**Figure 3-42: Non-Residential Structure/Damage/NFIP Info tab**

The non-residential **Structure/Damage/NFIP Info** tab contains the following data fields:

- **Structure Attributes/Information** – drop-down lists for structure type, the number of stories, structure use, sprinkler system (yes or no), conveyance (elevator or escalator, yes or no), quality (of initial construction), and data fields for the year of construction and structure information comments.
- **Inspector/Damage Information** – inspector name and phone number, date of inspection, date damage occurred, cause of damage, drop-down list for damage undetermined, duration of flood (in hours or days), estimated depth of flood above ground, and the estimated depth of flood above lowest floor.

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- **NFIP/Community Information** – NFIP CID (carried over from the Address tab), FIRM panel number, FIRM panel suffix, date of FIRM panel, FIRM zone, BFE, regulatory floodway (yes, no, possible), and a community-specific information comment box for information such as the name or number of the declared disaster, use of best available flood data in-place of an outdated Flood Insurance Study, etc.

### 3.11.3.2 Non-Residential Element Percentages Tab

The **Element Percentages** tab (Figure 3-43) is used by the inspector to enter the percent damaged values based on a rapid, visual evaluation for each of the seven non-residential elements. Once the required data has been entered on the **Structure/Damage/NFIP Info** and **Cost** tabs, the Element Percent for each element is calculated within the tool and populated on the **Element Percentages** tab.

Similar to the percent damaged estimates for residential structures; the values should be entered as whole numbers between 0 and 100, in 5 percent increments. The Element Percentages in the third column of this tab are fixed and based upon the attribute options on the **Structure/Damage/NFIP Info** tab selected for the structure.

The screenshot shows the 'Substantial Damage Estimator 3.0' application window. The title bar includes the application name and a database name field. The main window has a blue header with the application name and a toolbar with buttons for 'Print Summary Report', 'Print Detailed Report', 'Check Spelling', and 'Save'. Below the header is a navigation bar with tabs for 'Address', 'Structure/Damage/NFIP', 'Cost', 'Element Percentages', 'Output Summary', 'Photos', and 'Assessment of 9/17/2016'. The 'Element Percentages' tab is active, displaying a table with the following data:

Element:	Percent Damaged:	Element Percentage:	Element Cost:	Damage Values:
Foundation:	0.0 %	13.0 %	\$0.00	\$0.00
Superstructure:	0.0 %	29.0 %	\$0.00	\$0.00
Roof Covering:	0.0 %	8.0 %	\$0.00	\$0.00
Plumbing:	0.0 %	11.0 %	\$0.00	\$0.00
Electrical:	0.0 %	6.0 %	\$0.00	\$0.00
Interiors:	0.0 %	23.0 %	\$0.00	\$0.00
HVAC:	0.0 %	10.0 %	\$0.00	\$0.00
			Replacement Cost:	Total Estimated Damages:
			\$0.00	\$0.00

At the bottom of the window, there is a footer with the text: 'SDE is a tool provided by FEMA to help local officials administer the substantial damage requirements of their floodplain management ordinance in accordance with the minimum requirements of the NFIP.' On the right side of the footer, there are two statistics: 'Total Number of Properties: 1131' and 'Total Number of Assessments: 1132'.

**Figure 3-43: Non-Residential Element Percentages tab**

Table 3-8 lists the elements and their individual components for non-residential structures in the SDE tool.

**Table 3-8: Non-Residential Structure Elements**

Element	Description
<b>1. Foundations</b>	<ul style="list-style-type: none"> <li>• Continuous perimeter footings</li> <li>• Footings</li> <li>• Piers</li> <li>• All foundation elements</li> </ul>
<b>2. Superstructure</b>	<ul style="list-style-type: none"> <li>• Load-bearing system that extends from the foundation to the roof of the structure (does not include foundation components)</li> <li>• Structural members that support the roof deck, such as rafters and trusses (does not include roof sheathing)</li> <li>• Exterior finishes, such as exterior walls, siding, and exterior doors</li> </ul>
<b>3. Roof covering</b>	<ul style="list-style-type: none"> <li>• Covering material (shingles, tile, slate, metal roofing, built-up roofing)</li> <li>• Roof sheathing</li> <li>• Roof flashing</li> <li>• Does not include structural framing members that support the roof deck</li> </ul>
<b>4. Plumbing</b>	<ul style="list-style-type: none"> <li>• Incoming water service (municipal water supply or well service)</li> <li>• Plumbing fixtures</li> <li>• Water heater</li> <li>• Water distribution system</li> <li>• Wastewater collection and removal system</li> <li>• Exterior drainage (roof gutters, downspouts)</li> <li>• Fire protection</li> </ul>
<b>5. Electrical</b>	<ul style="list-style-type: none"> <li>• Electrical wiring systems (junction boxes, circuit breaker panels, distribution wiring, outlets, switches, receptacles)</li> <li>• Lighting</li> <li>• Ceiling and exhaust fans</li> <li>• Electric baseboard heaters</li> <li>• Communications</li> <li>• Conveyance (escalators, elevators)</li> <li>• Security systems</li> </ul>
<b>6. Interiors</b>	<ul style="list-style-type: none"> <li>• Partitions</li> <li>• Interior doors</li> <li>• Interior surface finishes (wall, floor, and ceiling)</li> </ul>
<b>7. HVAC</b>	<ul style="list-style-type: none"> <li>• Heating units</li> <li>• Cooling units</li> <li>• Ventilation</li> </ul>

HVAC = heating, ventilation, and air conditioning

### 3.11.4 Required Data Fields for All Assessments

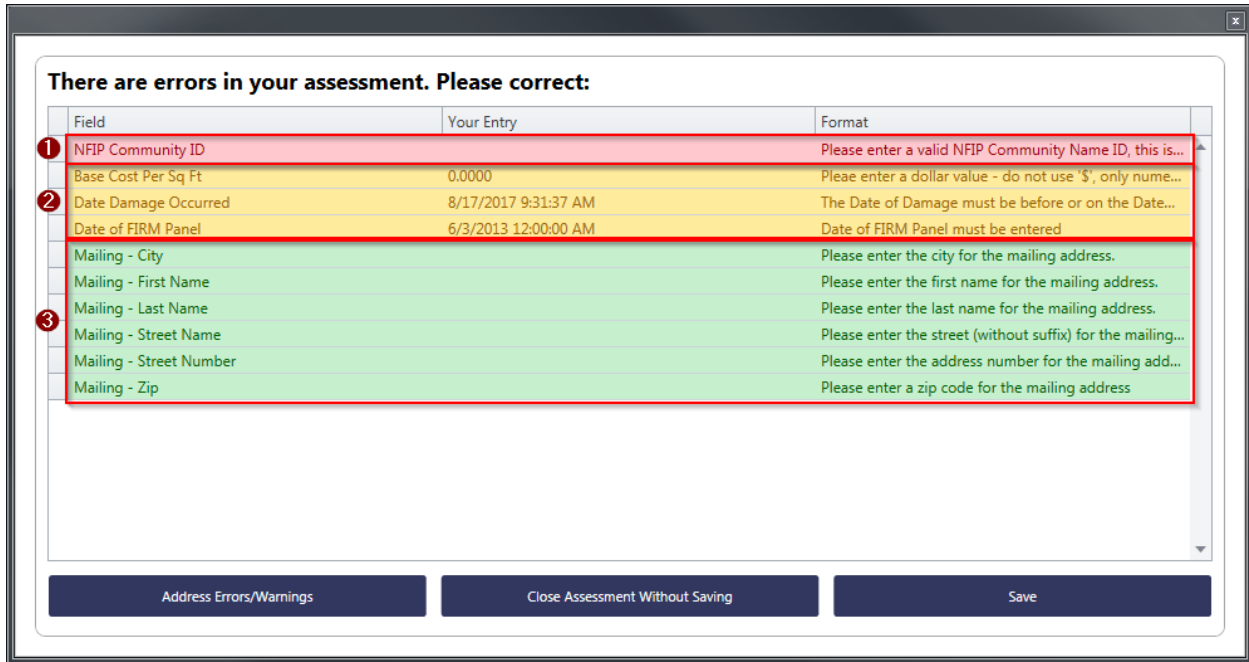
When creating an assessment, key data fields are required to save a valid assessment. These fields are provided in Table 3-9 for both residential and non-residential assessments. The only differences between residential and non-residential assessments are the structure attributes and the elements to be evaluated for damage on the **Structure/Damage/NFIP Info** and **Element Percentages** tabs.

**Table 3-9: Required and Suggested Data Fields for Residential and Non-Residential SDE Assessments**

Required or Suggested	Fields
<b>Required to Save an Assessment</b>	<ol style="list-style-type: none"> <li>NFIP CID</li> <li>Date of Assessment (i.e., inspection date)</li> </ol> <p><b>Residential-specific:</b></p> <ol style="list-style-type: none"> <li>Residence Type</li> <li>Number of Stories (1, 2 or more)</li> </ol> <p><b>Non-Residential-specific:</b></p> <ol style="list-style-type: none"> <li>Number of Stories (1, 2-4, 5 or more)</li> <li>Structure Use</li> </ol>
<b>Required to Save a Valid Assessment</b> (same fields required for residential and non-residential assessments)	<ol style="list-style-type: none"> <li>Elevation of Lowest Floor</li> <li>Latitude and Longitude</li> <li>Year of Construction</li> <li>Quality (initial construction)</li> <li>Date Damage Occurred</li> <li>Cause of Damage</li> <li>FIRM Panel Number</li> <li>Date of FIRM Panel</li> <li>FIRM Flood Zone</li> <li>BFE</li> <li>Regulatory Floodway</li> <li>Base Cost Per Square Foot</li> <li>Depreciation Rating</li> <li>Depreciation Explanation (if manual depreciation value is entered)</li> </ol>
<b>Suggested</b> (same fields suggested for residential and non-residential assessments)	<ol style="list-style-type: none"> <li>Building Owner Name and Address Information</li> <li>Owner Mailing Address</li> <li>Inspector Name and Phone Number</li> </ol>

When the key data fields are empty or contain incorrect data and the user attempts to save the assessment, an error window opens to identify the remaining data fields that must be completed to save a valid assessment (Figure 3-44). A scroll bar is available along the right side of each of

the three lists when the number of errors exceeds the viewing area of the window. The user can select *Address Errors/Warnings* or *Close Assessment Without Saving*.



**Figure 3-44: Error window identifying incomplete or blank data fields**

- 1 The top portion of the assessment errors window (red) in Figure 3-44 indicates the fields required to save the assessment.
- 2 The middle portion (yellow) in indicates the fields required to save a valid assessment.
- 3 The lower portion (green) in indicates the fields that are recommended, but not required for a valid assessment.

If the user selects *Address Errors/Warnings*, red, yellow, or green pushpins (Figure 3-45) will appear next to the data field(s) with incorrect or missing data for incomplete data on the each of the six SDE tabs. The color of the pushpins matches the row color in the error window above.

- Red pushpin – the data field is required to save the assessment.
- Yellow pushpin – the data field is required to save a valid assessment.
- Green pushpin – the data field is recommended, but not required for a valid assessment.

As an example, the *NFIP Community ID* is required to save the assessment and the empty data field has a red pushpin to the right of the field in Figure 3-45. The pushpins for the Mailing Address data fields are green and indicate that those fields are recommended, but not required to save a valid assessment.

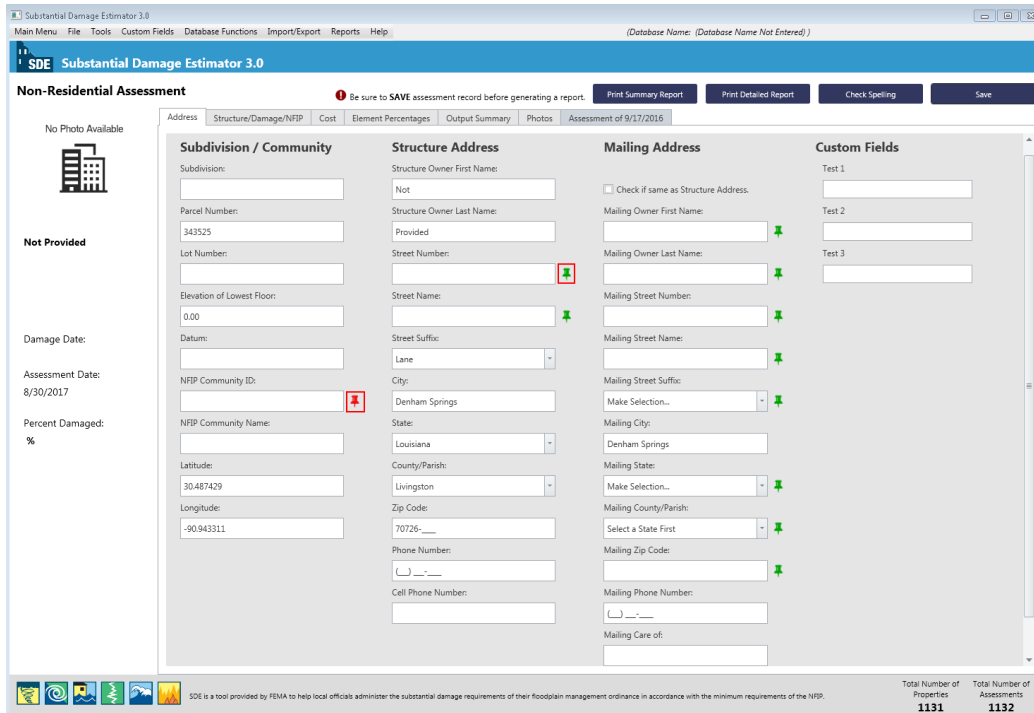


Figure 3-45: Example of colored pushpins that identify missing or incomplete data

## 3.12 Viewing and Editing Assessments

Users may view records or assessments using the *View/Search* or *Bulk Editor* functions found on the *Main Menu*. In the *View/Search* function, users can select *Residential*, *Non-Residential*, or *Both* to filter the displayed assessments.

### 3.12.1 View/Search

After selecting the *View/Search* function button (Figure 3-46), a grid will appear that shows the available records or assessments in the SDE database. The view (Figure 3-47) includes a photograph of the property and key property/assessment data such as assessment date, address, percent damaged, and a photograph of the structure (if available). There are filters available on this screen to facilitate searching for a specific record or group of records. The filters allow users to search for only residential or non-residential structures or both, a custom fields, properties only, a range of percent damaged, parcel numbers, names, or zip codes.

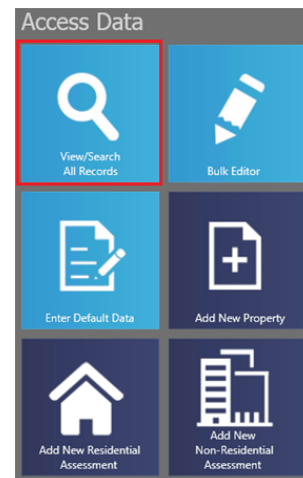
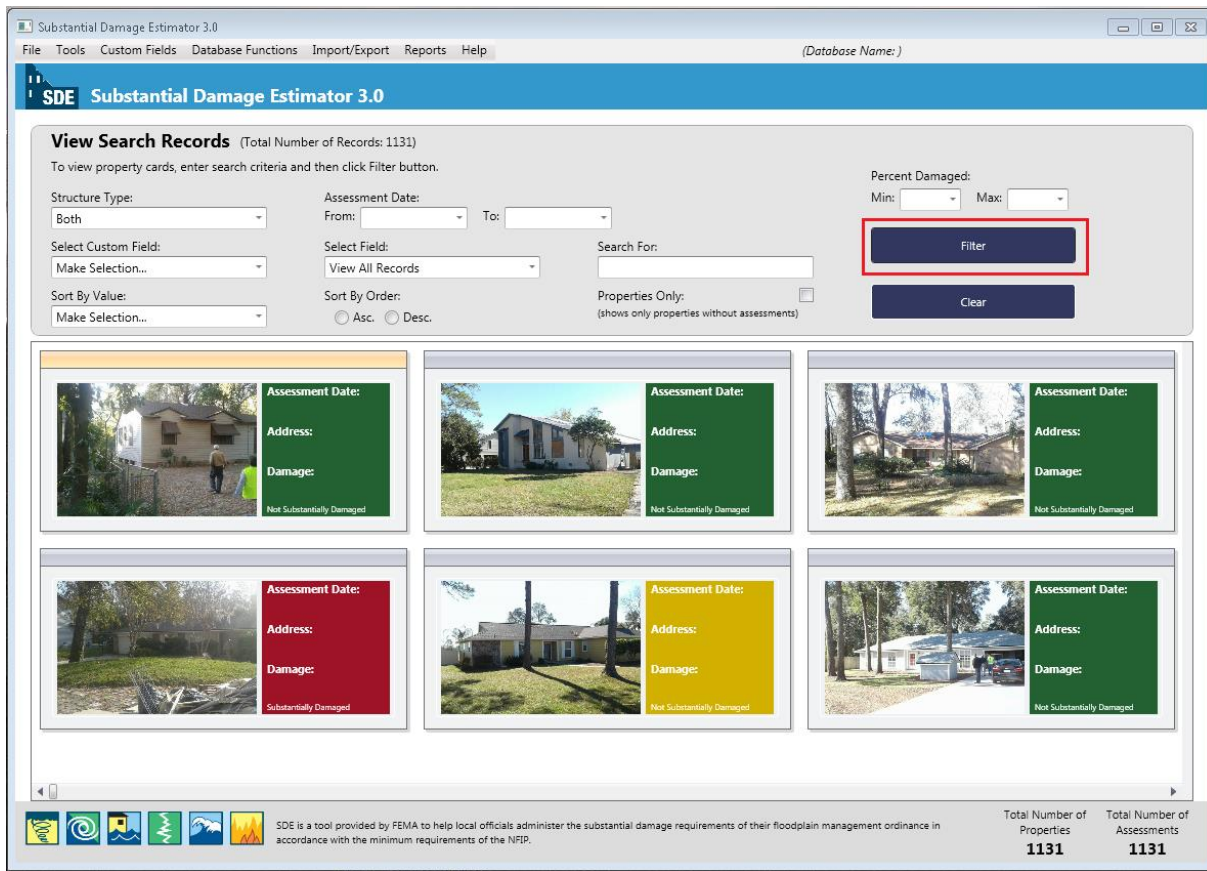


Figure 3-46: View/Search All Records function





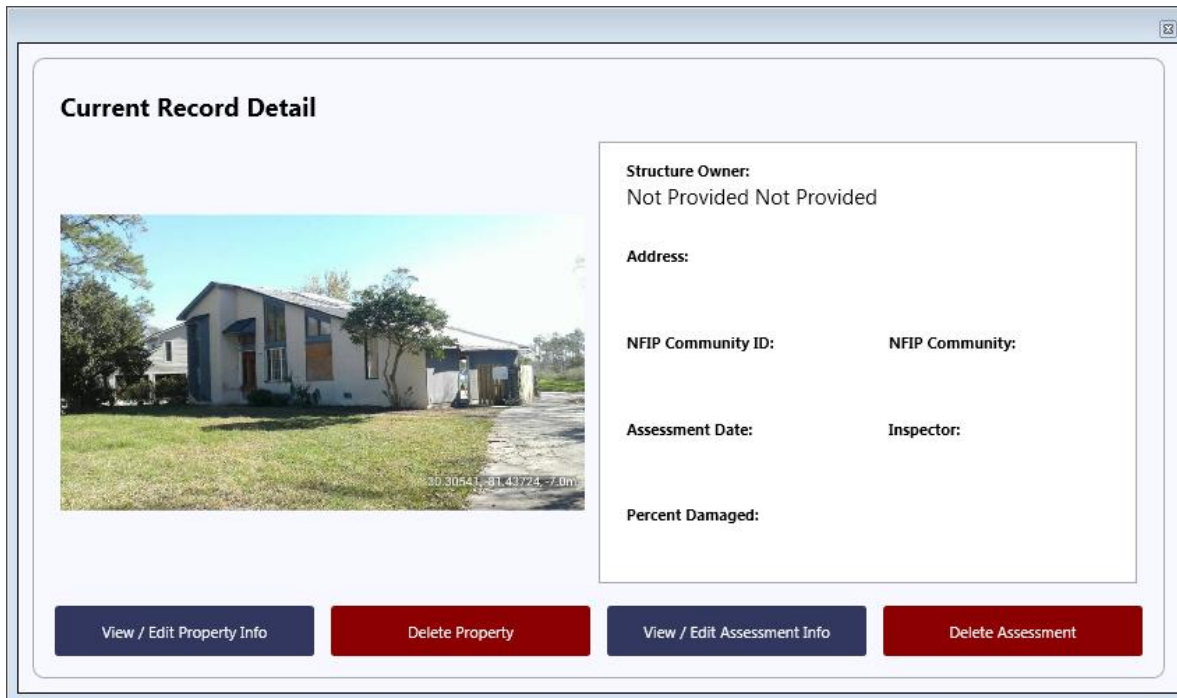
**Figure 3-47: View/Search grid for available properties/assessments**

Users can select one of the properties/assessments in the grid to open up the Current Record Detail screen (Figure 3-48) that displays the owner first and last name, address, NFIP CID, community name, inspection date, inspector name, and the percent damaged. The colors of the individual assessments in this view indicate the following:

- **Green** – percent damaged  $\leq 40\%$  (no Substantial Damage)
- **Yellow** – percent damaged between 40% and 50% (possible Substantial Damage)
- **Red** – percent damaged  $\geq 50\%$  (Substantial Damage)

The user has four options on the Current Record Detail screen:

1. **View/Edit Property Info**
2. **Delete Property**
3. **View/Edit Assessment Info**
4. **Delete Assessment**



**Figure 3-48: Current Record Detail screen**

**View/Search Using Filters:** For large inventories of assessments, users can locate individual assessments by filtering on the following criteria once the *View/Search* grid view is open:

- **Structure Type** – Residential, Non-Residential, or Both
- **Assessment Date** – options include the selection of a specific date or a range of dates
- **Percent Damaged** – range of percent damaged from 0 to 100 percent (in 5 percent increments)
- **Select Custom Field** - search for records based on data in one of the custom fields
- **Select Field** – one data field selected from among:
  - *View All Records*
  - *Owner’s Name (first or last)*
  - *Building Address*
  - *City*
  - *NFIP Community Name*
  - *Zip Code*
  - *County/Parish*
  - *NFIP CID*
  - *FIRM Panel*
  - *Inspector Name*
  - *Parcel Number*
  - *Lot Number*

**USER NOTES:**

1. Users must select one of the three options in the **Structure Type** field to activate the other filter fields.
2. Users should clear the filters before selecting new filters.

- **Sort By Value** – one data field selected from among:
  - *Structure Type*
  - *NFIP Community Name*
  - *FIRM Panel*
  - *Owner’s Name*
  - *NFIP Community Name*
  - *Address*
  - *City*
  - *County/Parish*
  - *Zip Code*
- **Search For** – a specific value based on the optional data fields in the *Select Field* or *Sort By Value* filters

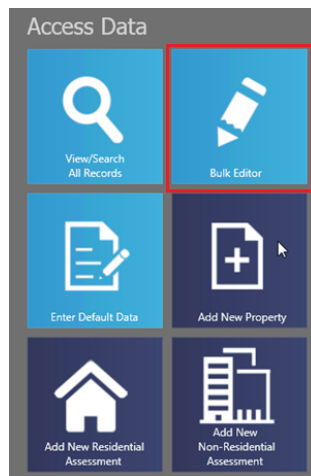
Note that any filters selected are temporary, apply to the current view only, and are deleted when the view is closed or other filters are used.

### 3.12.2 Bulk Editor

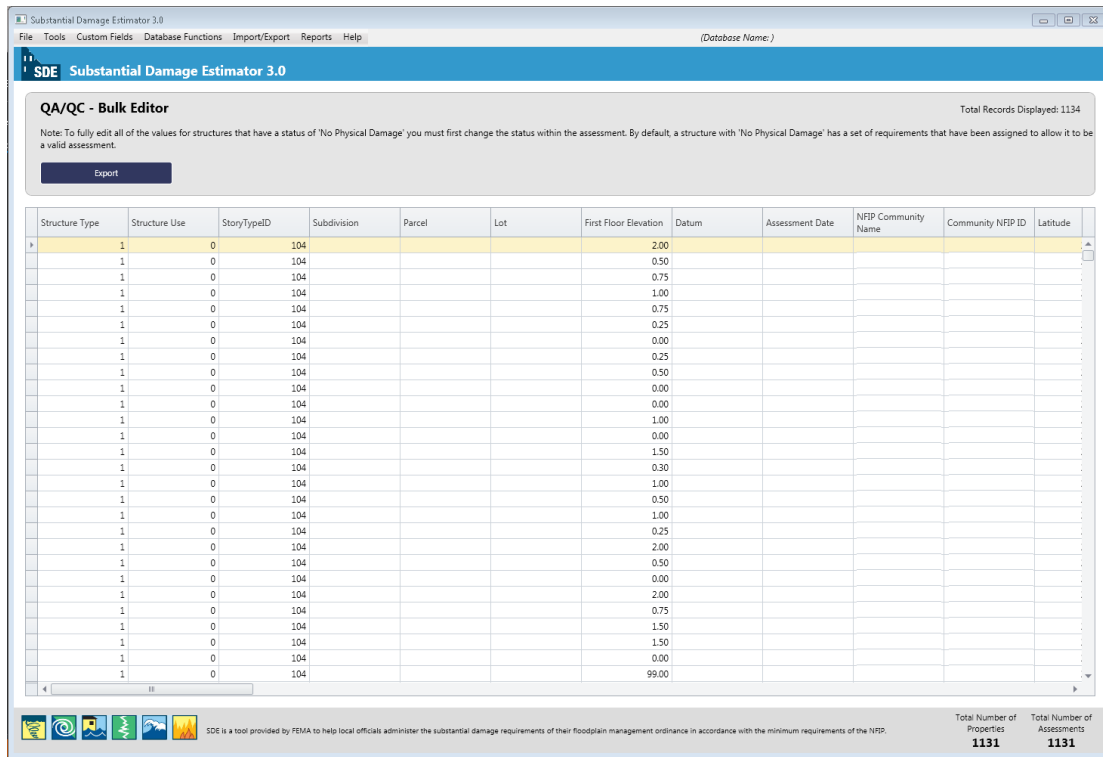
The **Bulk Editor** function (Figure 3-49) allows users to edit all data fields for as many assessments as needed from a single view. The edits are made directly to the current assessments in the SDE database. This function also has the enhanced grid search features as discussed in Section 3.12.1. After selecting the **Bulk Editor** function on the **Main Menu**, the **Bulk Editor** window (Figure 3-50) opens. The user has access to each assessment in the active SDE inventory. There is one assessment per row and the scroll bars along the bottom and right side can be used to navigate to a specific data field within a specific assessment. To edit a data field, the user selects the field to highlight the current data. The edits can be done by either typing over the current data or using the copy and paste functions. Edits must be made one at a time, on a field-by-field and assessment-by-assessment basis.

**USER NOTE:**

All edits are saved as they are made, and overwritten data is permanently erased from the assessment.



**Figure 3-49: Bulk Editor function**



**Figure 3-50: Bulk Editor window**

Data can be sorted by right clicking on the column header. The first click sorts the data either numerically (from low to high) or alphabetically (from A to Z). A second click on the column header produces a reverse sort (from high to low or Z to A).

Similar to the filters for the *View/Search All Records* function, the filters on the *Bulk Editor* can be used to view assessments by *Structure Type*, *Inspection Date*, a range of *Percent Damaged* values, and *Select Field* to filter by *Owner Name*, *Building Address*, *City*, *NFIP Community Name*, *Zip Code*, *County/Parish*, *NFIP Community ID*, or *FIRM Panel*. The filter parameters are only in effect for the current view and are deleted when either new filters are applied or the view is closed. User should select the *Clear Filters* button before using new filters.

**USER NOTE:**

Given the number of data fields in the SDE tool, not all of the fields are displayed as columns in the *Bulk Editor*. To review data in fields not shown in the *Bulk Editor*, users can export the entire SDE database to an Excel file and use that for their reviews.

The *Bulk Editor* function can also be used for reviews to check the completeness and consistency of the assessment data recorded in SDE tool.

### 3.13 Quality Assurance Reviews

Users can perform basic QA reviews within the *Bulk Editor* by sorting each data column low to high (or A to Z) and then using a reverse sort to check for the common data errors identified in

Table 3-10. Assessments with easily identified errors, such as street names spelled incorrectly, incorrect BFEs (45 feet instead of 450 feet), or incorrect zip codes can impact the credibility of the inventory, the inspections, and the process. Once the credibility of the data and the process are questioned, the community’s ability to complete the inventory in a timely manner and the required post-inventory actions can become more difficult. The *Bulk Editor* function can be used to review and correct these types of data entry errors.

**Table 3-10: QA Reviews for Common SDE Data Errors**

- |  |  |
|--|--|
| 1. Missing data – especially data required for a valid assessment                            | 12. Missing or inconsistent cause of damage  |
| 2. Missing or obviously incorrect elevation of the lowest floor                              | 13. Damage undetermined checked, but the reason was not selected   |
| 3. Incorrect NFIP CID  | 14. Incorrect flood duration and units   |
| 4. Incorrect NFIP Community Name   | 15. Missing or obviously incorrect depth of flood above ground   |
| 5. Obviously incorrect latitude or longitude coordinates                                     | 16. Missing or obviously incorrect depth of flood above lowest floor   |
| 6. Inconsistent or misspelled street, street suffix, community, county/parish or State names | 17. Inconsistent or incorrect flood information – FIRM panel number, suffix, effective date, flood zone, BFE, or missing selection for regulatory floodway |
| 7. Missing or incorrect zip codes  |  |
| 8. Inconsistent or incorrect inspector names or contact information                          | 18. Obviously incorrect square footage   |
| 9. Incorrect inspection date   | 19. Inconsistent or incorrect base cost per square foot  |
| 10. Incorrect date that damage occurred  | 20. Incorrect geographic adjustment  |
| 11. Obviously incorrect structure attributes   | 21. Incorrect depreciation rating  |

**Troubleshooting Tip** – If an assessment is completed and the result shows Data Entry Incomplete on the **Output Summary** tab instead of the structure Percent Damaged, this means that the assessment is missing key data. The user or reviewer can open the assessment to find and enter the missing data and then save the assessment. The most likely missing data are the square footage, base cost, or the depreciation rate. Once the missing data are entered and the assessment saved, the Percent Damaged for the structure should appear on the **Output Summary** tab. Using the initial data, the structure photographs, and the inspector notes or comments, a reviewer may be able to correct an assessment or add missing data without requiring another trip to the field to get additional data.

Additional, more detailed QA reviews can be performed by checking for the issues listed below. The user may want to use an Excel export of the entire SDE database to facilitate detailed QA reviews. The recommended reviews below are by no means a complete list of all the data that can be checked. Users may have unique issues associated with their community or inventory areas that the SDE Manager has determined are critical and therefore require a QA review.

### Recommended QA Reviews for the SDE Database

1. Review the entire database for duplicate records from the current or previous days. This can be done by sorting numerically on address numbers or tax parcel identification numbers.
2. Because assessments with damages between 35 percent and 65 percent are the ones most likely to be challenged by owners, the SDE Manager should perform an additional review on assessments with damage in this range to ensure that the determinations are reasonable and defensible.
3. Check for incomplete assessments (i.e., properties) and determine whether properties should remain in the SDE database.
4. Verify that each assessment includes two photographs, even if the location involves a vacant lot or the structure had no damage.
5. Verify that any community-specific notes required by the SDE Manager are included in the *Residence Information* or *Structure Information* comment boxes on the **Structure/Damage/NFIP Info** tab.

### Recommended QA Reviews for Individual, Grouped, or Neighborhood Assessments

1. If a structure has multiple assessments and was inspected by different inspectors during the same inventory or period of time, determine which of the assessments should be kept in the inventory and delete the unneeded assessment.
2. If the square footage or the structure value for the assessment appears to be too high or too low, check the square footage against the structure photographs to determine if the square footage is reasonable. Also, check the base cost to verify that it is appropriate for the structure.
3. Structures for which the depth of flooding above the lowest floor is high, but the damages are low or structures where the depth of flooding above the lowest floor is low but the damages are high require a review of the full assessment to ensure the damages are reasonable and defensible. Comments may be required in the *Residence Information* or *Structure Information* comment boxes on the **Structure/Damage/NFIP Info** tab to explain the Substantial Damage determination.
4. The Substantial Damage requirements of the NFIP state that “damage of any origin” should be considered when determining whether a damaged structure meets the Substantial Damage threshold. Therefore, damages caused by wind, fire, an extreme lack of maintenance, vandalism, or even a car driving into a house should be considered by inspectors when assessing the overall damage of the structure.
5. Verify that structures affected by the same flood depth above the lowest floor have similar and reasonable damages, especially in areas with little change in ground elevations. This can be performed quickly checking the *Est. Depth of Flood Above Lowest Floor*.

6. Verify that the residential assessment form was used for residential structures only. Non-residential structures must be assessed using the non-residential assessment form.
7. Verify that each assessment only includes a single structure. Inexperienced inspectors may attempt to include data from multiple structures, such as a separate residential structure elsewhere on the lot or a detached garage that has been converted into residential space.
8. For assessments with missing data or data requiring revisions, the reviewer may be able to make the corrections without requiring another field visit. Between the initial data, the structure photographs, and the inspector notes or comments, a reviewer may be able to prepare the correct assessment.

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## SECTION 4 EXPORTING SDE DATA

SDE data can be exported from the *Main Menu* by selecting the *Import/Export Functions*, then choosing *Export SDE Data*, *Export Files to Excel*, or *Import/Export User Settings* (Figure 4-1). Data exported as an SDE database must be imported back into the SDE tool to either view the assessments or make edits. An export to Excel is a one-way data export because data edited within the Excel file cannot be imported back into the SDE tool unless the *Enterprise Import* function is used. A limited amount of data per assessment can also be exported as a georeferenced file for viewing in a geospatial image viewer.

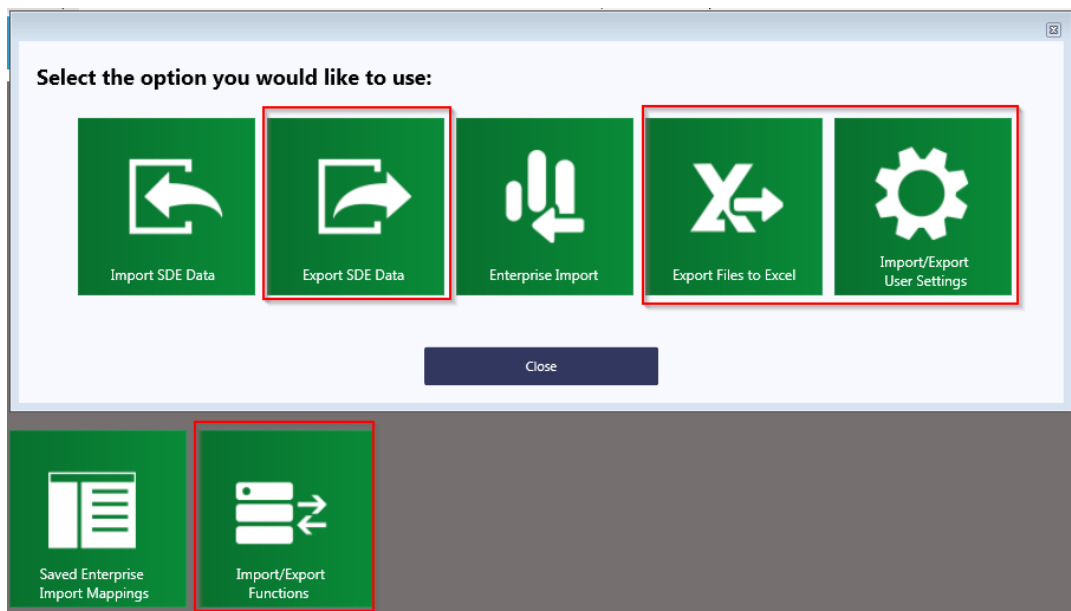


Figure 4-1: Export of SDE data

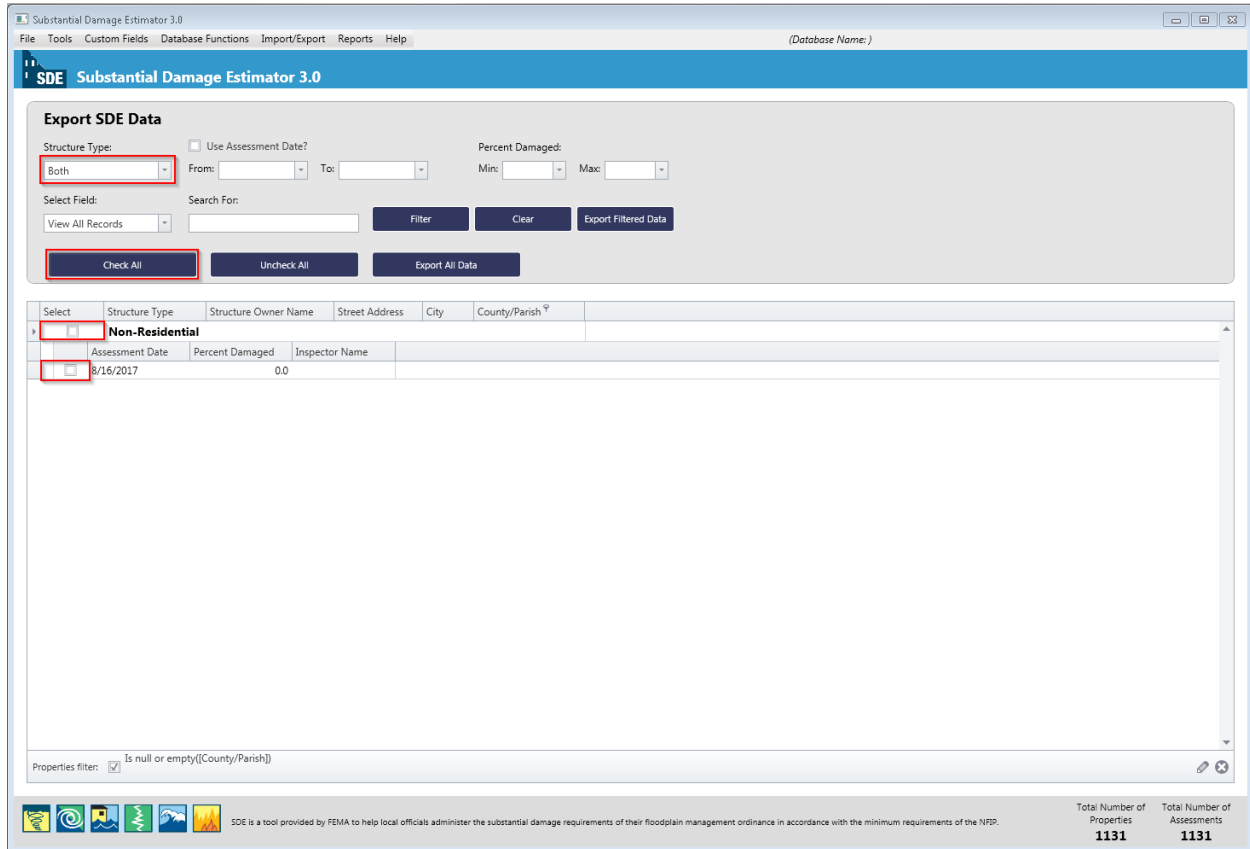
### 4.1 Exporting SDE Data

The *Export SDE Data* function allows assessment data to be exported from the tool and then imported back into the tool on the same or different computer. To export data, select the *Export SDE Data* button (Figure 4-1). This will open a window (Figure 4-2) that provides assessment filter criteria at the top. For large inventories of assessments, filters can be used to identify individual assessments for export by structure type, a range of inspection dates, a range of percent damaged values, and a search for names or values based on *Owner's Name*, *Building Address*, *City*, *NFIP Community Name*, *Zip Code*, *County/Parish*, *NFIP Community ID*, or *FIRM Panel*. The filter parameters are only in effect for the current view and are deleted when the view is closed or other filters are used. Select the *Clear* button before using new filters.

To view specific assessments for export, enter the filter information to view the desired assessments. To view all assessments in the database, select *Both* from the *Structure Type* drop-down list and leave the other fields blank. Once the filter fields have been entered, select the *Filter* button. All the assessments that meet the filter criteria will be available in the export view.

## Exporting SDE Data

The user should either select the **Check All** button for all assessments (and records) or select individual records of property data or assessments using the checkbox at the left end of the record or assessment row to be exported.



**Figure 4-2: Export SDE Data screen with filter and record options**

Once the desired property data and/or assessments have been checked, select the **Export** button. A window will open to allow the user to select a location on the host computer to save the exported file. Once the export is complete, a window will appear showing the file path and confirming that the files have been exported to a new folder called “SDE Assessments.” The user will then be returned to the SDE 3.0 **Main Menu**.

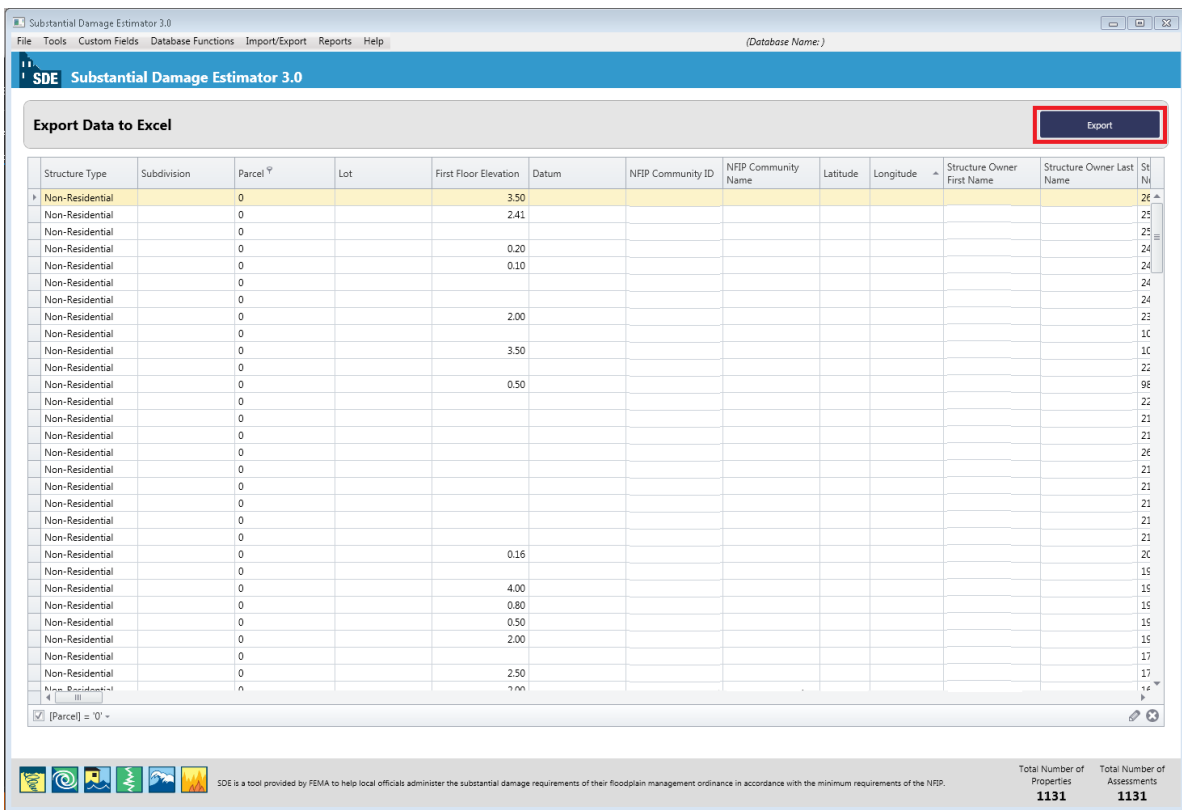
### Quick-Step Summary for Exporting Data in an SDE format:

1. Select the desired export function from the **Main Menu**; there are two import and two export options.
2. Select **Export SDE data** on the Export menu to open the Export SDE Data screen (Figure 4-2).
3. Enter or check all of the filter criteria first, and then select the **Filter** button.
4. Select the assessments (individual or all) to be exported based on the current filter(s).

5. Select the *Export* button.
6. The exported data will be sent to a user-selected folder on the host computer.

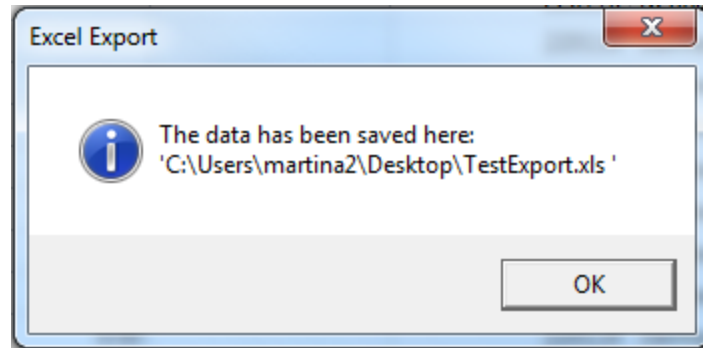
## 4.2 Exporting to Excel

The *Export Files to Excel* function allows the user to export all of the data located in the tool to an XLS file. When the user selects this function from the *Import/Export Functions* button (Figure 4-1), a new window will open (Figure 4-3). This window displays all of the records in the SDE database. The user can utilize the enhanced search features of the tool (refer to Section 3.12) to set a preferred record order or determine if any key data is missing prior to exporting the SDE database to Excel.



**Figure 4-3: Export Data to Excel window**

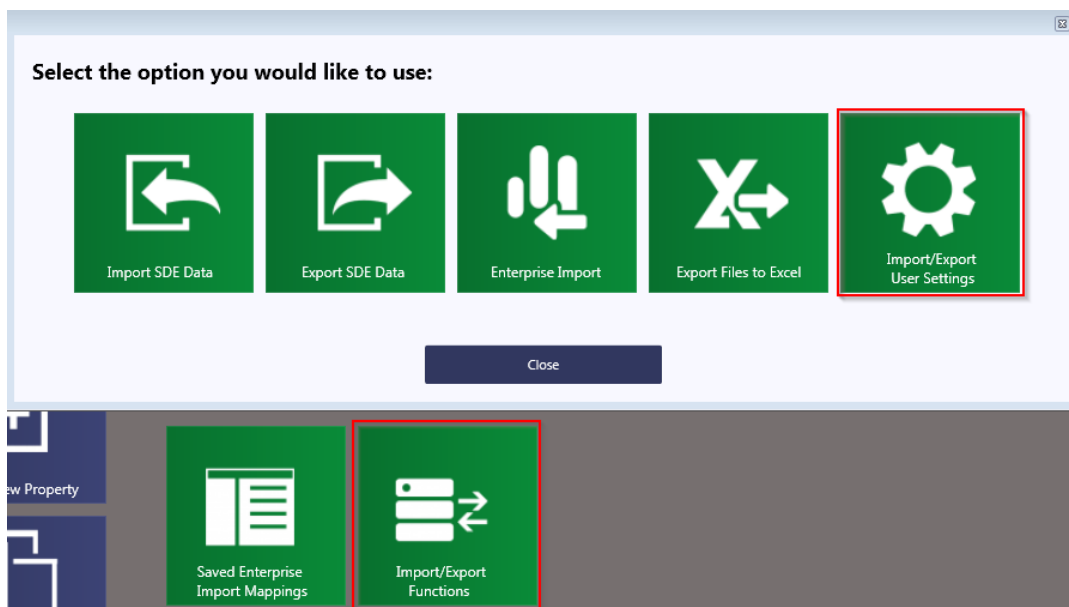
When the export is ready, the user will select the **Export** button in the upper right corner of this window to execute the export function. The user will be prompted to identify a destination folder on the computer for the export file. After the folder is identified, the user can select Save on the destination folder window and the export will begin. After the export is complete, a confirmation window will appear (Figure 4-4).



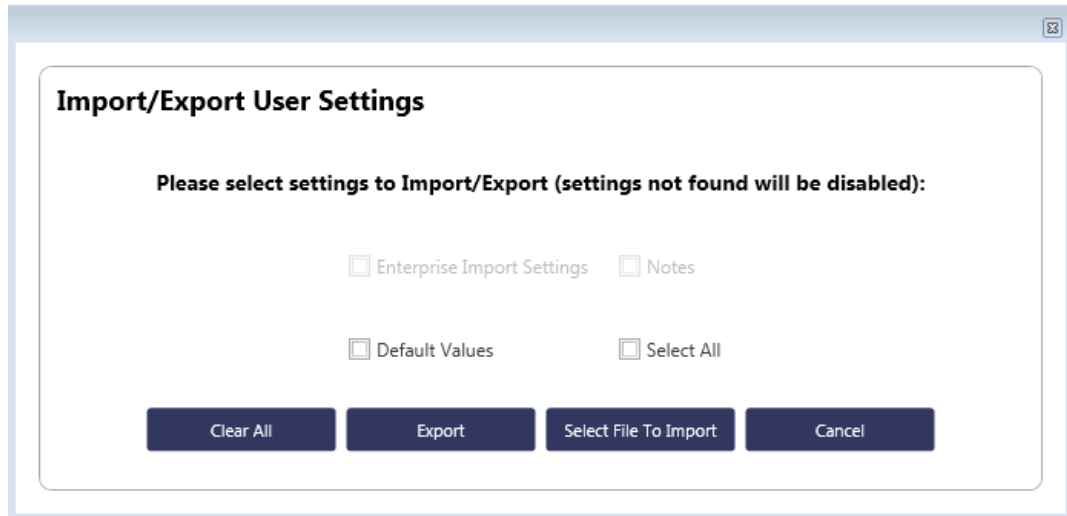
**Figure 4-4: Export Data to Excel confirmation**

### 4.3 Export User Settings

The *Import/Export User Settings* function in the SDE 3.0 Tool allows users to import or export their settings (refer to Section 3.7.5). In order for users to import their settings, they will need to select the *Import/Export Functions* button from the *Main Menu* (Figure 4-1), and then select the *Import/Export User Settings* option (Figure 4-5). The Import/Export User Settings window will appear, prompting the user to select the User Settings to either import or export (Figure 4-6).



**Figure 4-5: Import/Export for User Settings function**



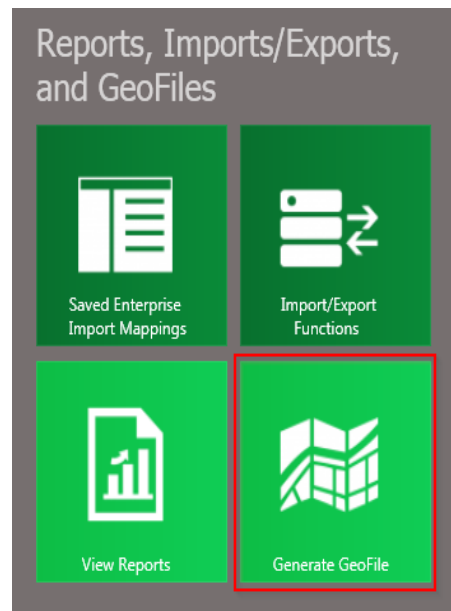
**Figure 4-6: Import/Export Options for User Settings**

Note that the user will only be able to export settings that are currently in the tool (i.e., if the user has not created Enterprise Import Settings but the tool finds Default Values and Notes, then the Enterprise Import Settings will be disabled). After selecting import or export, a window will appear and the user will need to identify the folder on the computer where the import file is located or the destination folder where the export file will be stored.

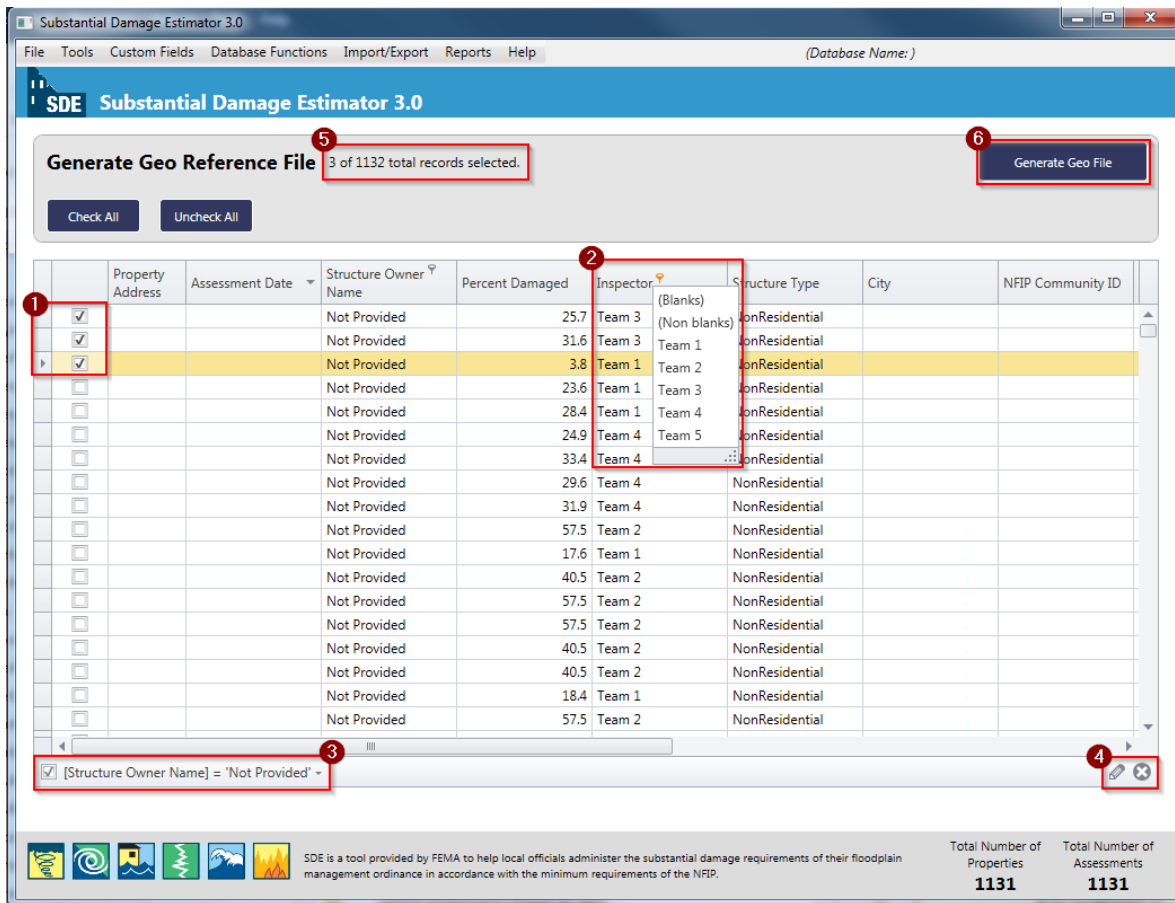
#### 4.4 Generating a Geo Reference File

A Keyhole Markup Language (KML) file is an extensible markup language (XML) file that can be used for geographic annotation by a geospatial image viewer that can show locations of GPS/GIS coordinates. A file with a .KMZ extension is a KML file that has been compressed (or zipped) to reduce the file size.

The SDE tool can generate a KMZ file and format place marks according to the degree of damage to a structure using KMZ's style capabilities. To generate a georeferenced file, select the **Generate GeoFile** function on the **Main Menu** (Figure 4-7). A window will appear for the user to select the filter criteria for the GeoFile (Figure 4-8).



**Figure 4-7: Generate GeoFile function**



**Figure 4-8: Generate Geo Reference File window**

Figure 4-8 shows the Generate Geo Reference File window options numbered according to the following list:

- 1 **Selections** – These boxes allow users to check the records to be included in the dataset for the geo reference file. There is also an option to Check All records for inclusion in the file.
- 2 **Data Sorts** –Data can be sorted by right clicking on the column header. This allows the user to group records by different values such as assessment date, percent damaged, inspector name or team number, etc. for checking records that meet specific criteria.
- 3 **Filter Status** – This feature shows which filters are currently turned on. Users can have multiple filters in use and this will alert them to how the data is being sorted.
- 4 **Filter Editor** – This feature opens a pop-up window that allows users to adjust the filters.
- 5 **Counts** – This feature provides a count of the records selected for the GeoFile.

- 6 Generate GeoFile** – This button allows users to create the georeferenced file based on the sorts and records selected for the GeoFile. Once selected, the tool will generate the georeferenced file and the KMZ file will be saved to the destination folder selected on the host computer. A window will open to confirm that the export was successful and display the KMZ file name.

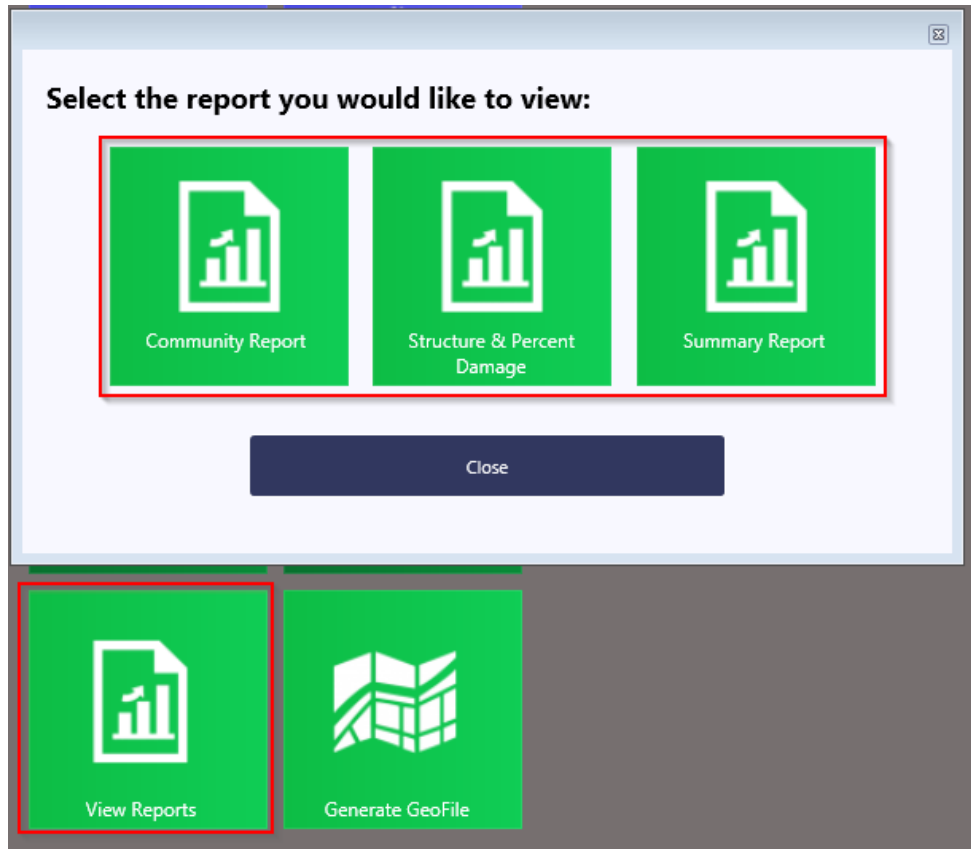
In the georeferenced file, place marks for residential properties appear at their respective latitude and longitude as either not substantially damaged (less than 50 percent damaged) or substantially damaged (50 percent or more damaged). Non-residential properties display as one of three types: not substantially damaged (0–40 percent damaged), possibly substantially damaged (40–60 percent damaged), or definitely substantially damaged (greater than 60 percent damaged). Place marks are color-coded: green for not substantially damaged, yellow for possibly substantially damaged, and red for substantially damaged structures.

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## SECTION 5 SDE REPORTS

The SDE tool can generate three primary report types that involve nine content options. These reports are pre-defined with a fixed format and can be accessed through the SDE *Main Menu* (Figure 5-1) by selecting the *View Reports* button. When *View Reports* is selected, the “Select the report you would like to view” window opens. After selecting a report, users have the option to either view or print the reports for all assessments in the inventory or for specific assessments using one or more of the available report filter criteria.



**Figure 5-1: Reports access on the Main Menu**

Table 5-1 identifies the three primary and one secondary report types and their contents.

**Table 5-1: SDE Report Types and Contents**

Report Type	Contents
Community Reports	<ul style="list-style-type: none"> <li>• All residential structures</li> <li>• All non-residential structures</li> <li>• All structures (both residential and non-residential)</li> </ul>

Report Type	Contents
Structure & Percent Damaged Reports	<ul style="list-style-type: none"> <li>All residential structures</li> <li>All non-residential structures</li> <li>All structures (both residential and non-residential)</li> </ul>
Summary Reports by Structure (from <i>Main Menu</i> )	<ul style="list-style-type: none"> <li>One-page summary reports for either all residential or non-residential structures</li> </ul>
Individual Structure Summary Reports (from <i>Output Summary</i> tab)	<ul style="list-style-type: none"> <li>Summary Report (one-page)</li> <li>Detailed Report (five-page)</li> </ul>

### 5.1 The Community and Structure & Percent Damaged Reports

The Community Report and the Structure & Percent Damaged Report can be accessed using the *View Reports* function of the *Main Menu*. These reports can be filtered beyond residential and non-residential structures to search for specific assessment dates, a range of damage between 0 percent and 100 percent (in 5 percent increments), specific names (owner, city, NFIP community, or county/parish), or specific numeric values (address, zip code, NFIP Community ID). The filter criteria are temporary and will only be active as long as the report is open in the tool. The reports will contain all assessments that meet the filter criteria selected by the user.

The Community and Structure & Percent Damaged Reports can be printed with or without structure photos. The without-structure photos option may be useful for large inventories of more than 200 structures because the data can be filtered and printed faster. In addition, both of these reports can be opened within the SDE tool and quickly scanned to verify that each assessment has at least one structure photograph. The reports contain all of the structures within the SDE inventory.

The Community Report contains the following data for each assessment summarized in the report:

- NFIP Community ID and Community Name
- Structure Address, City, State, and Zip Code
- Assessment Date
- Owner Name (last, first)
- Basis for Value of Structure (Computed Actual Cash Value, Adjusted Tax Assessed Value, or Professional Appraisal) and the value of the structure
- Basis for Cost of Repairs (Computed Damages, Contractor Estimate, or Community Estimate) and the value of the cost of repairs
- Computed ACV of the structure

#### Report Sharing

The Community and Structure & Percent Damaged Reports **should not be shared** with structure owners because the reports contain Substantial Damage data on all structures in the SDE inventory. Individual structure SDE data should not be shared with anyone but the structure owner or a designated representative.

- Type of Structure
- Percent Damaged
- Default Photograph (if available)

The Structure & Percent Damaged Report contains the following data for each assessment summarized in the report:

- NFIP Community ID and Community Name
- Structure Address, City, State, and Zip Code
- Assessment Date
- Owner Name (last, first)
- City and State
- County/Parish
- Percent Damaged
- Default Photograph (if available)

The Community and Structure & Percent Damaged Reports can be printed and used by community offices as quick references for Substantial Damage determinations and assessments that have been completed in the inventory.

## 5.2 Structure Summary Report

The Structure Summary Report can be accessed through either the *Main Menu* by selecting *View Reports* or the *Print Summary Report for this Structure* button at the lower right of the **Output Summary** tab. Accessing the Structure Summary Reports from the *Main Menu* allows for the batch printing of residential or non-residential one-page Summary Reports based on the available filters. The same one-page Summary Report can also be printed for a specific structure assessment that is open for review or editing from the print button on the **Output Summary** tab. The five-page detailed, individual Structure Summary Report can only be printed when an assessment is open.

The Summary Report involves a single structure and contains the following data organized by section name:

- **Subdivision information** – subdivision name, parcel number, lot number, elevation of the lowest floor, and datum
- **Community information** – NFIP community name, NFIP Community ID, and latitude and longitude
- **Structure Address** – owner name, structure address, and phone number

- **Structure Information** – year of construction, structure type, and initial construction quality
- **Damage Information** – date of assessment, inspector name and phone number, date of damage, cause of damage, duration of flood and units (hours or days), estimated depth of flood above lowest floor, and residence information notes (if available)
- **NFIP Information** – FIRM panel number, FIRM panel suffix, date of FIRM panel, FIRM zone, BFE, and regulatory floodway
- **Percent Damaged** – basis for the value of the structure and structure value, percent damaged, basis for the cost of repairs and the repair cost, and whether the structure is Substantially Damaged or Not Substantially Damaged
- **Damage Summary** – replacement cost, depreciation percentage, computed ACV (for the structure), computed damages, percent of existing improvements and repairs pre-disaster, and repair reconstruction percent
- **Optional User Entered Data** (if used) – professional appraisal, tax assessed value, tax adjustment factor, adjusted tax assessed value and the contractor or community estimate of repairs/improvements
- **Signature and Printed Name of Local Official**

### 5.3 Individual Structure Detailed Report

The five-page Detailed Report contains all the data entered into the assessment on the six tabs for the structure that is open for review or editing. The *Print Detailed Report for this structure* button can be found at the bottom right of the **Output Summary** tab, just below the print button for the one-page Summary Report.

### 5.4 Use of SDE Reports

Communities are encouraged to share either the one-page individual structure Summary Report or the five-page individual structure Detailed Report with the respective structure owners or their representatives. The reports:

1. Identify the elements that were damaged
2. Identify the degree of damage per element
3. Provide a complete summary of evaluations that can be included with Substantial Damage determination letters to structure owners
4. Verify community adherence to the NFIP regulations
5. Can be used as support for ICC claims by structure owners
6. Demonstrate that the SDE inspection process is formalized and thorough
7. Support permit applications for structure repair

8. Demonstrate community evidence for Substantial Damage determinations challenged by structure owners
9. Help track cumulative Substantial Damage for individual structures from multiple events

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# Substantial Damage Estimator (SDE) Field Workbook

Preparing Structure Inventories  
Using the SDE Tool

FEMA P-784 / Tool Version 3.0 / August 2017




**FEMA**



**Substantial  
SDE Damage  
Estimator**

The SDE is a tool to help local officials administer the Substantial Damage requirements of their floodplain management ordinances in keeping with the minimum requirements of the NFIP.



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## ACRONYMS AND ABBREVIATIONS

ACV	Actual Cash Value
BFE	base flood elevation
CID	(NFIP) Community Identification Number
CMU	concrete masonry unit
EIFS	exterior insulation finishing system
FAQs	Frequently Asked Questions
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
GIS	geographic information system
GPS	global positioning system
HVAC	heating, ventilation, and air-conditioning
ICF	Insulating Concrete Form
KML	Keyhole Markup Language
MB	megabyte
MH	manufactured house
NFIP	National Flood Insurance Program
PII	Personal Identifiable Information
POC	point-of-contact
QA	Quality Assurance
SDE	Substantial Damage Estimator
SF	single-family
SFHA	Special Flood Hazard Area
URM	unreinforced masonry

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## SECTION 6      WORKBOOK INTRODUCTION

Repairing or improving existing structures provides a unique opportunity for floodplain management programs to reduce the risk of flood damage to the structures. More than 22,000 communities currently participate in the National Flood Insurance Program (NFIP), which requires adopting and enforcing regulations and the latest codes that apply to development in Special Flood Hazard Areas (SFHAs). Local floodplain management regulations and codes contain minimum NFIP requirements not only for new structures, but also for existing structures with proposed Substantial Improvement or repair of Substantial Damage.

This workbook provides guidance, including recommended procedures, on collecting data on structures that may be either substantially damaged or substantially improved. The workbook should be used in conjunction with the following:

- **Substantial Damage Estimator (SDE) Version 3.0 Tool (2017).** The SDE tool was developed by FEMA to help State and local officials determine whether the damage to a structure qualifies as Substantial Damage, as defined in 44 CFR § 59.1, in accordance with local floodplain management ordinances that meet the requirements of the NFIP. The data that are collected and entered into the SDE tool can be used to develop an inventory of substantially damaged residential and non-residential structures. The SDE tool is available at <https://www.fema.gov/media-library/assets/documents/18692>.
- **FEMA P-758, *Substantial Improvement/Substantial Damage Desk Reference* (2010).** The Substantial Improvement/Substantial Damage Desk Reference provides practical guidance and suggested procedures to implement the NFIP requirements for Substantial Improvement /Damage. The desk reference is available at <https://www.fema.gov/media-library/assets/documents/18562?id=4160>

### 6.1 Workbook Purpose and Contents

The purpose of this workbook is to provide guidance on collecting field data to develop an inventory of substantially damaged structures after a damage event or disaster.

The procedures described in this workbook provide information and details to the procedures on the activities required in collecting SDE data and coordinating post-disaster collection activities at the community level. The activities are as follows:

- Post-disaster SDE inventory preparations
- SDE field preparations
- Collecting and recording SDE data
- Evaluating attributes for residential and non-residential structures
- Post-determination activities for community officials

### 6.2 Intended Users

This workbook is intended for local officials who are responsible for administering local codes and ordinances, including Substantial Improvement/Damage requirements, and for State officials who provide NFIP technical assistance to communities. Others who may benefit from the workbook include county/parish officials, consultants, surveyors, and FEMA disaster assistance employees.

Local officials should have a working knowledge of the NFIP requirements for substantially damaged structures and be familiar with the SDE tool, including data requirements and Damage Inspection Worksheets; guidance on the use of the SDE tool is summarized in Sections 9 and 10 of this workbook. More information is available through the FEMA Regional Office (see Appendix A for contact information).

Users of this workbook are assumed to be familiar with the SDE tool.

### 6.3 Resources

One useful document relative to evaluating Substantial Damage is FEMA's *Answers to Questions about Substantially Damaged Buildings* (1991), a guidance document on complying with NFIP regulations and policy governing substantially damaged structures. Table 6-1 provides a list of Substantial Improvement/Damage documents on the FEMA website. If the web links in Table 6-1 are updated in the future, users can go to the FEMA website at: <http://www.fema.gov> and search for "SDE" or "Building Science" to find the publications listed.

**Table 6-1: FEMA SDE Resources**

Source	Location
FEMA Website	<a href="http://www.fema.gov">www.fema.gov</a> (search on SDE)
Substantial Improvement Policy, Regulatory and Guidance Information (Note that the data and the regulatory requirements for Substantial Damage and Substantial Improvement determinations are the same.)	<a href="https://www.fema.gov/floodplain-management-old/substantial-improvement">https://www.fema.gov/floodplain-management-old/substantial-improvement</a>
FEMA P-784, Substantial Damage Estimator (SDE) User Manual and Workbook: Using the SDE Tool to Perform Substantial Damage Determinations (2017)	<a href="http://www.fema.gov/media-library/assets/documents/18692">http://www.fema.gov/media-library/assets/documents/18692</a>
Read Me Installation Instructions	<a href="http://www.fema.gov/media-library-data/1443633249034-367ae5ddcd208ff4da8e493e6e9f803b/Read_Me_-_SDE_3.0_Tool_Installation_Guide.pdf">http://www.fema.gov/media-library-data/1443633249034-367ae5ddcd208ff4da8e493e6e9f803b/Read_Me_-_SDE_3.0_Tool_Installation_Guide.pdf</a>



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<b>Source</b>	<b>Location</b>
Residential Inspection forms (manual)	<a href="http://www.fema.gov/media-library-data/20130726-1735-25045-4671/sde_damage_inspection_worksheets_residential.pdf">http://www.fema.gov/media-library-data/20130726-1735-25045-4671/sde_damage_inspection_worksheets_residential.pdf</a>
Non-residential Inspection forms (manual)	<a href="http://www.fema.gov/media-library-data/20130726-1735-25045-6516/sde_damage_inspection_worksheets_non_residential.pdf">http://www.fema.gov/media-library-data/20130726-1735-25045-6516/sde_damage_inspection_worksheets_non_residential.pdf</a>
Substantial Damage Estimator Best Practices (2017)	<a href="https://www.fema.gov/media-library/assets/documents/26753">https://www.fema.gov/media-library/assets/documents/26753</a>
FEMA 213, Answers to Questions About Substantially Damaged Buildings (1991)	<a href="https://www.fema.gov/media-library/assets/documents/2969">https://www.fema.gov/media-library/assets/documents/2969</a>
SDE Frequently Asked Questions (FAQs) (found on the FEMA Building Science webpage)	<a href="http://www.fema.gov/frequently-asked-questions-building-science">http://www.fema.gov/frequently-asked-questions-building-science</a>
FEMA P-758, Substantial Improvement / Substantial Damage Desk Reference (2010)	<a href="https://www.fema.gov/media-library/assets/documents/18562">https://www.fema.gov/media-library/assets/documents/18562</a>
FEMA Building Science webpages	<a href="https://www.fema.gov/building-science">https://www.fema.gov/building-science</a>

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### SECTION 7 POST-DISASTER SDE INVENTORY PREPARATIONS

After recovering from the initial shock of the disaster, homeowners will be anxious to begin salvaging and reconstructing their homes. Non-residential structure owners and occupants will want to restart operations, business functions, and other activities and will be eager to begin cleanup, repairs, and renovations. Structure owners are not normally aware of the NFIP Substantial Damage requirements or the potential impact of the requirements on their repairs unless they have been through a disaster before, and they may prematurely start making repairs or hiring contractors 1 or 2 days after the disaster.

Starting reconstruction before a Substantial Damage inspection has been completed and approved can potentially result in the following problems:

- Substantially damaged structures are reconstructed in violation of the local floodplain management ordinance.
- Structure owners repair a structure in violation of other local code requirements.
- The extent of the damage may have exceeded the demolition threshold or made the structure uninhabitable.
- Structure owners that begin repairs prior to a Substantial Damage determination or without a locally required permit may be required to remove repairs at their own cost. In addition, the owners may also incur fines for unpermitted or non-compliant construction.
- Reconstruction of structures may involve a combination of new construction and repairs that equals or exceeds the 50 percent threshold for Substantial Damage or Substantial Improvement even though they were not substantially damaged.
- Local officials cannot distinguish between undamaged portions of the structure, repairs, and new construction.

Consequently, local officials should initiate evaluations for Substantial Damage determinations as soon as possible after the disaster and no later than 2 weeks after the disaster. If this is not possible because of competing recovery interests, excessive amounts of debris, or lack of staff, officials need to alert structure owners in the damaged areas that permits must be obtained (if required by local building codes or floodplain ordinances) or Substantial Damage determinations must be made before repairs or reconstruction can begin.

Before the Substantial Damage inspections are conducted, planning for the inspections will help ensure that they are effective and conducted as efficiently as possible. The five steps involved in Substantial Damage inspection planning are shown in Figure 7-1 and described in Sections 7.1 through 7.5. One person or multiple teams of one or two people can complete the steps.

#### **Substantial Damage Requirements**

The NFIP requirement for post-disaster Substantial Damage determinations only applies to structures located within the SFHA or 100-year floodplain on the community's Flood Insurance Rate Map (FIRM).



**Figure 7-1: Five steps for post-disaster SDE inventory preparations**

## 7.1 STEP 1: Select an SDE Manager

The community should designate an SDE Manager before Substantial Damage data collection is initiated. Table 7-1 lists the SDE Manager’s seven key responsibilities and the corresponding sections that describe the responsibilities.

**Table 7-1: SDE Manager’s Responsibilities**

Responsibility	Workbook Section
1. Identify available resources.	Section 8.1
2. Notify elected officials and community departments, including fire, police, and emergency services, planning, and building of the upcoming fieldwork.	Section 8.1.1
3. Plan the Substantial Damage field inspections.	Section 8.3
4. Organize and train the inspectors.	Section 9.1
5. Supervise field operations.	Sections 9.6 and 9.7
6. Ensure follow-up coordination with structure owners is completed.	Section 11
7. Coordinate final storage of SDE files.	Section 11.3

**Action:** Select an SDE Manager who is familiar with the community. The manager may be a local floodplain management official, chief building inspector, head of the permitting department, or staff member. The SDE Manager should be involved in Steps 2 through 5.

## 7.2 STEP 2: Identify General Limits of the Inventory Area

The next step is to identify the general limits of the inventory area. This may not include all structures damaged during a disaster because some may be located outside the SFHA.

**Action:** Delineate the general limits of the inventory area (Figure 7-2) on a community map that has address information, tax parcel, or property boundaries and the SFHA boundaries (refer to Section 8.1.2). Only the properties with boundaries that overlap with the SFHA should be considered for inspection.

### 7.3 STEP 3: Perform an Initial Screening of Structures in the Inventory Area

When the general limits of the inventory area have been delineated, an initial screening of the structures in the area can be conducted. Consider the following:

- Only structures in the SFHA require evaluation for Substantial Damage.
- Structures damaged between 50 and 100 percent are considered substantially damaged and are required to be brought into compliance with both the local building code and the local floodplain development regulations. A structure that is damaged to 55 percent of its structure value is not treated differently than a structure that is 90 percent damaged in terms of floodplain development regulations;
- Structures damaged between 0 and 49 percent will not be subject to rebuilding requirements triggered by a Substantial Damage declaration. A structure that is damaged to 45 percent of its structure value is not treated differently than a structure that is 10 percent damaged in terms of floodplain development regulations.
- Structures that are not substantially damaged are still subject to all repair and replacement requirements of the local building code.

Tailoring the field inspections to use the available community resources most effectively is recommended as follows:

- Inspect only structures in the SFHA for damage.
- Estimate the total number of damaged structures within the SFHA throughout the community. This activity plus the available number of staff for inspections will help the SDE Manager to estimate a target completion date for the SDE inventory.
- If the number of inspections required greatly exceeds the community resources, the community may want to request inspection assistance from neighboring communities, the State, or the FEMA Regional Office.



**Figure 7-2: Delineating the general limits of the inventory area**

The community is encouraged to include all damaged structures within the SFHA in the SDE inventory for inventory completeness and documentation purposes.

## Post-Disaster SDE Inventory Preparations

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The data collected in Step 3 will help define the scope of the field inspection and the number of days that are needed to complete the SDE inventory.

**Actions:** Complete the following two actions for the area(s) that was delineated in Step 2. The action items are described in more detail in Sections 7.3.1 and 7.3.2.

- Collect the following flood information:
  - Depth of flooding above the first floor
  - Duration of flooding (if applicable)
- Perform a curbside screening of damaged structures
  - Count the total number of damaged structures
  - Approximate the degree of damage to structures, based on the depth and duration of flooding above the first floor
  - Refine the boundaries of area(s) needing field inspections

### 7.3.1 Collect Flood Information

The duration and depth of flooding above the lowest floor affect the amount of structure damage. A structure with a flood depth of 5 feet and duration of 0.5 day may have less damage than a structure that had only 1 foot of water for 4 days. The average depth and duration of floodwaters in the damaged area(s) should be determined during curbside screening based on visible observations of high water marks on structures or debris/dirt lines on adjacent vegetation or fences.

### 7.3.2 Perform Curbside Field Screening

A curbside field screening consists of the following actions:

- **Estimate the number of damaged structures:** Estimate the total number of structures that have been damaged by driving through all the damaged areas. This value does not need to be an exact count.
- **Evaluate damage to structures:** Determine the approximate percentage of damage by walking or driving through the damaged area(s), using the community Flood Insurance Rate Map (FIRM) data (prepared in Step 2). The SDE Manager or an inspection team can do this. A preliminary evaluation of several representative structures may be necessary to determine the average interior flood depth and extent of damage to structures in the area (Figure 7-3). Evaluating the damage to structures before



**Figure 7-3: Screening the exterior of a damaged structure**

they are inspected allows communities to determine where more inspection resources are needed.

For planning purposes, use the following criteria to estimate damage based on rapid, visual evaluations from the exterior of the structures:

- **25 percent or less damage:** Damage to a structure is most likely around 25 percent or less damaged if the interior flood height was 1 foot or less above the lowest floor, the flood duration was less than 1 day, floodwater velocities were relatively low (less than 5 feet/second), and the structure and its foundation, exterior walls, and roof are in good condition. Flood depth can often be approximated by a curbside examination of neighborhoods. If needed, the percent damage can be verified and documented by conducting a few preliminary inspections and using the SDE tool.
- **75 percent or more damage:** A structure is likely to be substantially damaged if there is obvious exterior damage to the foundation, exterior walls, or roof. An example of this may be a structure that has shifted off the foundation and the walls appear to be leaning, indicating the structure has experienced significant structural damage.
- **Damage to manufactured housing:** In manufactured housing, interior flood depths of 6 inches or more may be considered substantially damaged and result in a total loss. This is because the utilities in manufactured housing run along the underside of the floor and the flooring system provides much of the structural support for the entire structure.
- **Determine whether representative inspections are appropriate:** Representative inspections can be performed in areas where structures have the following characteristics:
  1. Same general structure (same number of stories, similar square footage, same building materials, and same foundation type)
  2. Similar quality
  3. Flat or similar topography around the structures
  4. Similar lowest floor elevation (within approximately 0.5 foot)
  5. Similar flood depth above the lowest floor (depth within approximately 0.5 feet)
  6. Similar flood conditions (duration and velocity)

If all of these conditions exist, a representative inspection can be used for all Substantial Damage determinations on the street or within a subdivision or neighborhood. The community should document that all the conditions are met.

- **Refine delineation of the SDE inventory area(s):** Based on the curbside screening described above, refine the area(s) to be included in the field inspections using the map prepared in Step 2. The size and building density of the areas with damaged structures affects the time needed to collect the field data. For example, inspecting 25 residential

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structures dispersed among three sprawling subdivisions may take more time than inspecting 40 residential structures in a single, dense subdivision.

The inventory map should differentiate the areas with structures that are 25 percent or more damaged to allow the most time for the inspection of these structures.

### **7.4 STEP 4: Define the Scope of the Inventory**

After the initial screening described in Step 3 is performed, the scope of the inventory can be determined. The scope is based on the size of inventory area, number of structures, and number of days needed for the inspections.

**Action:** Calculate the number of days it will take to collect the data based on the number of structures to inspect and the number of available inspectors, using two inspectors per team. The inspection rate for non-residential structures is likely to vary depending on the size of the structures (number of stories and square footage) and the complexity of the structure (shape, utility systems). After several inspections, the inspectors should have a sense for the time needed to complete an inspection (exclusive of travel time between structures).

A general estimate for the number of residential inspections per two-person team per day is 20 to 35 for areas where the inspectors can walk between structures. Teams may be able to do more inspections per day in areas that are very flat, with homes close to each other, and housing that is similar in size and flood damage.

If any teams are consistently well below or above the other teams in terms of the number of completed residential inspections per day, the SDE Manager may want to accompany the teams in the field to determine whether they are following the inspection protocols. The teams could be trying to be too precise and taking too much time per inspection or rushing through each structure and not fully capturing all the data required for a valid SDE assessment (refer to Section 3).

Depending on the size, location, complexity, and uses of the non-residential structures, the inspection rate per day could vary from 3 to 15 inspections. If there are a limited number of non-residential structures to inspect, the SDE Manager could designate one team for all or most of the non-residential inspections.

The initial screening should also identify areas that may either need to be left until later or require coordination and approval for entrance into the area. Areas with standing water, heavy debris, or downed power lines should be put aside until access is available. Other areas such as gated communities, industrial sites, schools, or State or Federal facilities will require advance notice, coordination, and approval before the inspections can be started.

### **7.5 STEP 5: Finalize Planning**

The advance planning for the SDE data collection, including a schedule and sequence of areas to be inspected, will help the SDE Manager and the Inspection, Data, and Quality Assurance (QA) leads stay on track and identify potential problems before they arise.



### 7.5.1 Final Plan for Data Collection

A well-planned data collection effort will increase the efficiency of the inspectors while ensuring the accuracy and consistency of the data.

**Action:** Complete the following five tasks using all of the data collected so far:

- **Task 1.** Determine whether the inspectors will be entering data directly into the SDE tool in the field via a tablet or laptop or recording data on the SDE worksheets for data entry later that day into the SDE tool by either the inspectors or other staff.
- **Task 2.** Divide the identified damage areas among the teams and plan the approximate sequence of inspections using the best available community map that includes the SFHA boundaries. The route and team assignments can be made on a block-by-block, neighborhood, or subdivision basis. When laying out a data collection route, it is important to ensure that:
  - Assignments include all areas in the SFHA with potential damage
  - There are no gaps in data collection, particularly at the end of a block where structures face a cross street
  - There are no overlaps in data collection to avoid different inspection teams inspecting the same structures
  - The route is determined in a logical sequence to reduce travel time and facilitate data collection and entry
- **Task 3.** Prepare guidance and any training materials, including an adequate supply of Damage Inspection Worksheets if that is the selected method for data collection, for the inspectors. Training should include:
  1. Group pilot inspections for up to three residential structures and three non-residential structures to familiarize the inspectors with the required data using either the SDE Damage Inspection Worksheets or the SDE tool.
  2. Discussion of the differences between residential and non-residential assessments and the data required for each.
  3. Discussion of the benefits of using the default data option in the SDE tool. The benefits include reduced data entry and increased data consistency and quality.
  4. A review of the typical structure foundation types in the inventory area.
  5. An explanation of the photograph requirements and the differences between good and unusable photographs.
  6. Verification that the inspectors know what camera settings they should be using to reduce photograph and data storage requirements.
  7. A review of the correct procedures for calibrating global positioning system (GPS) units and obtaining GPS coordinate data.

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8. An explanation that GPS coordinates obtained from tablets, cell phones, or cameras is not a substitute for coordinates obtained using a quality hand-held GPS unit in the proper manner.
  9. A review of the data required for a valid assessment.
  10. Guidance for resident and occupant interaction (Section 9.9).
  11. Reference to the guidance documents in Appendix E (Residential Structures) and Appendix F (Non-Residential Structures) for completing the exterior and interior inspections.
- **Task 4.** Identify all tools and resources that are needed and assign someone to begin collecting and organizing these items (Section 8.1).
  - **Task 5.** Pre-load available tax or other structure data into the SDE tool to reduce data entry by the inspectors as well as the chance of errors from manually entered assessment data.

### 7.5.2 Final Field Plan

The SDE Manager is responsible for developing a final field plan.

**Action:** Develop a final field plan that includes the following:

1. Numbers and locations of structures to be inspected
2. Delineation of inspection boundaries on a FIRM or community map
3. Sequence of inspections
4. Inspection team assignments by area
5. Guidance materials for inspectors
6. Guidance on resident interaction
7. Instructions for obtaining photographs and GPS coordinate data

## SECTION 8 SDE FIELD PREPARATIONS

As described in Section 7.2, the scope of the inventory must be defined before inspection teams are assigned to the field. Preparations for the SDE fieldwork include notifying the local fire, police, and emergency management agencies of the purpose and proposed dates of inspections before ANY field inspections are conducted. It is also recommended that the community issue a press release providing the reasons for the inspections, the inspection process, hours of operation, and a community contact. The SDE Manager should complete these tasks or ensure that they have been completed.

Section 8 discusses the following preparations for the SDE field inspections:

1. Identifying available resources
2. Planning for resource requirements
3. Identifying sources for base cost and structure value data
4. Planning for SDE data collection, data entry, and QA reviews of the data

### 8.1 Identifying Available Resources

After reviewing the data requirements in the SDE tool and Sections 1 through 5, the User Manual, the SDE Manager should identify the local resources that will be needed to collect field data and prepare Substantial Damage determinations. Local resources include property and structure data, floodplain boundary information, SDE two-person inspection teams, and other project team members. Table 8-1 lists data potentially available from tax records. Not all structure and other needed SDE data are readily available after a disaster. Therefore, it may be worthwhile to meet with the tax assessor as soon as possible to discuss the SDE data needs and the format of the available tax data while also determining how much time the assessor's office will require to provide the requested data.

To determine the number of two-person inspection teams needed for data collection, the SDE Manager must estimate the size of the inventory, the number of inspections a team can complete per day (20 to 35 per team, for residential inspections depending on structure type and development density), and the target date for completion of the fieldwork. If local staffing resources are insufficient to complete the required number of inspections by a particular date, the SDE Manager should obtain additional staff from the county/parish or nearby communities or extend the completion date.

Identifying available resources also includes:

1. Designating the SDE inspection, non-field SDE data, and QA review leads.
2. Identifying the points-of-contact (POCs) for police and local officials.
3. Reviewing FIRMs and other maps for floodplain boundary, street, and structure locations.
4. Compiling tax data (if available) and reviewing how to use it with the inspectors.

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5. Pre-loading available structure data into the SDE tool.

These tasks are further described in the following subsections.

**Table 8-1: Potential Tax Data Used in the SDE Tool**

<b>Category</b>	<b>Data</b>
Owner and Structure Location	<ul style="list-style-type: none"><li>• Owner's first and last name</li><li>• Owner's telephone number</li><li>• Community name</li><li>• Zip code</li><li>• Official structure address</li><li>• Owner's mailing address if different from structure address</li><li>• County/parish name (for multiple communities in the same county/parish)</li><li>• Lot and parcel number</li></ul>
Structure Information	<ul style="list-style-type: none"><li>• Date of construction</li><li>• Date of improvements requiring building permits</li><li>• Number of dwelling units on the property</li><li>• Habitable area (in square feet) per structure</li><li>• Structure use (e.g., single-family home, manufactured housing, commercial use, public building)</li><li>• Structure style (number of stories, with or without basement)</li><li>• Construction type (e.g., wood frame, masonry)</li><li>• Foundation type</li><li>• Exterior material type (e.g., vinyl siding, brick veneer)</li><li>• Attached or detached garage</li><li>• Other structures on the same lot</li></ul>
Assessed Building Value	<ul style="list-style-type: none"><li>• Adjusted tax assessed structure value</li><li>• Date of last tax adjustment (to verify validity of the adjusted tax assessed value)</li></ul>

### 8.1.1 Selecting SDE Inspection, Data and QA Review Leads

In addition to selecting the SDE Manager, the community needs to select the leads for inspections, non-field SDE data, and QA reviews. In addition, the POCs for the police and other departments that should be aware of the inspections should be advised of the need for the inspections, the inspection areas, and the proposed schedule. Table 8-2 lists the roles and responsibilities for SDE data collection.

**Table 8-2: Roles and Responsibilities for SDE Data Collection**

Roles	Responsibilities
SDE Manager	<ol style="list-style-type: none"> <li>1. Overall responsibility for completing the SDE Assessments.</li> <li>2. Understand the NFIP requirements for making the Substantial Damage determinations, how to use the SDE tool, and the data required for a valid SDE assessment.</li> <li>3. Determine which of the three options for structure value and the three options for damage amounts will be used in making the Substantial Damage determinations.</li> <li>4. Identify the structures and areas to be inspected and the duration of the field data collection.</li> <li>5. Identify inspection areas that will require coordination and potential approval for the inspectors to be allowed access to the property.</li> <li>6. Determine the daily work hours and the number of days per week (5, 6, or 7) that inspections will be conducted.</li> <li>7. Select the SDE inspection, data, and QA review leads.</li> <li>8. Coordinate with elected officials, police, and other community departments as needed.</li> <li>9. Coordinate with local media (newspapers, radio, and TV) so citizens are aware of the requirement for SDE inspections and how the process will work.</li> <li>10. Prepare a one-page Letter of Introduction, printed on community letterhead and containing a designated community SDE POC (usually the SDE Manager) for inspectors to provide to structure owners during inspections.</li> <li>11. Determine the source of the base cost data used to estimate residential and non-residential structure values.</li> <li>12. Prepare and train inspectors for SDE inspections and data recordation in the SDE tool.</li> <li>13. Review the different types of foundations in the community with the inspectors.</li> <li>14. Identify any local or unique construction designs or materials not covered by the SDE tool and explain how these should be addressed in the tool.</li> <li>15. Identify potential weather conditions that could impact the inspectors; provide some procedures and guidance for dealing with the weather and determining when to suspend inspections temporarily. The weather conditions could include extreme heat, cold, rain, lightning, snow, and high winds.</li> <li>16. Develop a health and safety plan and the procedures to follow if anyone is injured in the field.</li> <li>17. Coordinate with community enforcement official to inform the structure owners about the results of the Substantial Damage inspections. Letters should be mailed to the owners to provide the determination (substantially damaged or not substantially damaged), the options and requirements for an owner's appeal, and the actions, including the need for permits, that the owner must take before starting repairs.</li> </ol>

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Roles	Responsibilities
SDE Inspection Lead	<ol style="list-style-type: none"> <li>1. Understand the NFIP requirements for making the Substantial Damage determinations, use of the SDE tool, and the data required for a valid SDE assessment.</li> <li>2. Coordinate the collection of all field materials, including laptop computers or tablets, maps of the SDE inspection areas, lists of SDE team and emergency contacts, vehicles, digital cameras, GPS units, safety equipment, copies of the health and safety plan, and field supplies needed to complete the required inspections.</li> <li>3. Verify the daily work hours and the number of days per week (5, 6, or 7) that inspections will be conducted.</li> <li>4. If designated by the SDE Manager, coordinate with elected officials, police, and other community departments as the inspections move forward.</li> <li>5. Verify that the procedures and requirements developed by the SDE Manager for potential data issues are being followed in the field.</li> <li>6. Determine where each inspection team will be working every day and track their progress.</li> <li>7. Work with the SDE inspectors to verify that required data are being obtained in the field, recorded correctly in the SDE tool, and that the data are at the required level of detail to meet the SDE Manager's objectives.</li> <li>8. Verify that structures affected by the same flood depth above the lowest floor have similar and reasonable damage, especially in areas with little change in ground elevations. This can be performed quickly by checking the Depth of Flood Above Lowest floor.</li> <li>9. Verify that inspectors are correctly identifying the different types of foundations in the community.</li> <li>10. Discuss new or unusual inspection issues with the SDE Manager and then coordinate on how to address these issues with the inspectors.</li> <li>11. Identify inaccessible areas or areas requiring prior approval not previously identified by the SDE Manager. Collect relevant data such as street, subdivision or neighborhood names, POC information, normal operating hours, and the potential level of damage for these areas.</li> </ol>
SDE Data Lead	<ol style="list-style-type: none"> <li>1. Coordinate with the SDE Manager and the local tax department or other community departments to obtain structure data that can be pre-loaded into the SDE tool to reduce data entry requirements while enhancing data consistency and improving data quality.</li> <li>2. Pre-load all available data into the SDE tool.</li> <li>3. Coordinate the base cost values for residential, manufactured housing, and non-residential structures. If needed, develop tables of base costs that vary by the number of stories, the square footage, structure type, or the quality of the initial construction.</li> <li>4. Coordinate with the SDE Inspection Lead and the inspectors to verify that the data collected are consistent and conform to the requirements of the SDE Manager.</li> </ol>

Roles	Responsibilities
QA Review Lead	<ol style="list-style-type: none"> <li>1. Responsible for the overall quality and consistency of the SDE data that the Substantial Damage determinations will be based on.</li> <li>2. Immediately review the inspections by every team for the first 1 to 3 days to verify that the inspectors are:               <ol style="list-style-type: none"> <li>a. Obtaining and recording the correct data</li> <li>b. Entering the data properly into the SDE tool</li> <li>c. Preparing valid SDE assessments</li> <li>d. Understanding the differences between residential and non-residential in the SDE forms</li> <li>e. Obtaining photographs and GPS coordinates correctly.</li> <li>f. Saving the assessments correctly (i.e., none of the assessments show “Data Entry Incomplete” where the structure percent damaged should be)</li> <li>g. Collecting data consistent with the other teams</li> </ol> <p><b>Note:</b> Errors that are not caught in the first 2 to 3 days of inspections will multiply rapidly and can easily require a significant amount of time to correct.</p> </li> <li>3. Identify the QA review procedures, QA staff, and the level of detail that will be used for the QA reviews. The reviews could consist of spot checks, the review of every fourth or fifth assessment, or reviews of every assessment.</li> <li>4. Identify procedures for revising incorrect data.</li> <li>5. Identify errors that require a return site visit.</li> <li>6. Identify critical or unique data that requires additional attention during the QA reviews.</li> </ol>

The size of the inventory may require additional resources for data support and QA reviews. Variations in quality and consistency of the data can affect the credibility of the SDE data for local officials and structure owners.

The SDE Manager or Inspection Lead should explain to the police POC the purpose of the SDE inspections, inspection format (exterior and interior evaluations of damage), number of teams in the field each day, and provide a copy of the letter of introduction and the type of identification the teams will carry.

### 8.1.2 Reviewing FIRMs and Other Community Maps to Prepare Maps Showing Current Floodplain and Street Data

Local officials should be familiar with areas of their community that are floodprone or involve repetitive flood loss areas. *Floodprone* refers to all areas within the SFHA on the community’s FIRM or other flood inundation maps prepared by Federal, State, or local agencies. *Repetitive loss areas* are the areas of the community, either inside or outside the SFHA that have flooded two or more times.

Flooding can, and does, occur outside the SFHAs shown on the community’s FIRM, for the following reasons:

- The FIRM is outdated and does not reflect increases in stream flow due to rainfall runoff from new development.
- There are structural changes to the channel such as new or replaced bridges, channelization, or flood control projects (e.g., levees, floodwalls, detention basins).
- Development has occurred in areas not previously mapped by FEMA.
- An extreme flood (i.e., 100-year flood) exceeds the mapped boundaries of the SFHA.

The NFIP requirements for Substantial Damage determinations involve only the SFHA. Communities are *not* required to evaluate flooded structures located outside the SFHA where the floodplain management ordinance does not apply.

Because the primary intent of the FIRM is to show the limits of the 100-year floodplain, street data (i.e., names and locations) may not be current or accurate on the maps, particularly if the FIRMs are older and have not been updated recently. If street data are not accurate on the current FIRMs, it is recommended that the 100-year floodplain boundary delineations from the FIRM be carefully transferred to another community map with accurate street or structure information. Maps with structure locations, addresses, or tax parcel boundaries are the most useful for verifying structure locations during field data collection.

The SDE tool can export property locations, based on the latitude and longitude coordinates, to a Keyhole Markup Language (KML) file, which can be used to georeference structure locations on a map.

### 8.1.3 Compiling Tax Data

When available, tax data can provide much of the information required for the structure data that are entered in the **Address** tab and the **Structure/Damage/NFIP Info** tab in the SDE tool. Reviewing any compiled tax data prior to field deployment can save time in the field while reducing data entry and increasing the accuracy and consistency of the data.

When possible, tax data should be sorted alphabetically by street name and then numerically by address to facilitate field use. Tax data may be provided for the entire community (for areas inside and outside the SFHA), or tax data with limited sorting capabilities may be sorted by tax parcel number or the structure owner's last name. In these situations, it will be necessary to screen the tax data to find information that is relevant to the SDE inventory area. The tax data that may be used in the SDE tool are shown in Table 8-1. However, tax data should never be used as a substitute for a physical inspection that verifies the structure location, square footage, and number of stories. Instead, the inspector should verify any available tax data with the inspection findings.

Some tax printouts contain a simple diagram of the structure's footprint that can be used during the inspection to verify structure size, orientation, and location. The format and content of tax information printouts vary among communities. In some communities, printouts are predefined



(i.e., no custom printouts or reports are available) and contain significantly more data than required for SDE input.

The most useful tax data are those that can be sorted by street names and the fields necessary to populate the SDE database. If simple one- or two-page printouts are available per structure, they can be attached to one of the two SDE summary reports and put into individual file folders identified by address labels. The folders can then be organized by street name and address and taken to the field as a verification tool. As an alternative to using file folders in the field, the inspectors can record the address data (if available) on the SDE Damage Inspection Worksheets or on a laptop computers or tablets as the structures are inspected.

**8.1.4 Pre-Loading Available Structure Data into the SDE 3.0 Tool**

Available SDE data regarding the structures in the SFHA can be pre-loaded into the SDE tool during the preparations for the SDE inspections. This may include information derived from tax data, building permits, contractor repair estimates, or previous community inspections of structures. Any data entered into the SDE tool before the inspections will facilitate faster data collection while preparing SDE records of basic structure information.

Structure data can be pre-loaded into the data fields on the first three tabs of the SDE tool—**Address, Structure/Damage/NFIP Info, and Cost**. A helpful feature in SDE is the ability to import multiple properties into the tool simultaneously using the *Enterprise Import* function (refer to Section 3.7 for more information).

Only structure data can be pre-loaded into the SDE tool. Assessment data can only be added while an individual structure record is open for data entry.

Table 8-3 provides a summary of potentially available data that can be used to develop the SDE inventory.

**Table 8-3: Data Resources to Assist in Substantial Damage Determinations**

<b>Data Resource</b>	<b>Description</b>	<b>Possible Source(s)</b>
Maps	<ul style="list-style-type: none"> <li>• FIRMs</li> <li>• Other maps of floodprone areas or maps identifying areas of previous flooding</li> <li>• Topographic maps</li> </ul>	<ul style="list-style-type: none"> <li>• Community</li> <li>• State NFIP Coordinator</li> <li>• FEMA</li> <li>• Other Federal agencies</li> </ul>
Flood Insurance Study texts or other reports	<ul style="list-style-type: none"> <li>• Flood profiles (to help determine flood boundaries on topographic maps)</li> </ul>	<ul style="list-style-type: none"> <li>• Community</li> <li>• State NFIP Coordinator</li> <li>• FEMA</li> </ul>
Newspaper articles or community assessments of previous flooding		<ul style="list-style-type: none"> <li>• Community files</li> <li>• Community library</li> <li>• Internet archives</li> </ul>
Tax parcel maps	Structure location and other data that can be cross-referenced to obtain addresses	<ul style="list-style-type: none"> <li>• Tax assessor’s office</li> </ul>

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<b>Data Resource</b>	<b>Description</b>	<b>Possible Source(s)</b>
Street or address maps		<ul style="list-style-type: none"><li>• Community building department</li><li>• Planning department</li></ul>
Tax data	<ul style="list-style-type: none"><li>• Owner's name and mailing address</li><li>• Structure address</li><li>• Date of construction</li><li>• Structure use (residential vs non-residential structures)</li><li>• Square footage</li><li>• Number of stories</li><li>• Dates of additions or renovations</li><li>• Adjusted tax assessed structure values</li><li>• Number of years since last tax adjustment</li></ul>	Tax assessor's office
Professional appraisals		<ul style="list-style-type: none"><li>• Community building permit files</li><li>• Insurance claims data</li></ul>
Permit data	Includes contractor cost estimates for developing base costs	<ul style="list-style-type: none"><li>• Community building</li><li>• Planning department</li></ul>

FEMA = Federal Emergency Management Agency

FIRM = Flood Insurance Rate Map

NFIP = National Flood Insurance Program

## 8.2 Organizing SDE Field Inspections

The SDE Manager must plan SDE field inspections to facilitate accurate and complete assessments collected in a timely and efficient manner. Planning consists of the following:

- Identifying the activities that will be necessary to complete the SDE inspections. The number, size, and scope of activities will be based on the extent of damage, number of structures to be inventoried, the geographic areas to be inventoried, and the number of staff available to conduct the inspections.
- Planning the sequence of inspections (refer to Section 8.2.1).
- Determining the number of inspectors that will be required (refer to Section 8.2.2).
- Organizing the SDE inspection teams (refer to Section 8.2.3)

### 8.2.1 Sequence of Inspections

The initial sequence of inspections is based on the inventory characteristics and the community's target completion date.

The SDE Manager may decide to have as many inspections as possible completed in one or more large damage areas before the staff moves on to other activities in the following circumstances:

1. The community has limits on the number of work hours per day or work days per week.
2. The community requires that the structure owner be present when the inspection is performed.
3. The inspectors are only available for a limited amount of time.

The community must identify its inspection priorities and list the parameters for the inspections. Parameters include the number of inspection teams, hours worked each day, and the days of the week when inspections will occur. The SDE Manager should consider the following to determine which issues have higher priorities for the community when developing the sequence of inspections:

- Areas with little to no apparent damage so permits for minor repairs can be issued quickly.
- Areas where structures have initial estimates of damage between 25 percent and 75 percent of the structure value. Structure owners in these areas will be anxious to begin repairs and may not understand the need for permits.
- Areas where debris and contents have been removed from the structures, which allow faster inspections.
- Areas with critical facilities that may be a community priority for starting repairs.
- Damage areas with a high density of development and a large number of structures.
- Areas with temporary (flooding, debris, downed power lines) and permanent (gated communities, industrial sites) access issues that require additional time to resolve.

### 8.2.2 Determining the Number of Inspectors

After obtaining data for the inventory area, estimating the number of structures to be inspected, identifying the community priorities, and determining a target completion date, the SDE Manager can start to determine the number of inspectors that will be required. The number of inspection teams will be based on available staff, staff experience, the number of structures to be inspected, and the deadline to complete the inspections.

The SDE Manager can assume that the inspection teams will average between 20 and 35 residential inspections per team per day. The inspections completed per team per day will vary based on the density or proximity of the structures to each other (whether the inspectors can walk between structures or have to drive), the weather, similarities or differences between housing stock, and whether the flood depth above the lowest floor varies by more than 0.5 feet.

The inspectors may be able to average between 3 and 15 non-residential inspections per team per day based on the proximity of the structures to each other, the size, structure use, complexity of the design and structure, the weather, the need for access permission, and whether the owner or a designated representative will accompany the team during the inspection.

The number of days to complete the inventory will depend on whether the inspectors are working 5, 6, or 7 days per week.

### 8.2.3 Organizing the SDE Inspection Teams

The inspection teams will be responsible for collecting and recording the field data required for making SDE determinations. Inspectors will collect data on structure attributes, dimensions, and GPS coordinates and will photograph the structures. Inspectors must be familiar with the SDE data requirements, how to use the SDE tool or the SDE Damage Inspection Worksheets to record the data, and safety precautions for working in and around damaged structures.

If staff resources allow, inspectors with damage assessment or construction experience should be paired with less experienced staff. Staff should be physically able to walk from structure to structure and be able to make the evaluations and judgments necessary for evaluating and recording SDE data.

Inspection teams should consist of two inspectors for the SDE fieldwork for the following reasons:

1. It is generally a good policy for this type of fieldwork for safety reasons. If one inspector gets injured or becomes incapacitated because of heat exhaustion or other reasons, the other inspector can assist and call for help.
2. Two people are better able to point out safety hazards to each other and identify structures that are unsafe to enter to collect data on interior damage.
3. It is easier to ensure that all of the construction elements (12 for residential structures and 7 for non-residential structures) have been evaluated and the data have been recorded in the SDE tool or on the Damage Inspection Worksheets.

4. Each inspector may evaluate damage slightly differently based on his or her individual experiences with damaged structures. An estimate of percent damaged based on a consensus is more defensible than an estimate from one inspector.
5. The structure dimensions and flood depth may need to be field-verified using a tape measure.
6. If one inspector is talking to the structure owner or a local official, the other inspector can evaluate damage and collect SDE data.
7. Inspections are normally completed faster.
8. Photographs are easier to obtain when one team member takes the photograph and the second team member points to a flood depth, is used in the photograph as a scale of reference, or holds an information/address sign if needed.
9. Multiple cell phones increase the ability of the SDE Manager to reach the inspectors.

### **Pre-Loaded Structure Information**

If the structure information is pre-loaded into the SDE tool, the inspectors should compare the available data to what they see in the field to verify that the dimensions, number of stories, square footage, and structure footprint agree. If any of these do not agree, the inspectors may be at a different structure than the one indicated in the pre-loaded data.

For multiple teams, designations should be assigned by number (e.g., 1, 2, 3), alpha character (e.g., A, B, C), or color (e.g., red, green, blue). The team designation will help distinguish the field supplies, photographs, and data collection areas (checked off on a map).

The teams should be provided with the following items:

1. Guidance materials and handouts prepared by the SDE Manager.
2. Community map showing the SFHA and the identified inspection areas for each day.
3. Available tax data that can be used for completing the Damage Inspection Worksheets if not already pre-loaded into the tool.
4. Checklist 2 – Field Preparations (field supplies and procedures) in Appendix B of this document; team members should be responsible for gathering and maintaining the required field supplies.
5. A quality hand-held GPS unit that can provide latitude and longitude coordinates at the community's required level of accuracy (refer to Section 3.7.4 for guidance on GPS units).

### **8.3 Planning for Resource Requirements**

The SDE Inspection Lead will be responsible for all field equipment and the SDE Data Lead will be in charge of having structure data ready for the inspection teams on a daily basis. Depending on the estimated size of the SDE inventory, these responsibilities may involve multiple duties for one or more people.

If structure data are available for pre-loading into the SDE tool, the data need to be organized based on the proposed sequence of the inspections and ready for use by the inspectors at least

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1 day in advance. Delays in the preparation of the structure data can delay the inspectors and affect the number of inspections completed per day and could impact the target completion date.

Field equipment includes vehicles, cell phones, safety equipment, field supplies, and laptop computers or tablets (see Checklist 2 in Appendix B). Field supplies include pens, paper, dry erase board and markers, digital cameras, GPS units, clipboard, 100-foot tape measure or measuring wheel, a 12-foot tape measure, rain or cold-weather gear, local and SDE contacts with phone numbers, maps of the inventory areas, letters of introduction, and printed copies of the SDE Damage Inspection Worksheets. Table 8-4 lists the equipment and supplies that need to be regularly maintained, charged, or replenished.

**Table 8-4: Maintenance of Field Equipment and Supplies**

<b>Item</b>	<b>Recommended Action</b>
Field vehicles	Maintain, including gasoline and fixing flat tires
Laptops computers or tablets, digital cameras, and GPS units	Charge after use every day Download data daily to the SDE tool Keep dry during rain or snow
Damage Inspection Worksheets, letters of introduction, pens, dry erase boards, and markers	Replenish as needed

### 8.4 Identifying Sources of Base Cost and Structure Value Data

The base cost is important because it is used to develop both the estimated structure value and the estimated cost to repair damage based on the percent damaged amounts observed during the inspection.

#### 8.4.1 Sources of Base Cost Data

The default method in the SDE tool for determining the structure value is based on the square footage, base cost, cost adjustments or add-ons, and depreciation. The value is calculated as a computed Actual Cash Value (ACV) within the tool. The total area of a structure (in square feet) is multiplied by a base cost (in \$/square feet) and a geographic adjustment factor to develop a base cost for the structure before including cost adjustments, add-ons, or applying a depreciation value.

The community will need to determine whether they will use an average residential base cost for the entire community or if they want to select a base cost on a structure-by-structure or neighborhood basis.

Sources of base cost data include:

- Industry-accepted, residential or non-residential cost-estimating guides
- Local permit data for new construction, repairs, or remodeling

- Professional experience by a community official

If the data from any of the above sources are more than a year old, the community will need to determine if an economic update factor is required to provide current costs. Industry-accepted cost-estimating guides include periodic update factors and a geographic adjustment factor. A geographic adjustment factor of 1.0 should be used in the SDE tool when using locally developed base costs.

The advantage of using industry-accepted cost-estimating guides is that professionals with specialized experience in residential and non-residential cost estimating have developed the base cost data. The cost guides include base cost tables based on the quality of the initial construction and provide examples of the features and attributes of each quality level and construction element. The disadvantages include the time required to develop local base costs and that the price of the guides may exceed \$300 per copy.

The advantage of using local permit data is that it should be readily available, although it may take several days to compile, which could impact the start of inspections.

### 8.4.2 Structure Values Based on Tax Assessed Data or Professional Appraisals

Although structure values can be determined as an ACV within the SDE tool (refer to Section 3.11.2), some communities may want to use adjusted tax assessed values. If the adjusted tax values are used in the SDE tool, the SDE Manager must verify that the value of the land is not included in the structure value. An adjustment should also be applied to reflect the current market value of the structure. The community can allow the use of professional appraisals, if available, instead of the ACV if the structure owner appeals the SDE determination and agrees to pay for the appraisal. The appraiser must be licensed to practice in the State where the structure is located. The option to pay for appraisals should be available to all structure owners so the SDE requirements are administered consistently for everyone.

#### Use of Unadjusted Tax Assessed Values

Use of tax values as structure values without a locally required adjustment factor or multiplier will generally skew the Substantial Damage determination upward (thereby increasing the percent damaged for the structure). This is because the denominator in the Substantial Damage equation (i.e., the pre-damage value of the structure) will typically be smaller than if the ACV was used to determine structure value.

Users have the option of selecting one of three structure values (ACV, Professional Appraisal, or Adjusted Tax Assessed Value) and one of three damage estimates (Computed Damages, Contractor's Estimate, or Community's Estimate) to use in making the Substantial Damage determinations.

To use the market appraisal or adjusted tax assessed value as the structure value for determining the percent damaged, follow these steps:

- Enter the Professional Market Appraisal value in the Optional User Entered Data section on the **Output Summary** tab

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- Select the **Professional Market Appraisal** radio button in the Value of Building section at the top of the **Output Summary** tab screen

Tax assessed values must include a factor that adjusts the assessed value to market value to provide values that are comparable to the ACV. The factor is provided by the tax assessor at the community, county, or parish level. To determine the percent damaged, follow these steps:

- Enter the Tax Assessed Value and Factor Adjustment value in the Optional User Entered Data section on the **Output Summary** tab
- Select the **Adj Tax Value** radio button in the Value of Building section at the top of the **Output Summary** tab

Users cannot pre-load structure values based on appraisals or tax values in the tool. Therefore, when structure values are based on appraisals or tax values, the SDE Manager should prepare a list of addresses and corresponding structure values for the inspectors to take with them into the field so they can enter the data along with the other field assessment data.

If a professional market appraisal or adjusted tax assessed value is used for the structure value, the following data fields must be completed for a valid assessment. Users can refer to Section 3.11.2 for more information on required data fields. To determine the percent damaged based on a contractor's or community cost estimate, follow the steps below.

**Note:** If a professional appraisal or adjusted tax assessed value is used for the structure value, and a contractor or community cost estimate is used for the cost of repairs or improvements, the depreciation rating on the **Cost** tab is still required for a valid assessment.

- On the **Output Summary** tab, enter the dollar value of **Contractor Estimate** or the **Community Estimate for the Cost of Damage** portion of the tab. Then change the **Cost of Repairs/Improvements** radio button from **Computed Damages** to **Contractor' Estimate** or **Community' Estimate**.
- On the **Cost** tab, enter \$1 for the **Base Cost Per Sq Ft**.
- On the **Cost** tab, select the **Calculate or Enter Square Footage** button and then complete only one of the following:
  - Select the **Enter Total Square Footage Manually** button on the Square Footage Calculator window. Enter the actual square footage in the **Enter Total Square Footage** field, select **Save**, and then select the **Save the Total Square Footage and Close Form** button; or
  - Select the appropriate structure shape button and enter the building dimensions to calculate the square footage and then select the **Save the Total Square Footage and Close Form** button
- On the **Cost** tab, select **Other** for the **Depreciation Rating**, and:
  - Enter an explanation, such as “Used Professional Market Appraisal value prepared by the ABC Appraisal Company on MM/DD/YY instead of depreciation” in the **Depreciation Explanation** box



- Enter a value of 1 for the *Depreciation Percentage*

## 8.5 Planning for SDE Data Entry

The SDE Manager has two options for entering the data required to make a Substantial Damage determination.

- Option 1 – Manual data collection. This is a two-step process. The inspector records data manually in the field on the Damage Inspection Worksheets and later transfers the data to the SDE tool on a computer in the office.
- Option 2 – Digital data collection. This is a one-step process. The inspector enters the SDE field data directly into the tool on either a laptop computer or a tablet.

Table 8-5 shows a comparison of the advantages and disadvantages of the two options.

If the SDE Damage Inspection Worksheets are used for manual data recordation, the SDE Manager will need to identify staff to enter the worksheet data into the SDE tool and determine whether they will enter data during the evening of the day the data are collected or the next day. The data entry staff could involve either the original inspectors or office staff that may be more proficient at data entry. The advantage of having the inspector enter the data is that errors, inconsistencies, or missing data can be addressed right away.

**Table 8-5: Advantages and Disadvantages for Entering SDE Data**

<b>Advantage / Disadvantage</b>	<b>Option 1: Manual Data Collection</b>	<b>Option 2: Digital Data Collection</b>
Advantage	<ul style="list-style-type: none"> <li>• Low cost.</li> <li>• Simple.</li> <li>• Requires less time per inspection.</li> <li>• Avoids need to carry and provide power for tablets or laptop computers.</li> </ul>	<ul style="list-style-type: none"> <li>• One-step process.</li> <li>• Data entry is more accurate.</li> <li>• Photographs are downloaded and attached to the correct assessment immediately (no photo log needed).</li> <li>• Inspectors can verify that photographs are legible in the field.</li> <li>• Requires less time to complete assessments because the assessments are completed immediately instead of hours or a day later.</li> <li>• Faster completion of SDE inventory.</li> <li>• Avoids having to print and track copies of the Damage Inspection Worksheets.</li> </ul>
Disadvantage	<ul style="list-style-type: none"> <li>• Requires two steps (recording the data manually then entering the data into the tool).</li> <li>• Requires more time to develop full SDE assessments and complete the SDE inventory.</li> <li>• Potential impact to data quality and consistency if the inspector and data entry person are different people.</li> <li>• Requires a photo log to track the photographs, and therefore more time, to verify that the correct photographs are uploaded and attached to each assessment.</li> <li>• May require additional data entry staff to keep pace with the inspectors.</li> <li>• Requires storage of completed Damage Inspection Worksheets.</li> </ul>	<ul style="list-style-type: none"> <li>• Requires taking a laptop computer or a tablet to the field.</li> <li>• Laptop computers and tablets are susceptible to damage from water, being dropped, or being stepped on, or being left behind by inspectors.</li> <li>• Requires an external power source to run laptop computer or tablet for 8 to 10 hours.</li> <li>• Requires one laptop computer or tablet per inspection team (with extras available in case of malfunction or damage).</li> <li>• Requires that SDE data be transferred from the field laptop computer or tablet to the main SDE computer at the end of every workday.</li> <li>• Data transfer may not be possible if the laptop computer or tablet is damaged.</li> </ul>

## **SECTION 9            GUIDANCE ON COLLECTING AND RECORDING SDE DATA**

This section provides guidance on collecting SDE data beginning with SDE pilot inspections to train inspectors on collecting SDE data. The aspects of data collection that are discussed involve the structure address, photographs, curbside information, exterior and interior inspections, and interaction with the structure owner.

### **9.1 SDE Pilot Inspections**

In preparation for the inspections, the SDE Manager should take all of the inspectors into the field and conduct up to three pilot inspections each for both residential and non-residential structures with various levels of damage. These structures can be the first entries in the SDE inventory. The purpose of the pilot inspections is to familiarize inspectors with the SDE data requirements, inspection procedures, and use of the SDE tool. The inspectors need to understand the SDE requirements as well as the expectations of the SDE Manager for the data collection.

For inspectors with limited experience in assessing damage, the pilot inspections provide a first-hand view of the construction elements in the SDE tool (12 for residential and 7 for non-residential structures). Through onsite discussions, the inspection teams will also get a feel for how to estimate the percent damaged for each element and how to do it consistently. Each pilot inspection requires approximately 45 to 90 minutes for residential structures and 45 to 120 minutes for non-residential structures, depending on their size and complexity.

Before the pilot inspections, the SDE Manager should review the guidance in Appendices E and F for estimating percent damaged by element for residential and non-residential structures, respectively.

During the pilot inspections, the SDE Manager should review the following:

1. Field safety requirements and site/structure access procedures
2. SDE data requirements
3. Residential and non-residential elements on the pilot structures
4. Guidelines for estimating the percent damaged for the structure elements
5. Requirement that the percent damaged per element be entered in increments of 5 to 10 percent
6. Structure attributes for residential structures and non-residential structures (refer to Sections 10.1 and 10.2, respectively).
7. Data that can be ignored (e.g., structure color, contents damage, non-living spaces such as garages)
8. The amount of time that should be spent on residential and non-residential inspections

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9. Importance of obtaining the most accurate data for structures with damage between 35 and 65 percent
10. Not all elements are equal because some elements contribute a greater percentage of the structure's value than others do. Based on the amount of damage to the key or higher value elements, inspectors can gauge whether a structure is likely to be substantially damaged.
11. After evaluating two or three structures as a group, each team should collect data for up to three additional structures on their own. Team members should be encouraged to rotate activities so that each inspector understands the data collection and data entry process for the inventory. Team members can take turns identifying structure element percent damage and structure dimensions, recording data, taking photographs, and obtaining GPS coordinates.
12. The data from all the inspection teams from the first day should be reviewed as a group exercise to identify data issues and consistency, verify completeness, review estimates of percent damaged, and evaluate photograph quality. The SDE Manager should stress that data collection and data entry is a team effort and that everyone will approach it differently based on his or her own experience. Inspections are not a competition to see which team can complete the most inspections. Each inspection team should review another team's data entries for consistency and quality to obtain a better understanding of the data requirements and potential data consistency issues.

The first 3 days of inspections are critical to the quality of the SDE inventory. Maximizing data quality and efficiency requires that the SDE Manager and all inspectors be “on the same page.” Inconsistencies and other problems with data collection can quickly multiply and require hours or days of revisions.

### **9.2 Structures with 35 to 65 Percent Damage**

Structures with damage between 35 to 65 percent require more effort and precision than structures with damage below 35 percent or above 65 percent. In fact, it is recommended that officials consider a second or independent evaluation for structures in which the initial determination is between 35 and 65 percent damaged. Appeals of Substantial Damage determinations tend to occur more frequently for structures in the range of 35 to 65 percent damaged. An independent evaluation of damage may include a cost estimate for repairs provided by a local official (other than the initial inspector) or a contractor. Appendix D includes a list of items that should be evaluated for damage and inclusion in a repair cost estimate.

### **9.3 Structure Address**

The structure address is important because it is the simplest and most common identifier of a structure. Addresses are a familiar and easy way to sort structures in the SDE tool and track Substantial Damage data. However, not every structure will have a posted or visible address on the structure or mailbox, particularly in rural areas. The address may be missing because of the

age of the structure, local custom, lack of a 9-1-1 emergency call system in the area, or lack of a local requirement for posting addresses. If the address is missing, a community address map or tax parcel number map must be used to identify structures in the inventory. Because of their importance, addresses should be the first choice in data for identifying all structures and photographs in the inventory.

### 9.3.1 Lack of Posted or Visible Addresses

For a structure without a visible address, the procedure described in this section is recommended to identify the structure when attaching GPS data and structure photographs to the SDE assessment. Attaching structure photographs or GPS coordinates to an assessment after many inspections have been completed is extremely difficult, and errors may require returning to the field to verify data or re-collect data for structures that would otherwise have valid assessments.

A temporary structure ID number in the SDE tool can be used for new properties found and assessments as an interim aid until more complete structure information is available. A properly managed temporary structure identification system consists of three types of data for each structure: photographs, GPS coordinates, and a temporary structure ID number. This data ensures that the SDE Manager, inspectors, and other local officials are discussing the same structure in the post-data-collection phase.

The temporary structure ID number can be developed and used as follows:

1. Organize inspection staff into teams.
2. Deploy each team to a defined geographic area.
3. Assign a range of ID numbers to each inspection team before starting the fieldwork. For example, Team 1 could use the 1000 series of numbers for all structures they encounter without addresses. The first structure would be recorded as “Structure 1001 plus the street name” and the next as “Structure 1002” and so on. Team 2 would use “Structure 2001 and the street name” for their first structure followed by “Structure 2002,” while Team 3 would use the 3001 series, and so on.
4. Obtain two photographs for each structure.
5. Record available street names and other similar information.
6. Obtain and record accurate GPS coordinates for each structure.

Temporary ID numbers are entered into the SDE tool as follows:

- Enter the temporary ID number in the **Street Number** data field under Building Address on the **Address** tab.

If the structure address is available after the inspection, the temporary ID number can be replaced with the address number using one of the tool’s edit functions.

### 9.3.2 Address Board

Depending on the preferences of the SDE Manager, a white dry erase board with the address number or temporary structure ID number, street name, suffix (e.g., street, boulevard, road, etc.), team number, and inspection date can be placed so that it appears in one of the lower corners of the structure photograph. This information will provide a cross reference between the photograph and the SDE assessment. A black marker should be used on the white board to ensure that the address stands out in the photograph. The address board should take up less than 20 percent of the photograph. The white board photograph and address should appear in at least one of the photographs for the assessment.

When using an address board, inspectors should ensure that:

- The address number is written legibly and large enough to be visible in a printed photograph without taking up more than 20 percent of the photograph.
- The address board does not block so much of the background that the structure is indistinguishable from neighboring structures or that key features of the structure are not visible (e.g., foundation, high water marks, visible damage).
- After obtaining the photograph, the photograph is absent of glare that could affect the legibility of the photograph.

### 9.3.3 Tax Parcel Identification Numbers

It may be necessary to cross reference tax data and tax parcel ID numbers that contain an official address with a map containing tax parcel boundaries to show addresses relative to structure locations. This is necessary to provide the inspectors with addresses for the properties that are found in the field. Cross referencing can be confusing at times and time consuming. To avoid having to refer constantly to the tax data printouts for addresses, the address numbers should be transferred to the field copy of the tax map prior to the start of inspections.

Tax parcel ID numbers can involve a long string of digits, and long numbers are difficult to track and sort manually. As the volume of collected data increases, inspectors and data entry staff may become confused about particular structures or data. Using address data is therefore preferable to tax parcel ID numbers whenever possible.

## 9.4 Photographs

The SDE tool allows users to attach digital photographs to the property records and assessments. The photographs are critical to the credibility of the SDE inspections because they show the owner, local officials, and the SDE team the specific structure that was inspected. If the photographs are obtained quickly after the disaster, they may also help to distinguish existing construction and repairs of damage that may have been made without permits.

Inspectors should take a minimum of two photographs of every structure. Ideally, the inspector will obtain a curbside view of the front or side of the structure and another of the element with the most significant damage. If available, one of the photographs should include a high water

mark or debris line with a tape measure indicating the height of the flood above ground or the lowest floor.

High-resolution digital photographs can have large file sizes, which can slow down the operating speed of the SDE tool, especially when there are many large photograph files. The higher (better) the resolution of the photograph, the larger the digital file. The larger the digital files and the more photographs attached per inspection, the larger the SDE database becomes, and the slower the SDE tool may operate. For communities with a large number of inspections (> 100 assessments), lower resolution photographs ( $\leq 3$  megabytes [MB] file size) are recommended. Although individual photograph file sizes may not seem large, the collective size will increase as more assessments are added to the inventory.

The following procedures are recommended for digital photographs to avoid large file sizes:

- Review the manufacturer's instructions for the digital camera to learn how to set the image resolution and size.
- Set the digital image to 640 pixels wide by 480 pixels high (640 x 480).
- Verify each day that the resolution has not changed, especially if the camera ran out of power during the last use as this may have caused a reset of all the settings.
- Save photographs as JPGs or JPEGs, because these formats include compression, which keeps the file size small. Make sure that every file with a photograph is 3 MB or less.

Digital photographs that are not checked in the field may be determined to be unusable after inspectors return from the field. The photographs may be too dark or washed out by sunlight; may have been taken too far from the structures; or have dense foliage on the top, front, or sides of a structure that obscure structure features and render the structure indistinguishable from similar nearby structures.

Inspectors should try to frame the photograph so that the structure fills most of the photograph while also being readily recognizable to the structure owner or anyone else who views the structure from the point where the photograph was taken. Taking photographs from the curbside or driveway of the structure is recommended. The purpose of taking two photographs per structure is to provide a reference for the structure being inspected and not to record all of the damage.

The following procedures are recommended for photographs:

1. In addition to the curbside view, take a corner view of the structure to obtain two different views.
2. When heavy vegetation is present, take additional or close-up photographs where the structure outline extends beyond the edges of the photograph. Taking photographs of more than one side of the structure may also help.
3. For elevated structures, include an object such as a vehicle, a person, or a nearby structure at ground level in the photograph to provide a perspective on the elevation of

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the structure. For structures elevated more than 3 feet above ground, include a note on the estimated height of the lowest floor above ground in the *Residence Information* comment box on **Structure/Damage/NFIP Info** tab of the tool.

4. Include any visible high water marks on the structure or debris lines on an adjacent fence or vegetation.
5. Take the photograph from a different angle if bright sunshine washes out the image.
6. As a routine procedure, **review the photographs before leaving the structure to ensure that the photographs are adequate.** This will avoid having to return to the field for better photographs later.

Figure 9-1 shows two views of the same structure as well as a high water mark, structure displacement, and some of the damage.



**Figure 9-1: Two views of the same structure showing a high water mark, structure displacement, and some of the damage**



As the photographs are taken, they should be attached to the assessment in the SDE tool. If a tablet or computer<sup>1</sup> will not be used in the field for direct entry of SDE data and photographs, inspectors should use the address board (refer to Section 9.3.2) and a photo log to ensure that they will be able to match photographs to the correct structure. A sample photo log is included in Appendix B. A new photo log should be started every day or each new photo memory card used. A photo log should include the following data as a minimum:

1. Team designation
2. Date
3. Community name if multiple communities are involved
4. Memory card designation if multiple cards are being used
5. Photograph number
6. Structure address or location

### **9.5 Curbside Information**

After arriving at a structure, the inspector should obtain a curbside photograph of the front or side of the structure and then record basic data for the structure on a Damage Inspection Worksheet (Appendix B) or in the SDE tool on a tablet or computer. Much of the information in the first and second SDE tabs can be completed curbside, including entries for the Building Address, Structure Attributes (residential only), Structure Information, Inspector Information, and NFIP Information sections.

### **9.6 Exterior Inspections**

Data collected during the exterior inspection includes the structure attributes, dimensions (Structure Information), information about exterior-related items in Adjustments (e.g., porches, decks), and Damage Information (e.g., exterior depth of flooding).

After recording this data, the inspector should perform a damage evaluation of the structure's exterior by walking around the entire structure if possible.

#### **9.6.1 Structure Dimensions**

Before beginning the inspection, the inspectors should measure the dimensions of the structure using a measuring tape. Exact dimensions are not required and minor variations such as bay windows, extended or pulled inward entrances, or fireplaces can be ignored.

Four common structure shapes for residential and non-residential structures are provided in the SDE tool and on the Damage Inspection Worksheets. The structure shapes are L, T, rectangle,

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<sup>1</sup> For SDE fieldwork, the term "computer" refers to a laptop or notebook computer.

and U and are shown in the Square Foot Calculator on the **Cost** tab in the SDE tool, and on the SDE Damage Inspection Worksheets.

### 9.6.2 Exterior Damage

The inspector can perform a damage evaluation of the structure's exterior by walking around the entire structure or as much as possible. The inspector should record the percent damaged for each element. When more than one inspector is present, the team should agree upon the percent breakdown.

Table 9-1 contains the features that should be evaluated for damage during the exterior inspection.

One of the key factors in distinguishing between damage and poor maintenance (e.g., peeling paint, worn interior floor finishes) is the consideration of the repairs that would be necessary to make the structure compliant with local code requirements and to return it to its pre-damage condition.

#### **USER NOTE:**

A residential structure will most likely not be determined substantially damaged if the foundation, superstructure, interior finish, plumbing, and exterior finish are not significantly damaged because of the relative weight of these elements in the percent damaged calculation.

## 9.7 Interior Inspections

When performing an inspection, all inspectors need to remember that they are inside someone's home or non-residential structure. Inspectors should always verify that they have permission to enter the structure. Appropriate care and respect for the structure and contents should be demonstrated during the inspections.

The aspects of interior inspections that are discussed in this section are structure stability, inspection guidelines, the presence of upgrades or custom-design items, and interior damage.

Residential structures that are within the 35 to 65 percent damage range should be more carefully inspected than those that are clearly less or more damaged. The same is true for non-residential structures.

**Table 9-1: Features to Evaluate during Exterior Inspections of Structures**

Item	Required Evaluation
Depth of flooding inside and outside of the structure	<p>Examine all sides of the structure to locate a high water mark.</p> <p>If no high water mark is visible, check adjacent fences or vegetation for water, dirt, or debris line.</p> <p>Depending on the flood duration, the high water may be at different elevations inside and outside of the structure.</p>
Obvious roof damage	<p>Observe the roof for:</p> <ul style="list-style-type: none"> <li>• Missing shingles or roof covering</li> <li>• Roof sheathing movement</li> </ul>
Less obvious roof damage	<p>Observe the roof for warping of the roof sheathing due to lost or damaged shingles. This can be viewed by stepping back from the structure and looking at the roof surface for ripples and sunken or raised areas. This type of damage may require replacement of a significantly large portion of the roof sheathing and shingles. The inspector will need to determine if the roof damage was disaster related or due to poor maintenance. Maintenance-related damage can be addressed by the selection of the depreciation rating as part of the assessment.</p>
Foundation damage	<p>Examine the foundation for settlement, lateral movement, or cracking that affects structural stability.</p> <p>Determine whether the structure has become separated from the foundation.</p>
Post, pier, or column damage and an evaluation of the floor stability	<p>Examine these elements for structures built on a continuous wall with slab, crawlspace, piles, and piers and posts foundation types.</p>
Exterior wall damage	<p>Observe for holes or damage affecting the structural integrity of the superstructure.</p>

### 9.7.1 Structure Stability

Extreme caution should be exercised before entering damaged structures because of the possibility of structural deficiencies in either the floor or the floor support system. The inspectors must first verify that the floor is stable enough to support their combined weight. Foundation settlement, high flood depths, floor warping, and damage to floor joists can significantly weaken a floor and the ability of inspectors to safely walk on the floor. Stability can be evaluated during the exterior inspection in structures built on crawlspaces or other elevated foundations.

### 9.7.2 Inspection Routine

A set procedure is recommended for the interior inspection to avoid missing any rooms or damage. For instance, in residential structures, inspectors could start on the first or main floor in the utility room (which has the hot water tank, washer or dryer, furnace, or other appliances) or the kitchen, and then work their way through the home room by room. In non-residential structures, inspectors could start at the front entrance and move clockwise room by room.

### 9.7.3 Guidelines for Evaluating Damage

Not all elements that get wet will be 100 percent damaged. For example, in a house that was flooded for a short period to a depth of 2 feet above the lowest floor, the drywall and insulation of the interior walls only need to be removed up to a height 4 feet above the floor. Similarly, unless broken or permanently contaminated, plumbing pipes and fixtures can be flushed out with disinfectant, cleaned on the outside, and used again. Depending on the depth of flooding, some built-in appliances may require only minor repairs.

An important aspect of inspecting a structure is determining the damage to its support framework. If possible, the studs and foundation should be inspected for damage. However, invasive procedures, such as tearing back wallpaper or drywall, should be kept to a minimum and done if already loose or torn and then only with the owner's permission. Inspectors should look for areas that are already exposed.

### 9.7.4 Upgrades or Custom-Designed Items

For residential structures, any significant upgrades in flooring, interior finishes, kitchen cabinets and countertops, appliances, or custom-designed interiors should be noted in the Adjustments section on the **Cost** tab of the tool.

For non-residential structures, interior adjustments can include built-in security or communications systems, conveyance (elevator/escalator) systems, skylights, floor and wall coverings, and built-in appliances or equipment. These items should also be noted in the Adjustments section on the **Cost** tab of the tool.

### 9.7.5 Interior Damage

The inspection team should evaluate the interior construction elements identified on the **SDE Element Percentages** tab for both residential and non-residential structures. The estimate of the percent damaged should be based on a visual inspection of each element. When more than one inspector is present, the percent damaged should be agreed upon by the team. Table 9-2 summarizes the type of interior damage to look for and how to evaluate it based on the interior construction elements.

**Table 9-2: Features to Evaluate during Interior Inspections of Structures**

Element	Description	What to Look For
Foundation (residential and non-residential structures)	Damage that is significant enough to affect the overall structural stability of the foundation.	Settlement, lateral displacement, or cracking not visible from the exterior. This is especially important for homes with basements or crawlspace foundations. Check for foundation damage that may not be visible during the exterior inspection.
Superstructure (residential and non-residential structures)	Damage that either currently or in the future could affect the structural stability of the structure, including the wall support systems as well as roof trusses and framing.	<ul style="list-style-type: none"> <li>• Wall support system: Deformation or distortion of the structural frame that is not visible from the exterior</li> <li>• Roof support system:               <ul style="list-style-type: none"> <li>– For intact ceilings, look for sagging, water marks, dripping water, or other damage that may indicate truss or roof framing damage.</li> <li>– For removed ceilings, view the truss and roof framing for damage.</li> </ul> </li> </ul>
Roof covering (residential and non-residential structures)	Damage to the roof sheathing, shingles/tiles, flashing, or other elements that are part of the roof covering.	Sagging, water marks, and dripping water could indicate roof covering damage. Also, look for daylight entering through holes in the roof or warped sheathing not visible from the exterior.
Interior finish (residential) Interiors (non-residential)	<p>Damage should be evaluated for a height above the interior high water mark.</p> <p>For two-story homes with similar square footage on each floor, the first floor accounts for approximately 50 percent of the total quantity of these interior finish items in the house.</p> <p>All painted, stained, papered, or paneled surfaces touched by floodwaters are assumed to at least require cleaning, sanding, and resurfacing.</p>	<p>Damaged, broken, or warped interior walls or framing studs (windows, doors, or closets). Inspectors should check for wicking of water or moisture inside of drywall and insulation at a level above the interior high water mark.</p> <p>All wet insulation and drywall should be removed and disposed of properly.</p>
Doors and windows (residential only)	Depending on the flood duration, these items will require either a small amount of cleanup plus paint/stain or total replacement due to warping.	Damaged, broken, warped, or removed doors and windows

## Guidance on Collecting and Recording SDE Data

Element	Description	What to Look For
Cabinets and countertops (residential only)	Depending on the flood duration, these items will either require a small amount of cleanup, sanding, and new stain or paint for cabinets or total replacement due to warping.	Damaged, broken, warped, mold-covered, or removed cabinets and countertops.  Note: The amount of damage for cabinets should reflect the depth of flooding above the floor. If the flood depth did not reach the upper cabinets, the percent damaged should be based on the floor level cabinets only. If only the lower cabinets are damaged but the owner prefers to replace both upper and lower cabinets so that they match, that is irrelevant for the cabinet damage entered into the SDE tool.
Floor finish (residential only)	With the exception of ceramic and marble tile, almost all floor coverings and sub-flooring that get wet will need to be replaced.	Discolored, warped, cut, damaged, broken, or missing flooring.
Plumbing (residential and non-residential structures)	With the exception of broken fixtures or sections of pipe, many of these items can be flushed with disinfectant, cleaned on the outside, and used again.	Cracked, dented, misaligned, leaking, broken, or missing sections of pipe or fixtures such as toilets, sinks, tub, and showers.  Contamination of water supplies.
Electrical (residential and non-residential structures)	Depending on the depth of flooding, there may only be a need to replace fixtures such as outlets, switches, lights, or a junction/fuse box below a certain flood elevation. All electrical wiring exposed to salt water should be replaced.	Corroded, exposed, disconnected, broken, missing, or non-functioning items and fixtures.
Built-in appliances (residential only)	Depending on the depth of flooding, these may require only a cleanup with disinfectant plus a small amount of repairs or may require total replacement.	Damaged, water-logged, broken, non-functioning, or removed appliances.
HVAC (residential and non-residential structures)	Depending on the depth of flooding, this may require only a cleanup with disinfectant plus a small amount of repairs or may require total replacement.	Damaged, water-logged, broken, non-functioning, or removed heating-cooling units.

HVAC = Heating, ventilation, and air conditioning

### 9.8 SDE Determinations

When all of the data necessary to save a complete assessment have been entered into the tool, the SDE determination is complete. The percent damaged for the structure will be shown on the **Output Summary** tab. Users may revise data for any data fields in the assessment by using the

*View/Search All Records* function on the *Main Menu* and selecting the *Edit* function to open and edit a specific assessment.

When the SDE Inspection Lead or SDE Manager has determined that the assessments do not require any additional edits, the assessments can be considered final.

### **9.9 Structure Owner Interaction**

Encountering structure owners or occupants is common during inspections. They will be curious or possibly suspicious of the inspection objectives. Therefore, the SDE Manager should set guidelines for interactions with residents and structure occupants. The SDE Manager should develop a written set of guidelines for contact with owners or occupants, review it with the inspectors prior to the start of inspections, and provide a hard copy of the guidelines to each team. This should include guidance on entering locked (not normally done) or vacant structures. See Appendix C for example guidelines for interactions with residents.

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## **SECTION 10      STRUCTURE ATTRIBUTES**

After reviewing the SDE data requirements (refer to Section 3), preparing an inspection plan, and completing the pilot inspections (Section 9.1), the SDE Manager can initiate the data collection.

This section contains information on the structure attributes for residential and non-residential structures that must be evaluated for a Substantial Damage determination.

Refer to Section 3.11 to review the differences between residential and non-residential assessments.

### **10.1 Residential Structure Attributes**

Residential structures include site-built homes, row or townhouses, and manufactured housing. For each new assessment, the user must select which type of structure is being evaluated. Residential structure attributes are entered on the **Structure/Damage/NFIP Info** tab in the SDE tool.

Table 10-1 summarizes SDE residential attributes and inspection options.

## Structure Attributes

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**Table 10-1: Summary of SDE Residential Structure Attributes and Inspection Options**

<b>Residence Type:</b> <ol style="list-style-type: none"><li>1. Single-Family Residence</li><li>2. Town or Row House</li><li>3. Manufactured House</li></ol>	<b>Story:</b> <ol style="list-style-type: none"><li>1. One Story (Standard)</li><li>2. Two or More Stories</li></ol>
<b>Foundation:</b> <ol style="list-style-type: none"><li>1. Continuous Wall w/Slab (Standard)</li><li>2. Basement</li><li>3. Crawlspace</li><li>4. Piles</li><li>5. Slab-on-Grade</li><li>6. Piers and Posts</li></ol>	<b>Quality (of initial construction):</b> <ol style="list-style-type: none"><li>1. Low</li><li>2. Budget</li><li>3. Average</li><li>4. Good</li><li>5. Excellent</li></ol>
<b>Superstructure:</b> <ol style="list-style-type: none"><li>1. Stud-framed (Standard)</li><li>2. Common Brick</li><li>3. ICF (Insulating Concrete Form)</li><li>4. Masonry</li></ol>	<b>Cause of Damage:</b> <ol style="list-style-type: none"><li>1. Fire</li><li>2. Flood</li><li>3. Flood and Wind</li><li>4. Seismic</li><li>5. Wind</li><li>6. Other</li></ol>
<b>Roof Covering:</b> <ol style="list-style-type: none"><li>1. Shingles – Asphalt, Wood (Standard)</li><li>2. Clay Tile</li><li>3. Standing Seam (Metal)</li><li>4. Slate</li></ol>	<b>Damage Undetermined?</b> <ol style="list-style-type: none"><li>1. No Physical Damage Sustained</li><li>2. Vacant Lot / Property</li><li>3. Resident Refused Inspection</li><li>4. Address Does Not Exist</li><li>5. Other</li></ol>
<b>Exterior Finish:</b> <ol style="list-style-type: none"><li>1. Siding or Stucco (Standard)</li><li>2. Brick Veneer</li><li>3. EIFS (Exterior Insulation Finishing System)</li><li>4. None – Common Brick, Structural</li></ol>	<b>Depreciation Rating</b> <ol style="list-style-type: none"><li>1. Very Poor Condition – 88.9%</li><li>2. Requires Extensive Repairs – 66.5%</li><li>3. Requires Some Repairs – 38.8%</li><li>4. Average Condition – 24.2%</li><li>5. Above Average Condition – 13.4%</li><li>6. Excellent Condition (less than 2 years old, no visible deterioration) – 2.9%</li><li>7. Other (inspector must add an explanation)</li></ol>
<b>HVAC System:</b> <ol style="list-style-type: none"><li>1. Heating and/or Cooling</li><li>2. None</li></ol>	<b>Regulatory Floodway:</b> <ol style="list-style-type: none"><li>1. Yes</li><li>2. No</li><li>3. Possible</li></ol>

HVAC = Heating, ventilation, and air conditioning

### 10.1.1 Foundation Types

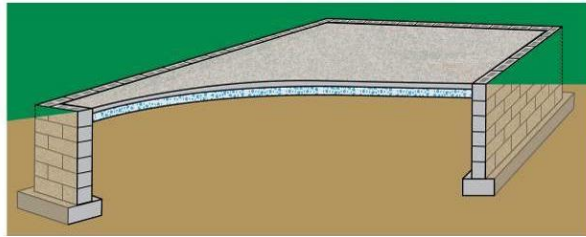
The SDE tool has six foundation types for residential structures. Because foundation types have varying costs, the foundation type affects the foundation element's percentage of the value of the structure. Furthermore, floor-framing materials vary with foundation type and they affect the superstructure element percentage. The user should understand that the element percentages for structure elements vary based on the combination of the elements for the structure being inspected.

The foundation types are described as follows and shown in Figure 10-1:

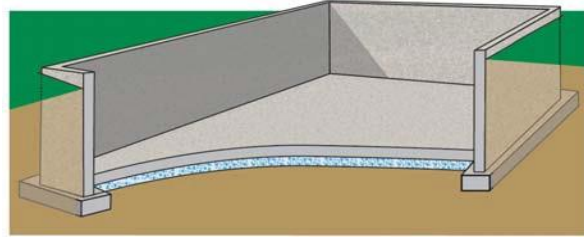
- **Continuous Wall with Slab (Standard)** – This system consists of low concrete or masonry perimeter stem walls supported on footings and connected to a raised slab, which may be at or above grade.
- **Basement** – For the purposes of the SDE tool, a basement is a below-grade enclosure. All sides of the foundation are enclosed with at least one side below grade.<sup>2</sup> The basement can be finished or unfinished.
- **Crawlspace** – A shallow, unfinished space beneath the lowest floor of the structure with access to ductwork, plumbing, and other utilities. The crawlspace is enclosed on all four sides, with vents and it may be susceptible to dampness and mold. Crawlspace foundation elements generally include spread footings and piers or posts.
- **Piles** – The piles support an elevated structure and consist of multiple columns driven into the ground and embedded several feet below grade. For purposes of the SDE tool, pile types include timber and precast concrete piles.
- **Slab-on-Grade** – The lowest floor of the house is formed by a concrete slab that sits directly on the ground.
- **Piers and Posts** – This system is often used on manufactured housing and consists of multiple small piers or posts that support the structure and are shallowly embedded into the ground. These foundations vary widely in quality, from code-compliant systems with proper embedment and connections, to systems that are blocks with little to no embedment and gravity loads providing connections between the structure and the foundation.

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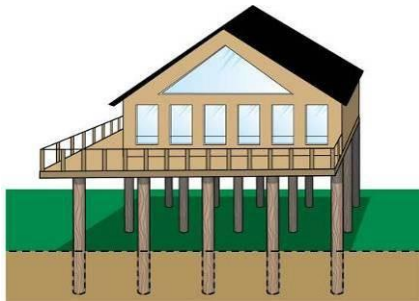
<sup>2</sup> The definition of basement for NFIP floodplain management purposes has the enclosure below grade on all sides.



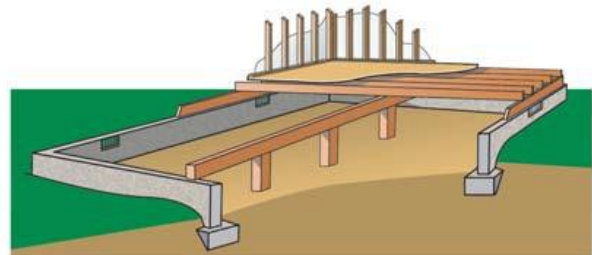
Continuous Wall with Slab (Standard)



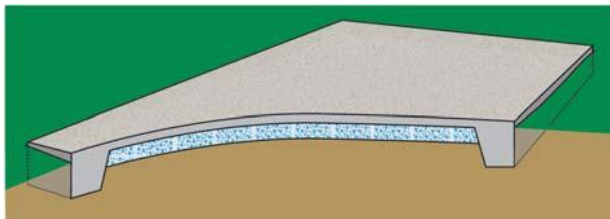
Basement



Piles



Crawlspace



Slab-on-Grade



Piers and Posts

**Figure 10-1: Residential Foundation Types**

### 10.1.2 Superstructure Types

The superstructure includes all of the framing that provides structural support and a load path between the foundation and the roof. For the purpose of the SDE tool, the following superstructure options are available for residential structures and represent the majority of residential superstructure types:

- **Stud-framed (Standard)** – This common superstructure type involves using wood or steel members to structurally frame a residence and continuously carry loads from the roof to the foundation. Stud-framing is common and can be used in many combinations, depending on the exterior finishing system. Sheathing is often connected to the exterior of the stud-frames as an initial exterior layer (see Figure 10-2).

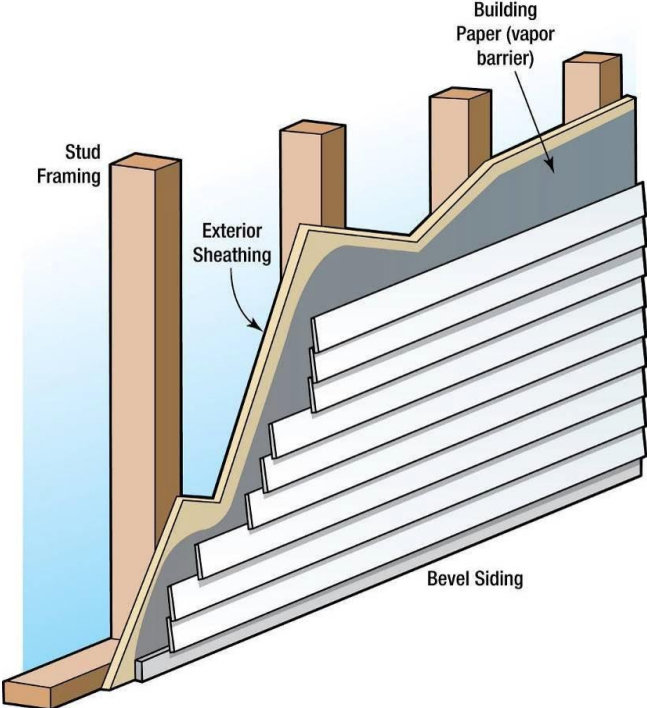
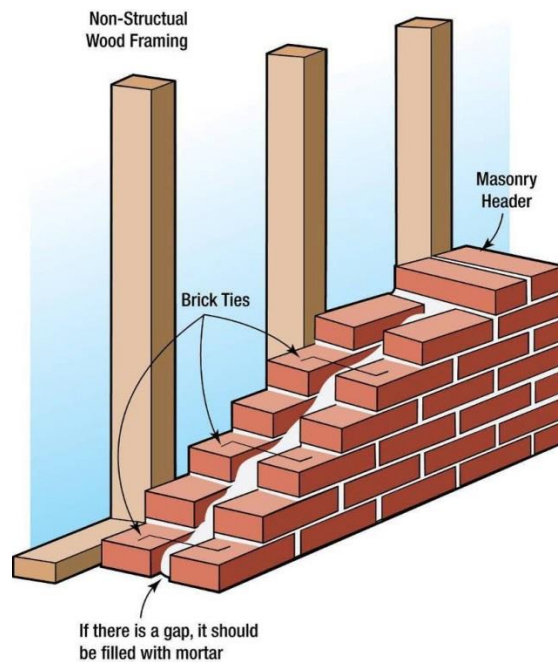


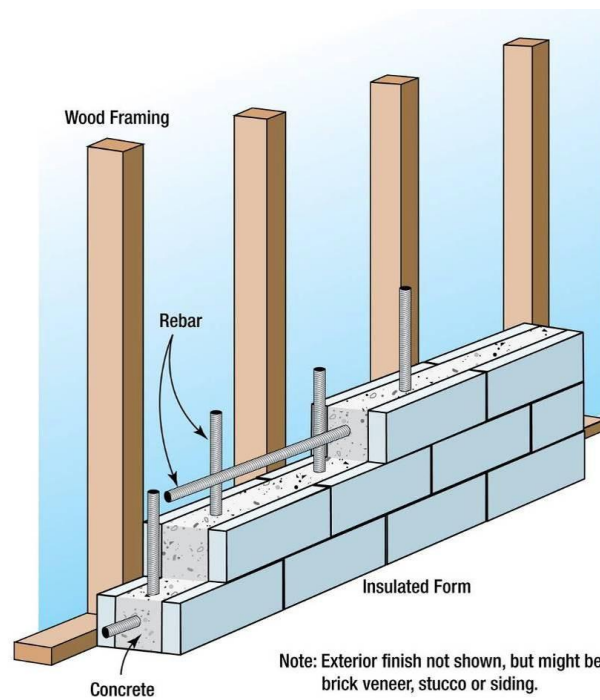
Figure 10-2: Stud-framed superstructure

- **Common Brick** – Brick units are stacked and mortared together to make up the exterior wall and provide the exterior structural system (see Figure 10-3). The interior system can be wood-framed or constructed of additional brick-wall systems. These systems can be either unreinforced or reinforced using steel rods.



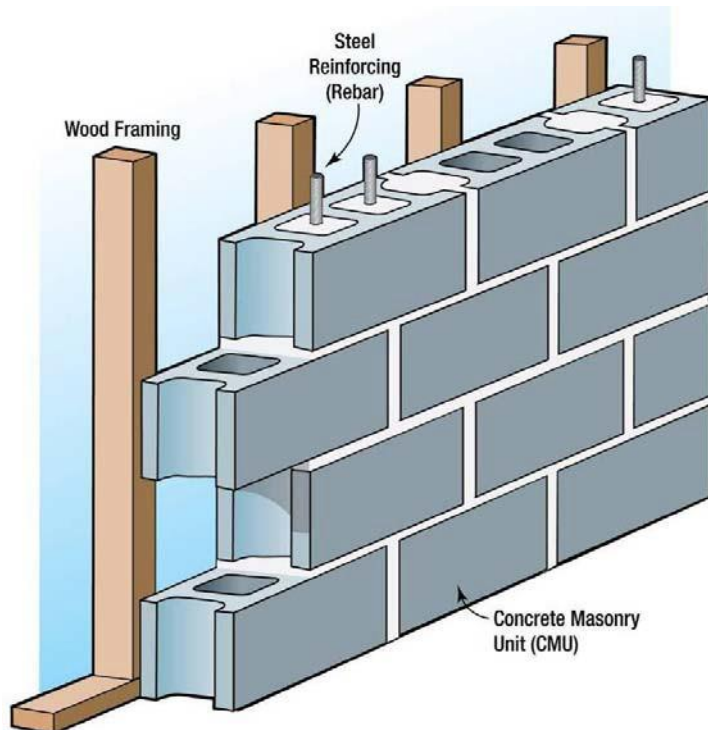
**Figure 10-3: Common brick superstructure**

- **Insulating Concrete Form (ICF)** – This building system uses a synthetic insulation-forming system filled with concrete (see Figure 10-4). This system requires an exterior finish of at least brick veneer, stucco, or siding to provide water resistance.



**Figure 10-4: Insulating Concrete Form (ICF) superstructure**

- **Masonry** – Concrete masonry units (CMUs) are stacked and mortared together to make up the exterior wall and provide the exterior structural system (see Figure 10-5). The interior system can be wood-framed or constructed of additional CMU wall systems. The systems can be unreinforced or reinforced using steel rods. This superstructure type may have no exterior finish, leaving the block exposed, or traditional cement-based stucco, exterior insulation finishing system (EIFS), or other exterior finishes may be attached to the CMU walls.



**Figure 10-5: Masonry superstructure**

Examples of these superstructure types are shown in Figure 10-6. The structures in the figure are in various stages of construction or have been damaged. The damaged or under-construction states provide a visible cross section of an exterior wall or a refinish depiction.





Stud-framed (Standard)



Common Brick



Insulating Concrete Form



Masonry

**Figure 10-6: Superstructure types with damage or in an unfinished state**

### 10.1.3 Roofing

Common roof coverings used throughout the United States that are similar in performance and cost to standard shingled-roof covering are considered as standard shingles to reduce the number of roofing options in the SDE tool. Storm events with high winds can cause damage to roof coverings.

The residential roof covering options in the SDE tool are described below and shown in Figure 10-7.

- **Shingles (Asphalt, Wood, or Fiberglass)** – This is the most common type of roof covering in the United States. Shingles are installed in overlapping arrangements. Shingles can have different wind resistance ratings, but also depend on their fasteners for proper resistance.
- **Clay Tile** – The tiles are often placed in parallel rows, with each row overlapping the row below it in order to hide the fastener and prevent water intrusion.
- **Standing Seam (Metal)** – These roofs are composed of metal panels that are crimped together to form the roof covering. They typically have long life spans and good durability while typically costing significantly more than shingles.



- **Slate** – Slate roof coverings are less common than most roof coverings because of high costs. Slate roofing can appear similar to clay tile but has different costs, performance, and material properties.



Asphalt Shingle Roof



Clay Tile Roof



Standing Seam Metal Roof



Slate Roof

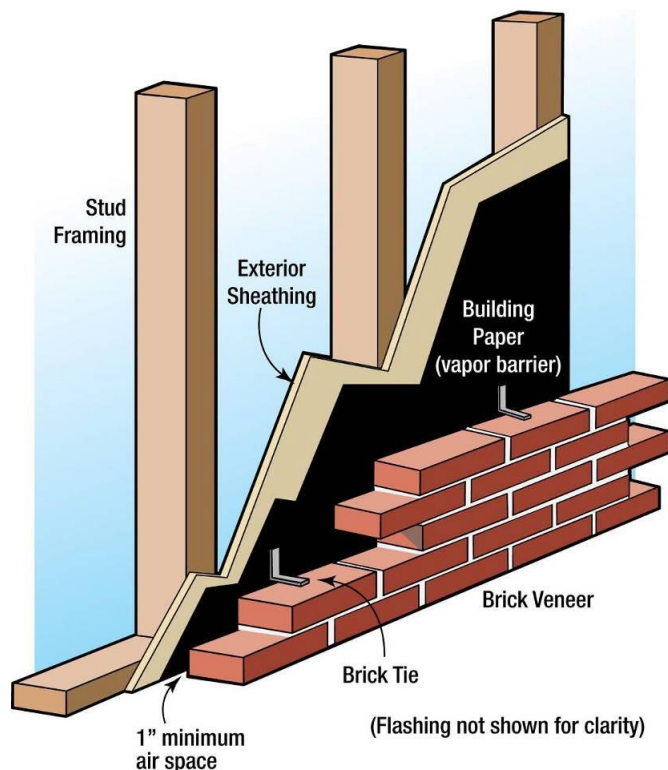
**Figure 10-7: Types of roof coverings**

#### 10.1.4 Exterior Finish Types

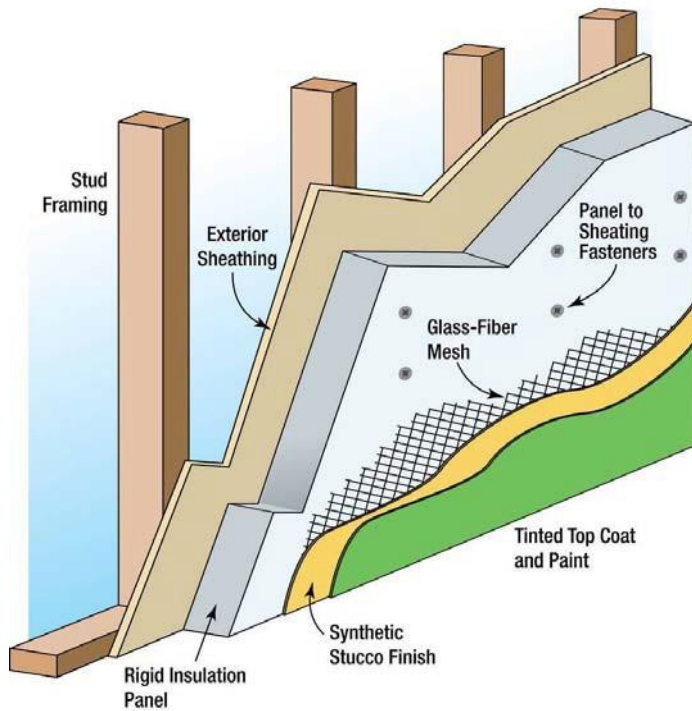
The exterior finish system's primary contributions to a structure are weatherproofing and aesthetics. An exterior finish is non-structural and therefore not required if the wall material provides sufficient weather protection. For example, some older homes may have structural walls composed of brick that serve as both a structural support system and exterior finish. Newer construction may have CMU walls with no exterior finish. Preferably, all types of exterior finishes have a waterproof barrier between them and the underneath sheathing or other structural element. The SDE tool provides the following exterior finish selections as Structure Attributes:

- **Siding or Stucco (Standard)** – The most common type of residential exterior finish in the United States is stucco or aluminum, clapboard, and wood or vinyl siding. The purpose is to protect the structure from the elements of heat/cold, rain/snow, sun, and up to a certain degree, wind while also adding an aesthetic feature through color or style. Most sections of siding are smaller than the walls they cover. Stucco involves a finish that is similar to a plaster or thin concrete compound that is mixed and applied wet onto concrete blocks, bricks, or sheets of wire mesh (metal lath) that help adhesion to the exterior of the wall.

- **Brick veneer** – A brick veneer is applied to the exterior sheathing of a stud-framed or masonry structure (see Figure 10-8). The bricks are attached using brick ties nailed to the exterior sheathing. Most brick veneers have air space between the inside face of the brick and the exterior sheathing.
- **Exterior Insulation Finishing System (EIFS)** – This option involves a non-load bearing exterior wall covering. It typically consists of several layers of materials sandwiched together into a single panel, which is then attached either adhesively or mechanically to the sheathing mounted on the outside of the wall studs. An EIFS wall normally has an exterior finish that includes an integrally reinforced base coat and a textured protective finish coat. Although the exterior is water resistant, the wall can be weakened by moisture that becomes trapped behind the wall. Once an EIFS wall has been weakened, it is more likely to be torn away or penetrated by high winds and windborne debris. If wind enters a building, the likelihood of severe structural damage increases, and the contents of the building will be exposed to the elements (see Figure 10-9).
- **None (common brick or structural)** – This option should be selected when common brick is used (brick units are stacked and mortared together to make up the exterior structural system and the exterior finish) or when another structural material (such as CMU or ICF) is used for both the exterior wall and the exterior finish.



**Figure 10-8: Brick veneer**



**Figure 10-9: Exterior insulation finishing system**

### 10.1.5 Heating, Ventilation, and Air-Conditioning

Residential structures in some areas of the country do not have heating, ventilation, and air-conditioning (HVAC) systems, especially in warmer or mild climates. The SDE tool defaults to residential structures having an HVAC system. However, the user can select no HVAC. The costs for a single system (i.e., heating or cooling alone) and a combined system that provides both heating and cooling are similar enough for the purposes of SDE. The user can select HVAC system for both heating and cooling or only one of them, or no type of system.

### 10.2 Non-Residential Structure Attributes

Non-residential structures vary considerably in use, design, performance requirements, construction materials, and in the complexity of their structural elements, mechanical systems, and plumbing systems. The SDE tool offers a simplified, basic damage estimate for damage to non-residential structure. Some non-residential structures have unique building materials or construction methods or have uses that may require a more detailed approach to determine an accurate estimate of damage. For larger or more complex structures, custom damage determinations by a contractor, appraiser, or an individual experienced in damage estimation are recommended.

Use of the SDE tool is similar for residential and non-residential structures, with some notable differences in the required data entries because of the way the element percentages are derived. The following sections describe the structure information that must be provided to adequately evaluate damage for non-residential structures in the SDE tool.

#### 10.2.1 Number of Stories

For the purposes of the SDE tool, non-residential structures are divided into three categories for the number of stories: one, two to four, and five or more stories. The user must select the number of stories before proceeding to other data entry fields. The number of stories is important because subsequent structure attributes and the element percentage arrays depend on this information.

#### 10.2.2 Structure Use

For non-residential structures, construction type is not used directly as the basis for determining the element percentage array. Instead, structure use and the number of stories are the determining factors for the array. For each structure use, the SDE tool uses representative structure types and the structure attributes to determine the element percentage arrays. Although the user does not choose the superstructure type, foundation type, and other attributes, these characteristics are assigned based on the representative structures for each use and are built into the element percentage arrays. Table 10-2 shows the structure uses and number of stories that are available in the SDE tool.

The SDE tool contains the most common non-residential structure types, but does not provide for every possible combination of number of stories and structure use. If the tool does not provide an exact match for the subject structure use after the number of stories has been selected, then selecting the structure use closest to the structure's actual attributes is recommended.

**Table 10-2: Non-Residential Structure Uses and Number of Stories in the SDE Tool**

Structure Use	Number of Stories			Structure Use	Number of Stories		
	1	2 to 4	5 or More		1	2 to 4	5 or More
Apartments	✓	✓	✓	Hotel			✓
Auditorium	✓			House of worship	✓		
Commercial retail	✓			Industrial		✓	
Convenience store	✓			Long-term care facility	✓	✓	
Courthouse	✓	✓		Mini-warehouse	✓		
Department store	✓	✓		Motel	✓	✓	
Elementary school	✓			Municipal building	✓	✓	
Fast food restaurant	✓			Office building	✓	✓	✓
Fire station	✓			Police station	✓	✓	
Grocery store	✓			Restaurant	✓		
High school		✓		Strip mall	✓		
Hospital	✓	✓	✓				

The structure uses available for SDE non-residential assessments cover a broad range of uses and consider more than the structure type. For example, the demands on a hospital HVAC system are very different from those of a warehouse, and the number of bathrooms in a hotel is different from the number in an elementary school. However, it is also useful for the user to understand the types of materials and construction that are considered for each structure use in the SDE tool. Tables 10-3, 10-4, and 10-5 list the basic construction materials for each structure use. For some of the structure uses, more than one representative structure is used to determine the element percentages. In these cases, the use is listed twice with the different characteristics of the representative structures.

### 10.2.3 Selecting a Best Fit Structure Use for Non-Residential Structures

The 22 uses for non-residential structures in the SDE tool may not contain all the structure uses in an inspection area. The list of uses could easily exceed 100, but such a lengthy list would be overwhelming and impractical for most SDE tool users, especially those without a background in non-residential construction or inspection. The current list is based on a balance between too many and too few uses while offering a reasonable range of structure heights (number of stories) and functions. Furthermore, the list of elements and the element percentages as part of the entire structure do not vary significantly for the non-residential structure uses beyond those in the current lists.

**Users should select the structure use that best fits the structure being inspected.** The following should be considered: structure use (whether the use is more like a factory, a warehouse, or an office building), building materials (schools and hospitals have different

## Structure Attributes

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construction materials than a warehouse), and variations in quality (warehouses and factories are usually of a lower quality construction than an office building or house of worship). For example, the options for a school are a one-story elementary school and a two- to four-story high school. The best choice for a two-story middle school would be a high school because of its additional features compared to an elementary school (larger gym, larger auditorium, pool), as well as the number of stories. Similarly, the best choice for a medical office would be an office building rather than a hospital. Additional considerations would include when a building has obviously been repurposed for another use such as a fire station that has been turned into an office building. The extent of the renovations would determine which use should be chosen.

Table 10-3: Construction Details for One-Story Buildings

Structure Use	Exterior Finish	Superstructure	Floor Area (square feet)	Roof Support
Apartment building	Wood siding	Wood frame	7,500	Wood truss
Commercial/industrial factory	CMU	CMU/steel frame	30,000	Steel joist
Convenience store	Wood siding	Wood frame	4,000	Wood truss
Courthouse	Brick, stone, or concrete	Reinforced concrete frame	30,000	Cast-in-place concrete
Department store No. 1	Brick veneer	CMU/steel frame	110,000	Steel joist
Department store No. 2	Brick veneer	Reinforced concrete frame	110,000	Precast concrete
Elementary school	Brick veneer	CMU	45,000	Steel joist
Fire/police station	Brick veneer	CMU/steel frame	6,000	Steel joist
Grocery store	Brick veneer	Steel frame	32,000	Steel joist
Hospital	Brick veneer	Steel frame	18,500	Steel joist
Mini-warehouse	CMU	Steel frame	20,000	Precast concrete
Motel	Brick veneer	Wood frame	8,000	Wood truss
Office building	EIFS	Metal studs and steel joists	7,000	Steel joist
Restaurant No. 1	Wood siding	Wood frame	5,000	Wood truss
Restaurant No. 2	Brick veneer	CMU/steel frame	5,000	Steel joist
Strip mall No. 1	CMU	Steel joists	20,000	Wood truss
Strip mall No. 2	Split-face concrete block	Steel frame	18,000	Steel joist

CMU = concrete masonry unit  
EIFS = exterior insulation finishing system

**Table 10-4: Construction Details for Two- to Four-Story Buildings**

<b>Structure Use</b>	<b>Exterior Wall Type</b>	<b>Structural System</b>	<b>Floor Area (square feet)</b>	<b>Roof Support</b>
Apartment building	Brick veneer	CMU/steel frame	22,500	Steel joist
Courthouse	Brick veneer	Steel frame	60,000	Cast-in-place concrete
Department stores	Brick veneer	Steel frame	95,000	Steel joist
High school	Brick veneer	Reinforced concrete frame	130,000	Cast-in-place concrete
Hospital No. 1	Brick veneer with structural facing tile	Reinforced concrete frame	55,000	Cast-in-place concrete
Hospital No. 2 (deep foundation)	Brick veneer	Reinforced concrete frame	55,000	Cast-in-place concrete
Industrial	Brick veneer	Reinforced concrete frame	90,000	Cast-in-place concrete
Motel	Decorative concrete block	Precast concrete	49,000	Precast concrete
Office building No. 1	Brick veneer	CMU/steel frame	20,000	Steel joist
Office building No. 2	Glass and metal curtain wall	Reinforced concrete frame	20,000	Cast-in-place concrete
Police station	Limestone	CMU	11,000	Steel joist

CMU = concrete masonry unit



**Table 10-5: Construction Details for Buildings with Five or More Stories**

<b>Structure Use</b>	<b>Exterior Wall Type</b>	<b>Structural System</b>	<b>Floor Area (square feet)</b>	<b>Roof Support</b>
Apartment building	Brick veneer	CMU/steel frame	60,000	Steel joist system
Hospital	Brick veneer	CMU/steel frame	200,000	Steel joist system
Hotel	Brick veneer	CMU/steel frame	135,000	Steel joist system
Office building No. 1	Precast concrete panel	Steel frame	80,000	Steel joist system
Office building No. 2	Precast concrete panel	Steel frame	80,000	Steel joist system
Office building No. 3	Glass and metal curtain walls	Steel frame	80,000	Steel joist system

CMU = concrete masonry unit

### 10.2.4 Fire Suppression/Sprinkler Systems

A fire suppression system, referred to as a sprinkler system in the SDE tool, affects the element percentage array for the plumbing element. Users should assume that five-story and taller structures have a sprinkler system. The default value in the SDE tool is no sprinkler system for one- to four-stories so the user must select this attribute for structures with fewer than five stories.

### 10.2.5 Conveyance

Because conveyance systems, which include escalators and elevators, can affect the electrical element percentage, the tool has an option for conveyance systems in a two- to four-story structure. The default in the SDE tool is no conveyance system in two- to four-story structures.

The user does not need to select conveyance for one-story and five-story or more structures. One-story structures do not have conveyance, and structures with five or more stories are assumed to have conveyance, which is considered in the element percentage arrays for these structures.

Table 10-6 summarizes SDE non-residential attributes and inspection options.

**Table 10-6: Summary of SDE Non-Residential Structure Attributes and Inspection Options**

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<b>Number of Stories:</b>	<b>Cause of Damage:</b>
<ul style="list-style-type: none"><li>• 1</li><li>• 2 thru 4</li><li>• 5 or more</li></ul>	<ol style="list-style-type: none"><li>1. Fire</li><li>2. Flood</li><li>3. Flood and Wind</li><li>4. Seismic</li><li>5. Wind</li><li>6. Other</li></ol>

---

<b>Structure Use:</b>	
<ol style="list-style-type: none"><li>1. Apartments</li><li>2. Auditorium</li><li>3. Commercial Retail</li><li>4. Convenience Store</li><li>5. Courthouse</li><li>6. Department Stores</li><li>7. Elementary School</li><li>8. Fast Food Restaurant</li><li>9. Fire / Police Station</li><li>10. Grocery Store</li><li>11. High School</li></ol>	<ol style="list-style-type: none"><li>12. Hospital</li><li>13. Hotel</li><li>14. House of Worship</li><li>15. Industrial</li><li>16. Long-Term Care Facility</li><li>17. Mini-Warehouse</li><li>18. Motel</li><li>19. Municipal Building</li><li>20. Office Building</li><li>21. Restaurants</li><li>22. Strip Mall</li></ol>

---

**Sprinkler System:**

- Yes
- No

**Damage Undetermined?**

1. No Physical Damage Sustained
2. Vacant Lot / Property
3. Resident Refused Inspection
4. Address Does Not Exist
5. Other

---

**Conveyance** (elevator or escalator):

- Yes
- No

**Regulatory Floodway:**

1. Yes
2. No
3. Possible

---

**Quality** (of initial construction):

1. Low
2. Budget
3. Average
4. Good
5. Excellent

**Depreciation Rating**

1. Very Poor Condition – 88.9%
  2. Requires Extensive Repairs – 66.5%
  3. Requires Some Repairs – 38.8%
  4. Average Condition – 24.2%
  5. Above Average Condition – 13.4%
  6. Excellent Condition (less than 2 years old, no visible deterioration) – 2.9%
  7. Other (inspector must add an explanation)
-

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## SECTION 11 POST-DETERMINATION ACTIVITIES

After all the data are collected, recorded, and finalized (by determining that the assessments do not require any additional or revised data), the community must initiate follow-up activities to distribute and enforce the results of the Substantial Damage determinations. The community should, as a minimum, consider the following activities:

1. Inform other community officials about the determinations and the NFIP requirements for reconstructing substantially damaged structures.
2. Prepare a press release to explain the determination process and the implications of the determinations.
3. Prepare and distribute a “determination letter” with the name and telephone number of a community contact (see Appendix C for sample determination letters). The letter should state that the determination is required under the community’s floodplain management ordinance and should specify that all rebuilding, improvements, or new construction in the regulatory floodplain requires a community permit.
4. Post notices of Substantial Damage or unsafe conditions on structures as appropriate.
5. Identify publications from FEMA, the American Red Cross, and State or local agencies that provide guidance on rebuilding after a disaster.
6. Identify potential mitigation measures for the community and individual residents.
7. Identify and implement appeal procedures.
8. Notify the State NFIP Coordinator’s office of the results of the Substantial Damage determinations and determine what, if any, additional activities are required.
9. Store the SDE data.

At a minimum, the community should complete activities 1, 2, 3, 4, and 9.

### 11.1 Substantial Damage Determination Letters

Determination letters should have the same format and be mailed to all residents and structure owners in the inventory, including those without Substantial Damage. Sample letters for both Substantial Damage and Non-Substantial Damage determinations are provided in Appendix C. The samples are provided as guidance, and using them is encouraged but not required.

The letters should be mailed after all data have been collected and the determinations have been signed and dated by a community official. The community should determine enforcement procedures for properties with letters that are undeliverable. Visiting these structures may be necessary to verify that reconstruction has not started without the required local permits.

#### 11.1.1 Non-Substantially Damaged Structures

As mentioned above, owners of structures that are determined to not be substantially damaged should also be notified of their determination. The letter of determination should include a

## Post-Determination Activities

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reminder that building permits are required for repairs and reconstruction and a list of necessary permits and permit fees, along with contact information for relevant community departments.

### **11.1.2 Substantially Damaged Structures**

The community should request a meeting with the owners of substantially damaged structures to explain the NFIP Substantial Damage requirements and discuss the structure owners' options for repair or rebuilding. The date and location of the meeting should be included in the determination letter.

## **11.2 Revising Substantial Damage Determinations Based on Structure Owner Data**

Some structure owners may submit additional or more detailed information than was used during the determination process after they have received the determination letter. The community must evaluate the information and determine whether revising the existing determination is appropriate. If the determination is revised, enforcement of the Substantial Damage requirements will be based on the new determination.

All structure owners have the option of submitting additional or more detailed data and requesting a revised determination, but the community is not required to revise determinations based on the results of the re-evaluation. In addition, the community is not required to reimburse structure owners for professional appraisals if an existing determination is reversed based on an appraisal paid for by the structure owner.

The community should maintain thorough documentation in its files for any reversals of Substantial Damage determinations. The documentation should include all supporting materials used to justify the reversal (e.g., contractor's estimate, property appraisal, SDE records) and should clearly document the reason the initial determination was reversed. Because enforcement of the Substantial Damage regulations is a key part of a community's floodplain management responsibilities under the NFIP, a review of Substantial Damage determinations (and determination reversals) may be conducted as part of a future FEMA Community Assistance Visit (CAV). State floodplain management or FEMA officials conduct CAVs periodically to assess a community's compliance with NFIP-required floodplain management enforcement.

For a community to remain in good standing with the NFIP, the community must show that it is adequately enforcing these regulations. Communities that do not retain good standing with the program are subject to probation or suspension from the program, which can have significant consequences for the community's residences and business owners with structures in the SFHA. Consequences include the loss of federally backed flood insurance and limited Federal disaster aid following declared flood events (i.e., no aid for the permanent repair or reconstruction of insurable structures in SFHAs).

### 11.3 Storage of Final SDE Data

After the SDE inspections have been completed, the SDE Manager must determine the process and format for storing the work generated by the SDE inventory project. SDE data storage should not be started until after the Substantial Damage determination letters have been sent to the structure owners and the appeal process (if any) has been completed. The items to consider for SDE data storage include:

- Storage of electronic data (i.e., the SDE database). At a minimum, the final SDE database file should be exported from the SDE tool and stored on a CD or DVD. If the community decides to leave the SDE data on a computer, a backup of the data should be made by copying the data to blank media.
- Electronic backups should also be made of all other project-generated guidance, forms, SDE reports, form letters, and individual determination letters, including:
  1. Unit cost tables, including source and date
  2. Guidelines for resident interaction
  3. Checklists for pre-disaster planning and field preparations
  4. Permit requirements in effect at the time of the Substantial Damage determinations
  5. PDF versions of the individual 5-page SDE determination reports and the community-wide reports
  6. Copies of the form letters used for introduction and determinations
  7. Copies of the final, individual determination and appeal resolution letters or forms
  8. Public hearing or appeal meeting notes and resolutions

If the inspection data were recorded manually on the SDE Damage Inspection Worksheets, the SDE Manager should determine whether the hard copy data should be retained in addition to the electronic version discussed above. If the hard copies of the inspection forms are retained, the SDE Manager may want these to be retained for a set period (6 or 12 months) before destroying.

#### **Personal Identifiable Information (PII)**

Both the electronic and hard copy SDE data contain Personal Identifiable Information (PII) that a community has an obligation to protect and ensure that it does not become public. Therefore, the SDE Manager may want to consider encrypting the electronic files containing any PII data with a password and shredding any hard copies of SDE inspections or other data when these data are no longer required.

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**Appendix A**  
**FEMA Regional Office Locations**

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**REGION I**

Federal Emergency Management Agency  
 99 High Street, 6th Floor  
 Boston, MA 02110  
 (617) 956-7506

**REGION II**

**New Jersey and New York**  
 Federal Emergency Management Agency  
 26 Federal Plaza  
 New York, NY 10278-0002  
 (212) 680-3600

**Puerto Rico and Virgin Islands**

*Mailing address:*  
 Federal Emergency Management Agency,  
 Caribbean Division  
 PO Box 70105  
 San Juan, PR 00936-0105

*Physical address:*  
 Federal Emergency Management Agency  
 New San Juan Office Bldg.  
 159 Calle Chardon, 6th Floor  
 Hato Rey, PR 00918  
 (787) 296-3500

**REGION III**

Federal Emergency Management Agency  
 615 Chestnut Street  
 One Independence Mall, Sixth Floor  
 Philadelphia, PA 19106-4404  
 (215) 931-5500

**REGION IV**

Federal Emergency Management Agency  
 3003 Chamblee Tucker Road  
 Atlanta, GA 30341  
 (770) 220-5200

**REGION V**

Federal Emergency Management Agency  
 536 South Clark St., 6th Floor  
 Chicago, IL 60605  
 (312) 408-5500

**REGION VI**

Federal Emergency Management Agency  
 800 North Loop 288  
 Denton, TX 76209-3698  
 (940) 898-5399

**REGION VII**

Federal Emergency Management Agency  
 9221 Ward Parkway, Suite 300  
 Kansas City, MO 64114-3372  
 (816) 283-7061

**REGION VIII**

Federal Emergency Management Agency  
 Denver Federal Center  
 Building 710, Box 25267  
 Denver, CO 80255-0267  
 (303) 235-4800

**REGION IX**

Federal Emergency Management Agency  
 1111 Broadway, Suite 1200  
 Oakland, CA 94607-4052  
 (510) 627-7100

**REGION X**

Federal Emergency Management Agency  
 Federal Regional Center  
 130 228th Street, Southwest  
 Bothell, WA 98021-8627  
 (425) 487-4600

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**Appendix B**  
**Forms and Checklists**

## **Appendix B: Forms and Checklists**

1. Blank SDE Damage Inspection Worksheets – Single, Town or Row House, or Manufactured House
2. Blank SDE Damage Inspection Worksheets – Non-Residential Structures
3. Checklist 1 – Post-Disaster Planning
4. Checklist 2 – Field Preparations
5. Photo Log

# Residential

## SDE DAMAGE INSPECTION WORKSHEET

**Single-Family, Town or Row House (Site Built Residences), or Manufactured House**

Address: \_\_\_\_\_

### **SDE ADDRESS Tab**

#### ***Subdivision / Community Information***

Subdivision: \_\_\_\_\_ Parcel Number: \_\_\_\_\_

Lot Number: \_\_\_\_\_ Elevation of Lowest Floor: \_\_\_\_\_ Datum: \_\_\_\_\_

#### ***Community Information***

NFIP Community ID: \_\_\_\_\_ NFIP Community Name: \_\_\_\_\_

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

#### ***Building Address***

Owner First Name: \_\_\_\_\_ Owner Last Name: \_\_\_\_\_

Street Number: \_\_\_\_\_ Street Name: \_\_\_\_\_ Street Suffix: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

County/Parish: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

#### ***Mailing Address***

***Check here if same as building address: \_\_\_\_\_***

First Name: \_\_\_\_\_

Last Name: \_\_\_\_\_

Street Number: \_\_\_\_\_ Street Name: \_\_\_\_\_ Street Suffix: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

County/Parish: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

**SDE STRUCTURE / DAMAGE / NFIP INFO Tab**

***Structure Attributes / Information***

Residence Type:  Single Family  Town or Row House  Manufactured House

Foundation:  Continuous Wall w/Slab (Standard)  Basement  Crawlspace  
 Piles  Slab-on-Grade  Piers and Posts

Superstructure:  Stud-Framed (Standard)  Common Brick  ICF  Masonry

Roof Covering:  Shingles – Asphalt, Wood (Standard)  Clay Tile  Standing Seam (Metal)  
 Slate

Exterior Finish:  Siding or Stucco (Standard)  Brick Veneer  EIFS  
 None – common brick, structural

HVAC System:  Heating and/or Cooling  None

Story:  One Story (Standard)  Two or More Stories

***Structure Information***

Year of Construction: \_\_\_\_\_

Quality of Initial Construction:  Low  Budget  Average  Good  Excellent

Residence Information (if needed): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

***Inspector / Damage Information***

Inspector's Name: \_\_\_\_\_ Inspector's Phone: \_\_\_\_\_

Date of Inspection (mm/dd/yyyy): \_\_\_\_\_ Date Damage Occurred (mm/dd/yyyy): \_\_\_\_\_

Cause of Damage:  Fire  Flood  Flood and Wind  Seismic  Wind  Other

Cause of Damage (if "Other" is selected): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**SDE STRUCTURE / DAMAGE / NFIP INFO Tab**

Damage Undetermined: \_\_\_\_\_ (check here and check the reason below):

\_\_\_\_\_ No Physical Damage Sustained    \_\_\_\_\_ Vacant / Property    \_\_\_\_\_ Resident Refused Inspection  
\_\_\_\_\_ Address Does Not Exist    \_\_\_\_\_ Other (Explain)

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Duration of Flood: \_\_\_\_\_ Hours    \_\_\_\_\_ Days

Depth of Flood Above Ground (estimated to nearest 0.5 foot): \_\_\_\_\_

Depth of Flood Above Lowest Floor (estimated to nearest 0.5 foot): \_\_\_\_\_

***NFIP / Community Information***

FIRM Panel Number: \_\_\_\_\_ Suffix: \_\_\_\_\_ Date of FIRM Panel (mm/dd/yyyy): \_\_\_\_\_

FIRM Zone: \_\_\_\_\_ Base Flood Elevation: \_\_\_\_\_

Regulatory Floodway: \_\_\_ Yes    \_\_\_ No    \_\_\_ Possible

***Community Information (if needed):*** \_\_\_\_\_

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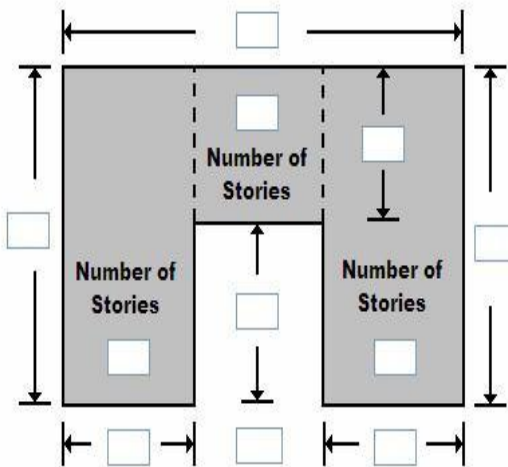
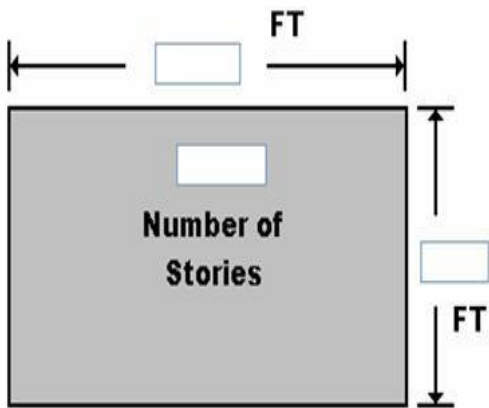
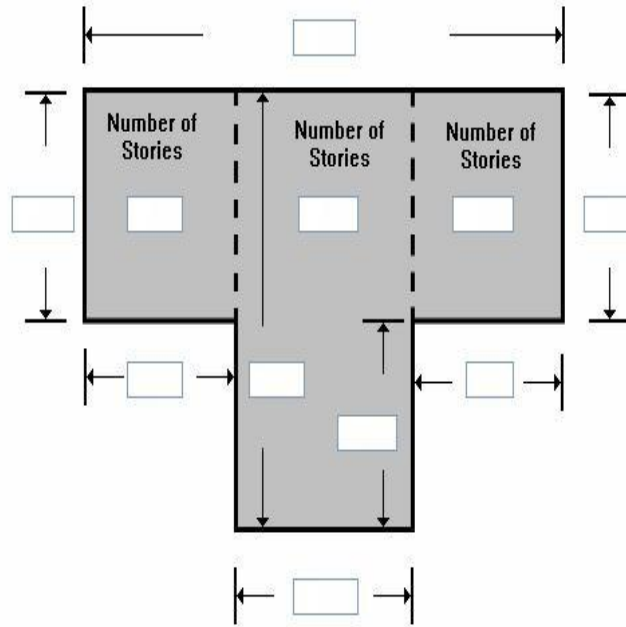
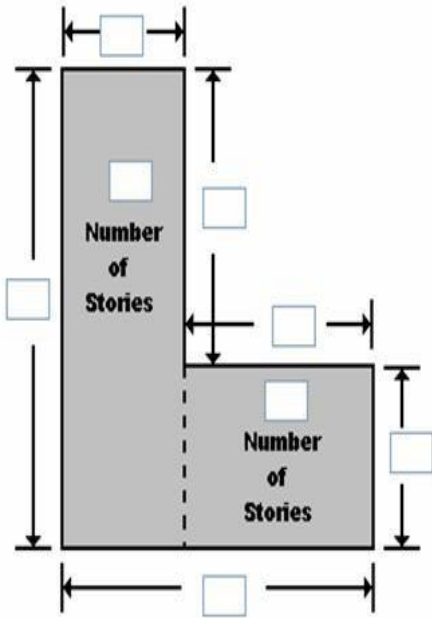
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**COST Tab**

Select appropriate diagram of structure footprint and enter structure dimensions and the number of stories:



**COST Tab**

***Square Footage***

Base Cost per Sq Ft.: \_\_\_\_\_ Total Square Footage: \_\_\_\_\_

Geographic Adjustment: \_\_\_\_\_

***Cost Adjustments***

<b><u>Single-Family House</u></b>	<b><u>Quantity</u></b>	<b><u>Units</u></b>	<b><u>Unit Cost</u></b>	<b><u>Item Cost</u></b>
Roofing		Sq Ft		
Heating / Cooling		Each		
Appliances		Each		
Fireplaces		Each		
Porch / Breezeways		Sq Ft		
Garage		Sq Ft		
<b><u>Manufactured House</u></b>	<b><u>Quantity</u></b>	<b><u>Units</u></b>	<b><u>Unit Cost</u></b>	<b><u>Item Cost</u></b>
Expando		Sq Ft		
Carport		Sq Ft		
Open Porch		Sq Ft		
Enclosed Porch		Sq Ft		
Decks		Each		
Skirting		Sq Ft		
Fireplaces		Each		

**COST Tab**

***Additional Cost Adjustments***

<u>Adjustments</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Item Cost</u>

**Cost Data Reference** (source or name): \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

**Cost Data Date:** \_\_\_\_\_

**Note:** The computed **Actual Cash Value (ACV)** for the structure will be calculated once the square footage, base cost, cost adjustments, costs add-ons, and depreciation percentage are entered into the SDE tool.

**Depreciation Rating:**

- \_\_\_ 1. Very Poor Condition \_\_\_ 2. Requires Extensive Repairs \_\_\_ 3. Requires Some Repairs  
\_\_\_ 4. Average Condition \_\_\_ 5. Above Average Condition \_\_\_ 6. Excellent Condition \_\_\_ 7. Other

Depreciation Percentage (if 'Other' selected for Depreciation Rating): \_\_\_\_\_

Depreciation Explanation (if 'Other' selected for Depreciation Rating): \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**ELEMENT PERCENTAGE Tab**

**Note:** The inspector needs only enter the % **Damaged** data here. The data in the Element %, Item Cost, and Damage Values columns will be populated based on the selected attributes once all the data are entered into the SDE tool.

**Residence Type:** \_\_\_\_ Single-Family (SF) House \_\_\_\_ Townhouse \_\_\_\_ Manufactured House (MH)

<b><u>Item</u></b>	<b><u>% Damaged</u></b>	<b><u>Element %</u></b>	<b><u>Item Cost</u></b>	<b><u>Damage Values</u></b>
Foundation (not required for MH)				
Superstructure				
Roof Covering				
Exterior Finish				
Interior Finish				
Doors and Windows				
Cabinets and Countertops				
Flood Finish				
Plumbing				
Electrical				
Appliances				
HVAC				
Skirting / Forms Piers (MH only)				

**SDE OUTPUT SUMMARY Tab – Optional User Entered Data**

**Professional Market Appraisal:** \_\_\_\_\_

**Tax Assessed Value:** \_\_\_\_\_ **Tax Factor Adjustment:** \_\_\_\_\_

**Adjusted Tax Assessed Value:** \_\_\_\_\_

**Contractor's Estimate of Damage:** \_\_\_\_\_

**Community's Estimate of Damage:** \_\_\_\_\_

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# Non-Residential

## SDE DAMAGE INSPECTION WORKSHEET

Address: \_\_\_\_\_

### **SDE ADDRESS Tab**

#### **Subdivision / Community Information**

Subdivision: \_\_\_\_\_ Parcel Number: \_\_\_\_\_

Lot Number: \_\_\_\_\_ Elevation of Lowest Floor: \_\_\_\_\_ Datum: \_\_\_\_\_

#### **Community Information**

NFIP Community ID: \_\_\_\_\_ NFIP Community Name: \_\_\_\_\_

Latitude: \_\_\_\_\_ Longitude: \_\_\_\_\_

#### **Building Address**

Owner First Name: \_\_\_\_\_

Owner Last Name: \_\_\_\_\_

Street Number: \_\_\_\_\_ Street Name: \_\_\_\_\_ Street Suffix: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

County/Parish: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

#### **Mailing Address**

**Check here if same as building address:** \_\_\_\_\_

First Name: \_\_\_\_\_

Last Name: \_\_\_\_\_

Street Number: \_\_\_\_\_ Street Name: \_\_\_\_\_ Street Suffix: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_

County/Parish: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Cell Phone: \_\_\_\_\_

**SDE STRUCTURE / DAMAGE / NFIP INFO Tab**

***Structure Attributes / Information***

Year of Construction: \_\_\_\_\_ Number of Stories: \_\_\_ 1 Story \_\_\_ 2 to 4 \_\_\_ 5 or more

Structure Use: \_\_\_\_\_

Sprinkler System: \_\_\_ Yes \_\_\_ No      Conveyance: \_\_\_ Yes \_\_\_ No

Quality of Initial Construction: \_\_\_ Low \_\_\_ Budget \_\_\_ Average \_\_\_ Good \_\_\_ Excellent

Structure Information (if needed): \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

***Inspector / Damage Information***

Inspector's Name: \_\_\_\_\_

Inspector's Phone: \_\_\_\_\_

Date of Inspection (mm/dd/yyyy): \_\_\_\_\_

Date Damage Occurred (mm/dd/yyyy): \_\_\_\_\_

Cause of Damage: \_\_\_ Fire \_\_\_ Flood \_\_\_ Flood and Wind \_\_\_ Seismic \_\_\_ Wind \_\_\_ Other

Cause of Damage (if 'Other' is selected): \_\_\_\_\_

\_\_\_\_\_

Damage Undetermined: \_\_\_\_\_ (check here and check the reason below):

\_\_\_ No Physical Damage Sustained    \_\_\_ Vacant / Property    \_\_\_ Resident Refused Inspection

\_\_\_ Address Does Not Exist    \_\_\_ Other (Explain)

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Duration of Flood: \_\_\_\_\_ Hours      \_\_\_\_\_ Days

Depth of Flood Above Ground (estimated to nearest 0.5 foot): \_\_\_\_\_

Depth of Flood Above Lowest Floor (estimated to nearest 0.5 foot): \_\_\_\_\_



**SDE STRUCTURE / DAMAGE / NFIP INFO Tab**

***NFIP / Community Information:***

FIRM Panel Number: \_\_\_\_\_ Suffix: \_\_\_\_\_ Date of FIRM Panel (mm/dd/yyyy): \_\_\_\_\_

FIRM Zone: \_\_\_\_\_ Base Flood Elevation: \_\_\_\_\_

Regulatory Floodway: \_\_\_ Yes \_\_\_ No \_\_\_ Possible

***Community Information (if needed):*** \_\_\_\_\_

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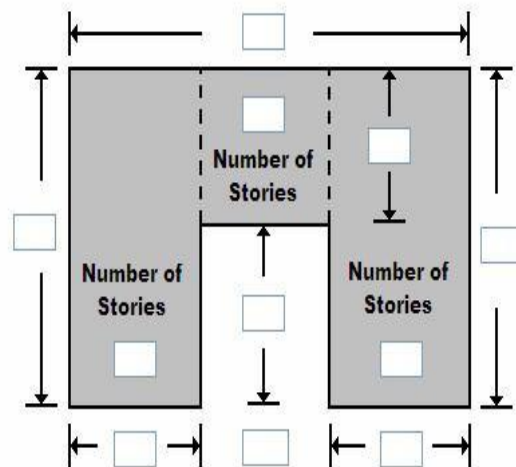
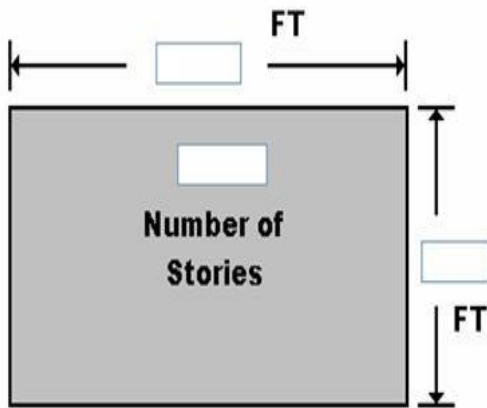
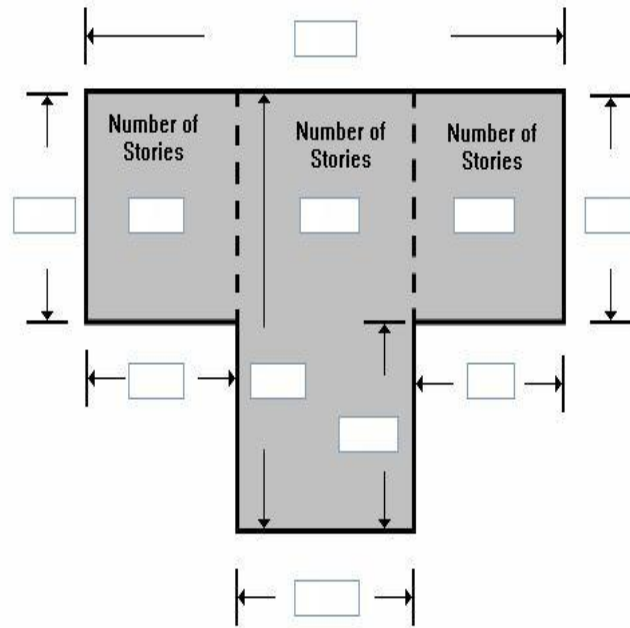
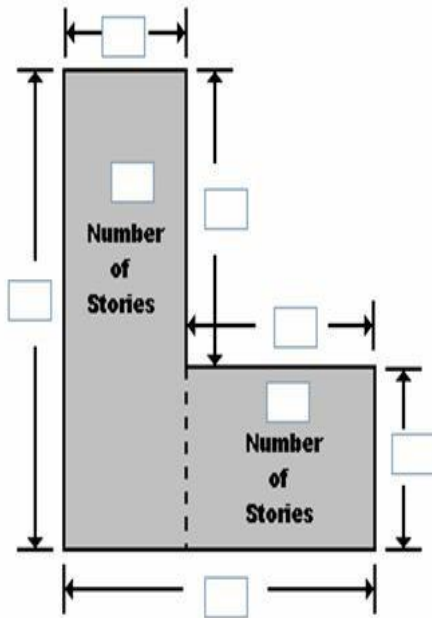
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**COST Tab**

Select appropriate diagram of structure footprint and enter structure dimensions and the number of stories:



**COST Tab**

***Square Footage***

Base Cost per Sq Ft.: \_\_\_\_\_ Total Square Footage: \_\_\_\_\_

Geographic Adjustment: \_\_\_\_\_

***Cost Adjustments***

<u>Adjustments</u>	<u>Quantity</u>	<u>Units</u>	<u>Unit Cost</u>	<u>Item Cost</u>

***Additional Cost Adjustments***

<u>Adjustments</u>	<u>Quantity</u>	<u>Unit Cost</u>	<u>Item Cost</u>

**Cost Data Reference** (source or name): \_\_\_\_\_

\_\_\_\_\_  
**Cost Data Date:** \_\_\_\_\_

**Note:** The computed **Actual Cash Value (ACV)** for the structure will be calculated once the square footage, base cost, cost adjustments, costs add-ons, and depreciation percentage are entered into the SDE tool.

**Depreciation Rating:**

\_\_\_\_ 1. Very Poor Condition \_\_\_\_ 2. Requires Extensive Repairs \_\_\_\_ 3. Requires Some Repairs  
 \_\_\_\_ 4. Average Condition \_\_\_\_ 5. Above Average Condition \_\_\_\_ 6. Excellent Condition \_\_\_\_ 7. Other

Depreciation Percentage (if 'Other' selected for Depreciation Rating): \_\_\_\_\_

Depreciation Explanation (if 'Other' selected for Depreciation Rating): \_\_\_\_\_

\_\_\_\_\_  
 \_\_\_\_\_

**ELEMENT PERCENTAGES Tab**

**Note:** The inspector needs only enter the % **Damaged** data here. The data in the Element %, Item Cost, and Damage Values columns will be populated based on the selected attributes once all the data are entered into the SDE tool.

<u>Item</u>	<u>% Damaged</u>	<u>Element %</u>	<u>Item Cost</u>	<u>Damage Values</u>
Foundation				
Superstructure				
Roof Covering				
Plumbing				
Electrical				
Interiors				
HVAC				

**SDE OUTPUT SUMMARY Tab – Optional User Entered Data**

Professional Market Appraisal: \_\_\_\_\_

Tax Assessed Value: \_\_\_\_\_ Factor Adjustment: \_\_\_\_\_

Adjusted Tax Assessed Value: \_\_\_\_\_

Contractor's Estimate of Damage: \_\_\_\_\_

Community's Estimate of Damage: \_\_\_\_\_

# Checklist 1 – Post-Disaster Planning

Need	Completed	Item
1. _____	_____	<p><b>Brief all elected officials as soon as possible after the event regarding the NFIP requirements for Substantial Damage determinations.</b></p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-758, <i>Substantial Improvement/Substantial Damage Desk Reference</i>, Chapter 7 (May 2010)</li> </ul>
2. _____	_____	<p><b>Select an SDE Manager.</b></p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 7.1 (August 2017)</li> </ul>
3. _____	_____	<p><b>Review NFIP requirements for Substantial Damage and Substantial Improvement.</b></p> <p>Sources:</p> <ul style="list-style-type: none"> <li>NFIP Regulations</li> <li>FEMA P-758, <i>Substantial Improvement/Substantial Damage Desk Reference</i> (May 2010)</li> <li>FEMA 213, <i>Answers to Questions About Substantially Damaged Buildings</i> (May 1991)</li> </ul>
4. _____	_____	<p><b>Review SDE tool and User Manual to understand the SDE data requirements.</b></p> <p>Sources:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 3 and 4 (August 2017)</li> <li>FEMA <i>SDE Best Practices</i> (August 2017)</li> <li>FEMA Substantial Damage Estimator Tool Frequently Asked Questions</li> </ul>
5. _____	_____	<p><b>Identify Flood Insurance Rate Maps (FIRMs) or other floodplain maps to review the boundaries of the SFHA.</b></p> <p>Data may include FIRMs, FBFMs, FIS reports, community maps showing previously flooded areas, and flood studies by State or other Federal agencies.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 8.1 (August 2017)</li> <li>Community NFIP coordinator</li> </ul>

## Checklist 1 – Post-Disaster Planning

Need	Completed	Item
6.	_____	<p><b>Identify type, location, and community contacts for tax or GIS data for structures within the SDE inventory area that are potentially Substantially Damaged.</b></p> <p>Any or all of the following data will be useful: owner name, building address, type of house, non-residential building use, year of construction, square footage, number of stories, adjusted building values, number of years since last tax adjustment, and dates of additions or renovations.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 8.1 (August 2017)</li> </ul>
7.	_____	<p><b>Identify community street, address, or tax maps for delineating the boundaries of the SFHA.</b></p> <p>This will help delineate the maximum limits of the SDE inventory area while also showing addresses or lot locations.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 7 (August 2017)</li> </ul>
8.	_____	<p><b>Transfer SFHA boundaries from floodplain map to a base map that includes streets, addresses, or a tax map.</b></p> <p>Using the effective FIRM for the community, transfer the SFHA boundaries to a base map with named streets and either addresses or lot boundary lines. This will delineate the maximum limits of the SDE inventory to narrow the focus of the inspections while avoiding areas outside the SFHA.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 8.1 and 9.3 (August 2017)</li> </ul>
9.	_____	<p><b>Perform a curbside review of structures within the SDE inventory area.</b></p> <p>This helps the SDE Manager understand the scope and extent of the inventory area as well as the initial construction quality, size, and type of structures that will require inspections.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 7.3 and 9.5 (August 2017)</li> </ul>

## Checklist 1 – Post-Disaster Planning

Need	Completed	Item
10.	_____	<p><b>Identify the property and structure access procedures for locked or unoccupied structures.</b></p> <p>These procedures should be written and well defined; the elected officials and community legal counsel should then review and approve them to ensure that the procedures are legal and defensible. As a minimum, these procedures should include guidance on owner/resident interaction, and requirements for entering open property and structures when owners/residents are not present or when occupants are present but refuse entry to the structure or property. In addition, inspectors with permission to enter a structure need to verify that the structure is structurally stable and safe to enter.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 8.2 and 9.1 (August 2017)</li> </ul>
11.	_____	<p><b>Pre-load available property data into the SDE tool.</b></p> <p>These data must be cross-referenced to a FIRM, address, or tax map so that the inspectors know which structure and property record are being inspected. Once the data are uploaded into the SDE tool, it will create property records. After the inspection is complete and the field data are entered, the records become SDE assessments.</p> <p>Sources:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 3.7, 7.5, and 8.1 (August 2017)</li> </ul>
12.	_____	<p><b>Identify the number and names of inspectors required for the inventory and form the inspection teams.</b></p> <p>The number of inspectors and inspection teams will determine the potential daily rate of completed inspections and a target completion date.</p> <p>Source:</p> <ul style="list-style-type: none"> <li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 8.2 (August 2017)</li> </ul>
13.	_____	<p><b>Identify inspection areas that may require permission or special access.</b></p> <p>Industrial parks, factories, private or gated subdivisions, islands, airports, school campuses, and other areas may require permission or other advance coordination to gain access to the property and structures.</p>

## Checklist 1 – Post-Disaster Planning

Need	Completed	Item
14.	_____	_____
		<p><b>Identify the proposed sequence of SDE inspections.</b></p> <p>Decide which subdivisions, neighborhoods, or areas will be inspected first, then next, and so on. The sequence will depend on the number of inspectors, their availability during the inspection process, the number of structures to inspect, and the proposed completion date of the inspections. The sequence may be revised as issues arise due to other post-disaster activities that may restrict or limit the inspection teams.</p> <p>Source:</p> <ul style="list-style-type: none"><li>• FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 8.2 (August 2017)</li></ul>
15.	_____	_____
		<p><b>Prepare a list of local contacts for all project personnel and local agencies.</b></p> <p>This list should include, as a minimum, the SDE Manager, a responsible community official, inspectors, office staff, and the police, fire, and emergency management contacts.</p> <p>Source:</p> <ul style="list-style-type: none"><li>• FEMA P-784, <i>SDE User Manual and Workbook</i>, Section 8.1 (August 2017)</li></ul>
16.	_____	_____
		<p><b>Research, obtain, or develop base costs for determining reasonable structure values for residential and non-residential structures in the community.</b> Resources include industry-accepted cost-estimating guides, building permit data, discussions with local contractors or realtors, adjusted tax data, guidance from adjacent communities, or personal experience with residential and non-residential cost estimating.</p> <p>Sources:</p> <ul style="list-style-type: none"><li>• FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 3.11, 8.1, and 8.4 (August 2017)</li></ul>



## Checklist 1 – Post-Disaster Planning

Need	Completed	Item
17.	_____	_____
		<p><b>Prepare a Letter of Introduction on community letterhead.</b></p> <p>The letter will be handed to occupants by the inspectors as they prepare to enter a new property. This should include, as a minimum, a brief discussion of the intent and scope of the SDE inspections, the normal work hours and days, the option of the structure owner or resident to refuse entry to the property or the structure, and the name, telephone number, and e-mail address of the SDE Manager or local official in charge of the SDE inventory.</p> <p>Source:</p> <ul style="list-style-type: none"><li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Appendix C (August 2017)</li></ul>
18.	_____	_____
		<p><b>Make Substantial Damage determinations for structures located in the SFHA.</b></p> <p>Sources:</p> <ul style="list-style-type: none"><li>FEMA P-784, <i>SDE User Manual and Workbook</i>, Sections 3.11 and 9 (August 2017)</li></ul>
19.	_____	_____
		<p><b>After Substantial Damage determinations are complete, issue permits for repair and reconstruction.</b></p> <p>Source:</p> <ul style="list-style-type: none"><li>FEMA P-758, <i>Substantial Improvement/Substantial Damage Desk Reference</i>, Chapter 7 (May 2010)</li></ul>

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## Checklist 2 – Field Preparations

	Need	Have	Item
1.	_____	_____	Flood maps such as FIRMs, FBFMs, FEMA Flood Recovery maps, or other floodplain or flood risk maps.
2.	_____	_____	Tax or address map with 100-year flood boundaries.
3.	_____	_____	Route or area map showing proposed areas and sequence for data collection.
4.	_____	_____	Tax data, including structure owner name, address, and zip code, mailing address and zip code, number of stories, and dimensions or habitable square footage (if available).
5.	_____	_____	Copies of blank SDE Damage Inspection Worksheets.
6.	_____	_____	Copies of blank photo logs (if needed).
7.	_____	_____	Photo ID badges for inspectors.
8.	_____	_____	Letter of Introduction with community point of contact (name and telephone number).
9.	_____	_____	Clip boards, pens/pencils, steno pad or notebook, highlighter.
10.	_____	_____	100 ft tape measure (to obtain or verify structure dimensions).
11.	_____	_____	Address board and dry erase markers.
12.	_____	_____	Hard hat, gloves, safety glasses and vest, steel-toe and steel-shank shoes, safety vest, and flashlight.
13.	_____	_____	Cell phones or walkie-talkies.
14.	_____	_____	Digital camera, primary and alternate memory cards, and extra batteries.
15.	_____	_____	Verification that police, fire, and emergency management agencies have been advised of SDE inspections.
16.	_____	_____	Laptop computers or tablets with SDE tool installed and power cords with plug adaptors for use and re-charging in field vehicles.
17.	_____	_____	Rain or cold-weather gear

**Checklist 2 – Field Preparations**  
**Procedures to review with inspectors prior to the start of data collection**

	Need	Have	Item
1.	_____	_____	Field safety procedures for dealing with extreme temperatures, wild and domestic animals, driving, parking, and accidents.
2.	_____	_____	SDE data collection and recording requirements.
3.	_____	_____	Guidance for entering locked, occupied, or unoccupied structures.
4.	_____	_____	Guidance on identifying initial construction quality for both residential and non-residential structures.
5.	_____	_____	SDE inspection procedures for residential structures.
6.	_____	_____	SDE inspection procedures for non-residential structures.
7.	_____	_____	Guidance on selecting the depreciation rating.
8.	_____	_____	Data collection routes and sequence.
9.	_____	_____	Guidelines for interaction with structure owners and occupants.



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**APPENDIX C**  
**Sample Documents**

## **Appendix C: Sample Documents**

1. Letter of Introduction
2. NOTICE OF DETERMINATION – Substantial Improvement
3. NOTICE OF DETERMINATION – Substantial Damage
4. NOTICE OF DETERMINATION – Work Does Not Constitute Repair of Substantial Damage
5. Recommended Guidelines for Interaction with Structure Owners by SDE Inspectors



*Sample Letter of Introduction for SDE Inspections*

**City of Floodville**

Department of Building Inspections

1212 River Road

Floodville, NY 14008

September 8, 2017

Dear Structure Owner or Occupant:

The bearer of this letter is on official business for the City of Floodville during the hours between 8:00 AM and 6:00 PM, Monday through Saturday.

As a result of the flooding that occurred between September 3 and 4, 2017, City staff will be inspecting buildings throughout the community for evidence of Substantial Damage. This evaluation is required by our Floodplain Management Ordinance dated April 8, 2005. These inspections apply to all structures within the 100-year floodplain as shown on the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), Panels 0100 through 0350 for Floodville dated June 19, 2008.

The inspectors will require approximately 30 minutes for a residential inspection and from 30 to 90 minutes for non-residential buildings to inspect for exterior and interior damage. They will record the required information used by the Floodville Department of Building Inspections to make Substantial Damage determinations. After the City has completed the determination process, a written determination will be mailed to the owners of the inspected structures.

Please be advised that all repairs, reconstruction, and new construction are subject to the provisions of the Floodville Building Code and may require a permit. Construction activities that are undertaken without a proper permit are violations and may result in citations, fines, the removal of the non-compliant construction, or other legal action.

If you refuse admittance to the inspectors, your address will be provided to our City Attorney for processing of a formal legal request to inspect the structure during normal business hours.

Questions regarding the inspection process may be directed to me or Mr. William Jones of the Building Department at 888-999-1212 between the hours of 7:30 AM and 5:00 PM, Monday through Friday, or e-mailed to [william.jones@floodville.ny.gov](mailto:william.jones@floodville.ny.gov).

Sincerely,

Lisa Donaldson, Chief Inspector  
Department of Building Inspections  
888-999-0000  
[lisa.donaldson@floodville.ny.gov](mailto:lisa.donaldson@floodville.ny.gov)

## ***Substantial Improvement***

### *Sample Letter to Notify Structure Owner of Determination*

#### **NOTICE OF SUBSTANTIAL IMPROVEMENT DETERMINATION (RESIDENTIAL)**

Dear [name of structure owner]:

The City of Floodville has reviewed your recent application for a permit to [*describe proposed improvement/addition*] for the existing residential structure located at [insert structure address], Floodville, NY 14056.

The Department of Building Inspections has determined that this structure is located within a mapped Special Flood Hazard Area on the Flood Insurance Rate Map (FIRM), Panel 0150, with an effective date of June 19, 2008. As required by our floodplain management ordinance or building code, we have evaluated the proposed work and determined that it constitutes Substantial Improvement of the building. This determination is based on a comparison of the cost estimate of the proposed work to the market value of the building (excluding land value). When the cost of improvements equals or exceeds 50 percent of the market value of the building, the work is considered to be Substantial Improvement under the requirements of the National Flood Insurance Program (NFIP) and the city's Floodplain Management Ordinance dated April 8, 2005.

As a result of this determination, you are required to bring the building into compliance with the flood damage-resistant provisions of the City regulations and/or code [cite pertinent sections].

We would be pleased to meet with you and your designated representative (architect/builder) to discuss the requirements and potential options for bringing the structure into compliance. Several issues must be addressed to achieve compliance. The most significant requirement is that the lowest floor, as defined in the regulations/code, must be elevated to or above the base flood elevation (BFE) [or the elevation specified in the regulations/code] on the FIRM. You may wish to contact your insurance agent to understand how raising the lowest floor higher than the minimum required elevation can reduce NFIP flood insurance premiums.

Please resubmit your permit application along with plans and specifications that incorporate compliance measures. Construction activities that are undertaken without a proper permit are violations and may result in citations, fines, the removal of the non-compliant construction, or other legal action.

Sincerely,

Lisa Donaldson, Chief Inspector  
Department of Building Inspections  
888-999-0000  
lisa.donaldson@floodville.ny.gov

## ***Substantial Damage***

*Sample Letter to Notify Structure Owner of Determination*

### **NOTICE OF SUBSTANTIAL DAMAGE DETERMINATION (RESIDENTIAL)**

Dear [name of structure owner]:

The City of Floodville has reviewed your recent application for a permit to repair [*describe proposed improvement/addition*] for the existing residential structure located at [insert structure address], Floodville, NY 14056. These repairs are required as a result of flood damage from the storms of August 26–28, 2017.

The Department of Building Inspections has determined that this structure is located within a mapped Special Flood Hazard Area on the Flood Insurance Rate Map (FIRM), Panel 0150, with an effective date of June 19, 2008. As required by our floodplain management ordinance or building code, we have evaluated the proposed repairs and determined that the damage constitutes Substantial Damage for the structure. This determination is based on a comparison of the cost estimate of the proposed cost of repairs to the pre-damage market value of the structure (excluding land value). When the cost of repairs equals or exceeds 50 percent of the pre-damage market value of the structure, the damage is considered to be Substantial Damage under the requirements of the National Flood Insurance Program (NFIP) and the city's Floodplain Management Ordinance dated April 8, 2005.

As a result of this determination, you are required to bring the structure into compliance with the flood damage-resistant provisions of the City regulations and/or code [cite pertinent sections].

We would be pleased to meet with you and your designated representative (architect/builder) to discuss the requirements and potential options for bringing the structure into compliance. Several issues must be addressed to achieve compliance. The most significant requirement is that the lowest floor, as defined in the regulations/code, must be elevated to or above the base flood elevation (BFE) [or the elevation specified in the regulations/code] on the FIRM. You may wish to contact your insurance agent to understand how raising the lowest floor higher than the minimum required elevation can reduce NFIP flood insurance premiums.

Please resubmit your permit application along with plans and specifications that incorporate compliance measures. Construction activities that are undertaken without a proper permit are violations and may result in citations, fines, the removal of the non-compliant construction, or other legal action.

Sincerely,

Lisa Donaldson, Chief Inspector  
Department of Building Inspections  
888-999-0000  
lisa.donaldson@floodville.ny.gov

**Work does NOT Constitute Repair of Substantial Damage**  
*Sample Letter to Notify Property Owner of Determination*

**NOTICE OF DETERMINATION (RESIDENTIAL)**

Dear [name of structure owner]:

The City of Floodville has reviewed your recent application for a permit to repair [*describe proposed improvement/addition*] for the existing residential structure located at [insert structure address], Floodville, NY 14056. These repairs are required as a result of flood damage from the storms of August 26–28, 2017.

The Department of Building Inspections has determined that this structure is located within a mapped Special Flood Hazard Area on the Flood Insurance Rate Map (FIRM), Panel 0150, with an effective date of June 19, 2008. As required by our floodplain management regulations and/or building code, we have evaluated the proposed repair work and determined that the damage does not constitute Substantial Damage for this structure. This determination is based on a comparison of the cost estimate of the proposed cost of repairs to the pre-damage market value of the structure (excluding land value). When the cost of repairs is less than 50 percent of the pre-damage market value of the structure, the damage is not considered to be Substantial Damage, so no additional requirements apply for this structure.

Please be advised that we may need to make another determination if you elect to perform work other than that described and defined in your current permit application, including additional renovations or upgrades or the building of an addition. Construction activities that are undertaken without a proper permit are violations and may result in citations, fines, the removal of the non-compliant construction, or other legal action.

Questions regarding the inspection process may be directed to me or Mr. William Jones of the Building Department at 888-999-1212 between the hours of 7:30 AM and 5:00 PM, Monday through Friday, or e-mailed to [william.jones@floodville.ny.gov](mailto:william.jones@floodville.ny.gov).

Sincerely,

Lisa Donaldson, Chief Inspector  
Department of Building Inspections  
888-999-0000  
[lisa.donaldson@floodville.ny.gov](mailto:lisa.donaldson@floodville.ny.gov)

## **Recommended Guidelines for Interaction with Structure Owners by SDE Inspectors**

1. The objectives of the SDE inspections are to accurately collect the data required for the Substantial Damage determinations through rapid visual inspections and then move on to the next structure. The initial inspections may require more than 30 minutes for a residential structure. After the first 2 to 3 days of residential inspections, the inspection time should be 15 minutes or less per structure, as the inspectors gain experience and feel more comfortable with the inspections.
2. Remember that you are entering someone's property and structure, or place of business on official City business. Therefore, conduct yourself in a professional manner and be respectful of personal property. Many of these owners and occupants have suffered significant financial losses.
3. The inspections will be conducted between the hours of \_\_\_\_ AM and \_\_\_\_ PM, Monday through Friday (or Monday through Saturday), until all required structures have been inspected. This is in accordance with the inspection guidance provided in the community Letter of Introduction that you will be carrying during the inspection period.
4. Given the extensive damage, many of the homes and buildings may be unoccupied. Our community legal counsel has determined that we can enter open, unoccupied structures. The structure must be unlocked and open, without any signs or other visible postings forbidding trespassing on the property or within the structure. Therefore, you may have little or no contact with some of the occupants as you complete the inspections.
5. When approached by a structure owner or occupant, verify that the building being inspected is theirs and then hand them a community Letter of Introduction. In general, structure owners and occupants will be curious and possibly suspicious of the inspections. Explain that you are only there to inspect for damage and record the required data. The Letter of Introduction should be handed out to anyone who requests information about the inspections.
6. If you feel threatened in any manner, return to your vehicle and call the police and then the SDE Manager with the address and type of threat.
7. Structure owners and occupants with additional questions should be directed to call the point-of-contact identified in the Letter of Introduction. Try to avoid lengthy conversations as much as possible. Many of the conversations will become repetitive and will unnecessarily slow down the rate of inspections.
8. Unless specifically directed by the SDE Manager, do not try to explain the Substantial Damage determination process, what the results might mean for the structure owner, or any State or Federal buyout or other post-disaster grant or funding program.
9. Under the SDE Manager's direction, explain that building permits may be required for any reconstruction, repairs, or new construction in the aftermath of the disaster. Also, any reconstruction, repairs, or new construction conducted without a proper permit may be considered non-compliant

construction and could result in daily fines, removal of the non-compliant construction, or other legal action.

10. For locked properties or properties where the owner or occupant is present but refuses to allow you inside, simply record the address, a name and telephone number (if available), the reason for the refusal, and then hand the owner or occupant the Letter of Introduction before moving on to the next structure.
11. Before entering a structure, verify that the floor is safe to walk on, and then enter carefully. Refrain from pulling pieces of plaster, tearing out drywall or ceilings, or tearing back wallpaper or drywall for the assessment of the damage on the percent breakdown section of the *Damage Inspection Worksheet* of the SDE tool.

**Appendix D**  
**Guidance for a Contractor or Community Estimate of Repairs**

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**Required and Recommended Elements to be Included  
In a Contractor or Community Estimate of Repairs  
ALL STRUCTURES**

Address or Location: \_\_\_\_\_

Community: \_\_\_\_\_

**ITEMS THAT MUST BE INCLUDED** (check box on left if present):

*All structure elements, including:*

- 1. Foundations (e.g., slab-on-grade, basement, crawlspace)
- 2. Monolithic or other types of concrete slabs
- 3. Bearing walls, tie beams, trusses
- 4. Joists, beams, subflooring, framing, ceilings
- 5. Interior non-bearing walls
- 6. Exterior finishes (e.g., brick, stucco, siding)
- 7. Windows and exterior doors
- 8. Roofing, gutters, and downspouts
- 9. Hardware
- 10. Attached decks and porches
- 11. \_\_\_\_\_
- 12. \_\_\_\_\_
- 13. \_\_\_\_\_
- 14. \_\_\_\_\_
- 15. \_\_\_\_\_

**ITEMS THAT MUST BE INCLUDED** (check box on left if present):

*All interior finish elements, including:*

- 1. Floor finishes (e.g., hardwood, ceramic, vinyl, linoleum, stone, carpeting over subflooring)
- 2. Bathroom tiling and fixtures
- 3. Wall finishes (drywall, paint, stucco, plaster, paneling, tile, and marble)
- 4. Built-in cabinets (kitchen, utility, entertainment, storage, and bathroom)
- 5. Interior doors
- 6. Interior finish carpentry
- 7. Built-in bookcases and furniture
- 8. Hardware
- 9. Insulation
- 10. \_\_\_\_\_
- 11. \_\_\_\_\_
- 12. \_\_\_\_\_
- 13. \_\_\_\_\_
- 14. \_\_\_\_\_
- 15. \_\_\_\_\_

**ITEMS THAT MUST BE INCLUDED** (check box on left if present):

*All utility and service equipment, including:*

- 1. HVAC equipment
- 2. Plumbing fixtures and piping
- 3. Electrical service panel, wiring, outlets, and switches
- 4. Light fixtures and ceiling fans
- 5. Security systems
- 6. Built-in appliances
- 7. Central vacuum systems
- 8. Water filtration, conditioning, or recirculation systems
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_
- 11. \_\_\_\_\_
- 12. \_\_\_\_\_
- 13. \_\_\_\_\_
- 14. \_\_\_\_\_
- 15. \_\_\_\_\_

**ITEMS THAT MAY BE EXCLUDED:**

- 1. Trash removal and clean-up
- 2. Costs to temporarily stabilize a structure so that it is safe to enter and evaluate
- 3. Costs to obtain or prepare plans and specifications
- 4. Land survey costs
- 5. Permit fees and inspection fees
- 6. Carpeting and re-carpeting installed on top of the sub-flooring or finished floor
- 7. Outside improvements, including landscape, irrigation, sidewalks, driveways, fences, yard lights, swimming pools, pool enclosures, and detached accessory structures costs required for minimum necessary work to correct existing violations of health, safety, sanitary, or building codes
- 8. Plug-in appliances such as washing machines and stoves
- 9. \_\_\_\_\_
- 10. \_\_\_\_\_
- 11. \_\_\_\_\_
- 12. \_\_\_\_\_
- 13. \_\_\_\_\_
- 14. \_\_\_\_\_
- 15. \_\_\_\_\_

**Appendix E**  
**Guidance for Estimating Percent Damage for Residential Structures**

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**Basic Flooding Model Assumptions:**

- 1) Medium height freshwater flooding; limited duration. No high-velocity action; no wave action.
- 2) A 1-story house (without a basement) is used for this example house to establish the Categories of Work percentages of total costs.

Foundation		Damage Threshold			
		0-25%	25-50%	50-75%	Over 75%
<b>Description</b>	<p>Continuous perimeter foundations, footings, and piers for internal beams and floor loads. Footing depth averages between 30 inches and 42 inches below ground level. Materials include unreinforced cast-in-place concrete, unreinforced masonry or concrete masonry units (CMUs), concrete slab on grade, or raised slab construction.</p>	<p><b>Threshold Markers</b></p> <p>Water level does not rise to the level of the bottom of the first floor of the structure.</p> <p>No scouring at the footings.</p>	<p>Water level rises just above first floor level.</p> <p>Limited scouring at the footings.</p>	<p>Water level is 4-7 feet against the outside of the building.</p> <p>Limited scouring at the footings.</p> <p>Soils are saturated and unstable</p>	<p>Water level is 7 feet or higher against the outside of the building.</p> <p>Limited scouring at the footings.</p> <p>Foundation is notably cracked and/or displaced. Structure has been knocked off its foundation.</p>
		<p>Some undermining but no visible cracking at concrete slab.</p>	<p>Soils are saturated.</p> <p>Undermining of the concrete slab, especially at corners - hairline cracks only.</p>	<p>Cracks noted on or along the foundation walls.</p> <p>Significant undermining of the concrete slab – significant cracking is visible.</p>	<p>Portions of the foundation are damaged or missing</p> <p>Significant undermining of the concrete slab - major cracking and separation of the concrete slab.</p>
	<p><b>Common Damage</b></p> <p>Short-term inundation to limited heights. Limited scouring and erosion - low flow and low velocity floodwaters. No noticeable cracking of the masonry or displacement of the foundation walls.</p>	<p>Short-term inundation - Foundation is inundated with flood waters but for a limited duration. Limited scouring or undermining of the foundation or footings is found. Minor cracking from some settlement but no displacement, heaving or discontinuities of the structural support systems.</p>	<p>Floodwaters extend over the top of the foundation system - significant inundation for over 12 hours. Some cracking of the masonry/concrete foundation walls. Some damage to the foundation wall from debris or settlement noted.</p>	<p>Settlement noted at the footings, due to erosion or unstable soils. Foundation wall damage – sections of the walls are cracking, displaced, and missing, causing an inherent instability to the support for the house. Use caution when approaching or entering the house.</p>	
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p>Coastal floods may show more evidence of scouring at the supports - the foundation system may be better designed to resist this scouring action.</p> <p>High velocity floodwaters may create erosion/scouring that the building has not been designed to resist.</p>			

Superstructure (Wood Frame/Masonry)		0-25%	25-50%	50-75%	Over 75%	
Description	<p>The wall support systems that extend from the foundation wall to the roof structure. Superstructures include the exterior wall sheathing panels, shear panels, or braced wall panels. This section also includes structural members that support the roof (rafters and trusses), but does not include the roof sheathing.</p>	<p>Water level does not rise to the level of the bottom of the first floor of the structure.</p>	<p>Water level rises just above first floor level.</p>	<p>Water level is up to 3 feet high on the first floor level.</p>	<p>Water is over 3 feet high on the first floor level of the house.</p>	
	<p>Wood frame construction: Lightweight lumber or metal studs Interior wall framing (without sheathing) Typical exterior structural panel wall sheathing is plywood or hardboard</p>	<p>No damage to the roof framing.</p>	<p>Damage to the roof framing is limited.</p>	<p>Some damage to exterior walls is limited</p>	<p>Significant damage to exterior walls.</p>	<p>Significant damage to the main portion or multiple sections of the roof framing.</p>
	<p>Masonry construction: Load bearing walls using unreinforced masonry (URM) and reinforced block or brick Typical exterior covers are stucco, siding (aluminum, vinyl, or wood), and masonry veneer (Reinforced concrete construction should be categorized under masonry.)</p>	<p>Minor damage to portions of the wall structure. Wall studs and sheathing suffered minor damage by contact with debris or from floodwater pressures against the structure. Minor missing or damaged sections of the roof structure. No deformation or distortion of the structural frame is evident.</p>	<p>Some missing sections or open damage to portions of the wall structure. Wall studs and sheathing suffered some damage by contact with debris or from floodwater pressures against the structure. Some missing or damaged sections of the roof structure. No deformation or distortion of the structural frame is evident.</p>	<p>Missing sections or open damage to significant portions of the wall structure. Wall studs and sheathing damaged by contact, collision, or piercing with debris or from floodwater pressures against the structure. Significant missing or damaged sections of the roof structure. Some deformation or distortion of the structural frame is evident.</p>	<p>Missing exterior wall(s) or open damage to large portions of the wall structure. Wall studs and sheathing damaged by contact, collision, or piercing with debris or from floodwater pressures against the structure. Large missing or damaged sections of the roof structure. Significant deformation or distortion of the structural frame is evident.</p>	
	<p>Special Considerations for Coastal/High Velocity Floods</p>	<p>Coastal areas have higher wind conditions requiring additional exterior wall structural panels, shear walls, and braced wall panels. Damage to these wall structural systems would indicate a higher percent of damage, because they are already designed to resist higher wind conditions.</p>				



Roof Covering		0-25%	25-50%	50-75%	Over 75%
Description	Roofing includes a lightweight composition shingle, tile roofs, metal roofs, or a built-up roof with gravel or rock cover material. Roofing does not include structural framing members such as rafters or prefabricated trusses that support the roof deck. The roof sheathing and flashing is included in this section.	<p>Minor wind damage to the roof coverings.</p> <p>Main surface areas are unaffected.</p> <p>Flashings are intact.</p> <p>No damage to the roof sheathing.</p>	<p>Some damaged areas of the roof from high-winds or damage from debris.</p> <p>Some sections of the roof covering are missing or loose.</p> <p>Some damage to the flashings.</p> <p>Minimal damage to the roof sheathing.</p>	<p>Significant damaged areas of the roof from high winds or damage from debris.</p> <p>Significant sections of the roof covering are missing or loose.</p> <p>Damage to the flashings allows some water infiltration at joints and roof penetrations.</p> <p>Significant damage to the roof sheathing - some areas of the sheathing will need replacement.</p>	<p>Large damaged areas of the roof from high winds or damage from debris.</p> <p>Major sections of the roof covering are missing or loose.</p> <p>Damage to the flashings allows significant water infiltration at joints and roof penetrations.</p> <p>Major damage to the roof sheathing - most of the roof sheathing will need replacement.</p>
		<p>Roof shingles or tiles mostly intact. Some minor damage to roof shingles - some torn or loose shingles in limited areas.</p>	<p>Some areas where the roof shingles were damaged by high winds. Several small areas of exposed roof sheathing as a result of missing/damaged shingles.</p>	<p>Some areas where the roof shingles were damaged by high winds. Several small areas of exposed roof sheathing as a result of missing/damaged shingles. Some damage to the roof covering and sheathing due to debris falling or penetrating the roof assembly.</p>	<p><b>Major areas of the roof where the shingles/tile are missing, allowing rainwater to freely enter the house below. Significant damage to roof covering and roof sheathing from strong winds or windborne debris penetrating the roof assembly.</b></p>
	Special Considerations for Coastal/High Velocity Floods	<p>Coastal areas have higher wind conditions requiring additional roof covering requirements.</p> <p>Damage to these roof coverings would indicate a higher percent of damage, because they are designed to resist higher wind conditions.</p> <p>Damage to the roofing is more likely during high-wind conditions due to the loss of protection from missing roof coverings and water infiltration. This will increase the percent of damage.</p>			

Exterior Finish		0- 25%	25-50%	50-75%	Over 75%
Description	<p>The wall covering system that covers the wall sheathing, as well as insulation and weather stripping. This includes the water resistant materials and the finish materials: Stucco, Siding (aluminum, vinyl, or wood), Masonry, Stone veneer.</p> <p>Insulation is installed at the flooring beneath the lowest floor level and throughout the walls and ceilings. Types of insulation include: fiberglass wall and ceiling insulation, blown wall and ceiling insulation, and rigid wall insulation.</p>	<p><b>Threshold Markers</b></p> <p>Water level is less than 6 inches above the lowest floor level.</p> <p>The duration of the floodwaters is limited - less than 12 hours.</p>	<p>Water level is between 6 and 18 inches above the lowest floor level.</p> <p>The duration of the floodwaters is limited - less than 12 hours.</p>	<p>Water level is between 18 inches and 3 feet above the lowest floor level.</p> <p>The duration of the floodwaters is more than 12 hours.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>The duration of the floodwaters is more than 12 hours.</p>
		<p><b>Common Damage</b></p> <p>Water staining, contamination, and damage on some of the exterior wall finishes. 'Clean and repair' process is likely. Brick and stone veneer walls, stucco walls, and 'cultured stone' walls may need some water removal techniques to allow drying of the interior materials and wall cavities. Verify adherence of the finish materials to the wall substrate. A limited amount of the siding materials may require replacement as needed. No damage or replacement of the insulation system is necessary, except where water and high moisture conditions have caused the insulation to fall loose within the crawlspace sub-flooring.</p>	<p>Damage/losses to some areas of the exterior wall surfaces, in addition to water staining and contamination. Some repairs are required at damaged locations prior or during 'clean and repair' process. Brick and stone veneer walls, stucco walls, and 'cultured stone' walls may need some water removal techniques to allow drying of the interior materials and wall cavities. Verify adherence of the finish materials to the wall substrate. Damaged house trim work will require replacement. Water damage to the insulation in the sub-flooring above the crawlspace or basement levels. Damage to insulation is evident and insulation often has fallen loose. This insulation should be removed and replaced.</p>	<p>Damage/losses to significant sections of the exterior wall surfaces, in addition to water staining and contamination. Significant repairs are required at damaged locations prior to 'clean and repair' process. Replacement of some sections of the exterior siding is required. Brick and stone veneer walls, stucco walls, and 'cultured stone' walls may need some water removal techniques to allow drying of the interior materials and wall cavities. Verify adherence of the finish materials to the wall substrate. Water damage to the insulation in the sub-flooring above the crawlspace or basement levels. This insulation should be removed and replaced. Water saturation of wall insulation may be found in the lowest section of the exterior walls. Contaminants in the flood waters are cause for removal and replacement of lower sections of the saturated insulation. Clean, sanitize, and dry the structural systems before re-installing materials. Damaged house trim work will require replacement, especially at door and window casings.</p>	<p>Damage/losses to major sections of the exterior wall surfaces, in addition to water staining and contamination. Major repairs are required at damaged locations prior to 'clean and repair' process. Replacement of large sections of the exterior siding is required. Brick and stone veneer walls, stucco walls, and 'cultured stone' walls may need some water removal techniques to allow drying of the interior materials and wall cavities. Verify adherence of the finish materials to the wall substrate. Damaged house trim will require replacement, especially at door and window casings. Water damage to the insulation in the sub-flooring above the crawlspace or basement levels. This insulation should be removed and replaced. Water saturation of wall insulation requires the removal of all of the insulation from the damaged sections of the exterior walls. Contaminants in the flood waters are cause for removal and replacement of lower sections of the saturated insulation. Clean, sanitize, and dry the structural systems before re-installing.</p>
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p>The salt, erosion, and winds in coastal areas will have a damaging effect on the quality of exterior wall finishes. Damage to exterior finishes are more likely during high-wind conditions due to the loss of protection from missing exterior finishes and water infiltration. Damage to the insulation is more likely during high-wind conditions due to the loss of protection from missing roof coverings and exterior finishes, and from subsequent water infiltration. This will increase the percent of damage.</p>			

Interior Finish		0-25%	25-50%	50-75%	Over 75%
<b>Description</b>	<p>Interior finish includes the gypsum board, drywall, plaster, or paneling that makes up the wall surfaces. It also includes trim around door baseboards, casings, chair rails, and ceiling moldings.</p> <p>Materials include low-grade wood/plastic composites, soft woods, and hard woods. Finishes include paint, stain, or varnish.</p>	<p><b>Water level does not rise to the level of the first floor structure.</b></p> <p><b>The duration of the floodwaters is limited - less than 12 hours.</b></p>	<p><b>Water level rises just above the first floor level.</b></p> <p><b>The duration of the floodwaters is limited - less than 12 hours.</b></p>	<p><b>Water level is up to 3 feet above the first floor level.</b></p> <p><b>The duration of the floodwaters is more than 12 hours.</b></p>	<p><b>Water is more than 3 feet above the first floor level of the house.</b></p> <p><b>The duration of the floodwaters is more than 12 hours.</b></p>
	<p><b>This item also covers any exterior and interior painted surfaces, but not the building or repairs of the underlying surfaces. This also includes those exterior siding materials (and trim work) that need to be painted, but not those that have inherent coloring within the materials themselves (brick, stucco, EIFS).</b></p>	<p>Wicking of the water and high moisture conditions into the finished materials at the subflooring and at the bottom of the walls. Water staining and damage possible at baseboard and the casings at the bottoms of door openings. Some adjustment/repair/replacement may be necessary. No damage anticipated on door, cabinet, and window hardware. The baseboards and the bottom of the door casings may need to be cleaned and painted.</p>	<p>Water staining and damage likely at the baseboard and the casings at the bottoms of door openings. Some adjustment/repair/replacement may be necessary. Water damage at the lowest levels of the wall assembly - lower wall and trim may need to be removed and replaced. Minor damage anticipated on door, cabinet, and window hardware. After repairs to surfaces, the lower wall finishes, baseboards, and door casings will need to be primed and repainted. The bottoms of the cabinet bases in the kitchen and bathrooms may require repainting.</p>	<p>Water staining and damage at the baseboards and the casings at door openings need to be replaced. Water damage at the lowest levels of the wall assembly - wall and trim, window sills and window aprons, wall paneling, wainscoting and chair rails require removal and replacement. Wall surfaces should be removed to a height of 4 feet. Some damage anticipated on door, cabinet, and window hardware. Some replacement needed. After repairs to surfaces, the entire wall finishes, baseboards, and door and window casings will need to be primed and repainted, along with the vanity cabinets in the bathrooms.</p>	<p>Water staining and damage at the baseboards, and running trim and casings at door and window openings need to be replaced. Water damage at all the levels of the wall assembly - wall and trim, window sills and window aprons, wall paneling, wainscoting, and chair rails require removal and replacement. Wall surfaces should be removed to a height of 8 feet. Significant damage anticipated on door, cabinet, and window hardware. Some replacement needed. After repairs to surfaces, the entire wall finishes, baseboards, door and window casings, and window sashes will need to be primed and repainted along with the vanity cabinets in the bathrooms. Repaint both the upper and lower kitchen cabinets, where these are paint-grade cabinets.</p>
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p><b>Damage to the interior finishes are more likely during high-wind conditions due to the loss of protection from missing roof coverings and exterior finishes, and from subsequent water infiltration. The salt, erosion, and winds in coastal areas will have a damaging effect on the quality of exterior hardware. This will significantly increase the percent of damage.</b></p>			

Doors and Windows		0-25%	25-50%	50-75%	Over 75%
<b>Description</b>	<p>This section includes all doors and windows of a structure, as well as locks, hinges, frames, and handles. Assumptions are hollow core doors with low-cost hardware for low, fair, and average quality construction, raised-panel hardwood veneer with good quality hardware for good or excellent quality construction.</p> <p>(This section does not include paint or stain.)</p>	<p><b>Threshold Markers</b></p> <p>Water level rises just to the floor structure of the first floor level.</p> <p>The duration of the floodwaters is limited - less than 12 hours.</p>	<p>Water level is just above the first floor.</p> <p>The duration of the floodwaters is limited - less than 12 hours.</p>	<p>Water rises to at least 12 inches above the first floor level.</p> <p>The duration of the floodwaters is more than 12 hours.</p>	<p>Water rises more than 12 inches above the first floor level.</p> <p>The duration of the floodwaters is more than 12 hours.</p>
		<p><b>Common Damage</b></p> <p>Bottoms of some interior doors may be deformed, delaminated, or have some swelling damage. Doors may need adjustment and/or repairs to close and latch properly. No impact on normal sill-height windows. Damage may be found at floor-level windows (hopper windows, awning windows, and floor-to-ceiling windows).</p>	<p>Bottoms of interior and exterior doors may be deformed, delaminated or have some swelling damage. Doors may need adjustment and/or repairs to close and latch properly. No impact on normal sill-height windows. Damage may be found at floor-level windows (hopper windows, awning windows and floor-to-ceiling windows).</p>	<p>Bottoms of interior and exterior doors will be deformed, delaminated, or have some swelling damage. Interior doors will likely need replacement. Exterior doors may need adjustment, repairs, or replacement. No impact on normal sill-height windows. Repairs or replacements may be needed at floor-level windows (hopper windows, awning windows, and floor-to-ceiling windows).</p>	<p>Bottoms of interior and exterior doors will be deformed, delaminated, or have some swelling damage. Interior and exterior doors will likely need replacement. Deformation or other damage will be found at normal sill-height windows. Replacement will be necessary at floor-level windows (hopper windows, awning windows, and floor-to-ceiling windows). Replacement may be necessary for other windows.</p>
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p>Wind-driven rain in coastal areas will have a damaging effect on the quality of exterior doors and windows.</p>			

Cabinets and Countertops		0-25%	25-50%	50-75%	Over 75%
Description	<p>The basic cabinets for bathroom vanities and kitchens include paint-grade cabinets made of a fiberboard or plywood material. The countertop is laminated plastic or a manmade 'cultured stone' surface.</p> <p>Paint-grade cabinets are the baseline because they can be painted to match upper wall cabinets, when they are repairable, to return the house to pre-disaster conditions.</p> <p><b>Damaged cabinets with hardwood face-frames, doors, and drawers will require replacement based on the depth of flooding above the floor. Therefore, if the flood depth only damages the base cabinet and countertops, the percent damage will be 60% or less.</b></p>	<p><b>Threshold Markers</b></p> <p>Water level is less than 4 inches above the finished floor level.</p>	<p>Water level is between 4 and 12 inches above the finished floor level.</p> <p>Flood duration is short - no prolonged exposure to water or contaminants.</p>	<p>Water level is between 1 foot and 3 feet above the finished floor level.</p> <p>Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.</p>	<p>Water level is more than 3 feet above finished floor level.</p> <p>Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.</p>
	<p><b>Common Damage</b></p> <p>Base cabinets have minimal water damage. Swelling and deterioration of manufactured case goods, especially cabinet bases, sides, and drawers using engineered wood products. Bathroom vanity cabinets and kitchen base cabinets may need cleaning, sanitizing, and limited repairs. Repainting will be required to match upper cabinets in kitchen.</p>	<p>Base cabinets of particleboard or medium-density fiberboard need to be replaced. Repaint to match upper cabinets in kitchen. Wood and plywood base cabinets may need cleaning, sanitizing, and some repairs at cabinet base. Repainting will be required to match upper cabinets in kitchen.</p>	<p>Replace base cabinets. Water damage and exposure is prolonged - deformation, delamination, and warping of cabinet base drawers and doors. Water contains debris and contaminants. The countertops may need to be replaced.</p>	<p>Replace base cabinets and upper wall cabinets. Water damage and exposure is prolonged - deformation, delamination, and warping of cabinet base drawers and doors. Water contains debris and contaminants. The countertops will need to be replaced.</p>	

Floor Finish		0-25%	25-50%	50-75%	Over 75%
Description	<p>Materials for floor finish include: carpet, hardwood, vinyl composition tile, sheet vinyl floor cover, ceramic tile, and marble. Sub-flooring is also included.</p> <p>Carpeting, hardwood flooring, vinyl flooring tiles, and sheet vinyl are typically replaced after water inundation. Brick, stone, and clay tile floor can be cleaned, sanitized, and reused. These types of floors may have areas where the mortar setting compound has broken loose. These tiles should be replaced. The floor sheathing is included in this Category of Work, as compared to the Superstructure Category.</p>	<p><b>Threshold Markers</b></p> <p>Water level does not rise to the level of the bottom of the first floor structure.</p> <p>No damage to the floor sheathing.</p>	<p>Water level rises just to the first floor level.</p> <p>Water level inundates the sub-flooring but does not rise to the finished floor materials.</p> <p>Minimal damage to the floor sheathing.</p>	<p>Water level is above the first floor.</p> <p>Water level inundates above the sub-flooring and finished floor materials.</p> <p>Significant damage to the floor sheathing - some areas of the sheathing will need replacement.</p>	<p>Water level is well above the first floor.</p> <p>Water level inundates above the sub-flooring and finished floor materials.</p> <p>Major damage to the floor sheathing - most of the floor sheathing will need replacement.</p>
	<p><b>Common Damage</b></p> <p>No damage is anticipated in the floor finish system at this water level.</p>	<p>The sub-flooring may be damaged or delaminated by high-humidity conditions, and may need to be repaired or replaced.</p>	<p>The sub-flooring may be damaged or delaminated by water inundation. Floor covering will need removal, drying, sanitizing, and replacement, depending upon the type of floor covering. Carpets (with padding) should be removed and replaced. Wood floors will need to be replaced. Ceramic tiles and stone flooring may be re-used if they are still secured to the substrate. Sheet vinyl and vinyl tiles will need to be replaced to facilitate drying and repair of damage of the sub-floor.</p>	<p>The sub-flooring may be damaged or delaminated by water inundation. Floor covering may need removal, drying, sanitizing, and replacement, depending upon the type of floor covering. Carpets (with padding) should be removed and replaced. Wood floors will need to be replaced. Ceramic tiles and stone flooring may be re-used if they are still secured to the substrate. Sheet vinyl and vinyl tiles will need to be replaced to facilitate drying and repair of damage of the sub-floor.</p>	
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p>Damage to the floor finishes and floor sheathing are more likely during high-wind conditions due to the loss of protection from missing roof coverings and exterior finishes, and from subsequent water infiltration. This will significantly increase the percent of damage.</p>			

Plumbing		0-25%	25-50%	50-75%	Over 75%
Description	<p>The plumbing system includes the incoming water service (municipal water supply or well service), the water heater, water distribution piping, and the wastewater system. Wastewater will be conveyed away from the structure by either a connection to the municipal sewer system or a septic system.</p> <p>When floodwaters saturate the soils, septic systems may be unable to discharge their waste, causing a back-up of the septic systems. If floodwaters raise above the level of the municipal sewer manhole covers, the sewage can back-up into the house through the sewer lines. Verify the condition of the potable water supply to determine if it can provide a safe water supply.</p>	<p><b>Threshold Markers</b></p> <p>Water level is less than 6 inches above the lowest floor level.</p>	<p>Water level is between 6 inches and 18 inches above the lowest floor level.</p> <p>Flood duration is short - no prolonged exposure to water or contaminants.</p>	<p>Water level is between 18 inches and 3 feet above the lowest floor level.</p> <p>Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.</p>
	<p><b>Common Damage</b></p> <p>Floor drains can backflow into the house. Under floor (or under slab) plumbing systems should be purged, cleaned, and sanitized. Any materials that might contain remnants of waste materials or other contaminants in the floodwaters will require replacement.</p>	<p>Floor drains, shower drains, bathtubs, and toilets can back flow into the house. Septic contamination is likely. The water heater may need to be replaced.</p>	<p>Floor drains, shower drains, bathtubs, toilets, bathroom sinks, utility sinks, and toilets will backflow into the house. Septic contamination will occur. The water heater will need to be replaced.</p>	<p>All plumbing fixtures will backflow into the house. Septic contamination will occur. The water heater will need to be replaced.</p>	
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p>Houses in coastal areas may have additional plumbing fixtures and piping on the exterior of the house.</p>			

Electrical		0-25%	25-50%	50-75%	Over 75%
Description	<p>100- to 200-amp electrical service providing circuit breaker panels and distribution wiring. B. Basic wiring (15/20 amp) for outlets, switches, receptacles, and lighting; 25- to 60-amp wiring systems for outlets for a washer, dryer, stove, and refrigerator.</p> <p>(A minimum number of outlets and lighting fixtures, sometimes quantified by local building code, begin to increase in number and application as the quality level of the residence increases.) The basic approach listed here is for slab-on-grade or elevated houses; crawlspace and basement houses will have higher damage levels more quickly due to the main panel and horizontal wiring runs located below the lowest floor level.</p>	<p>Water level is less than 12 inches above the finished floor level.</p> <p>Minor electrical components and limited wiring are inundated but remain below normal receptacle height.</p>	<p>Water level is between 12 inches and 18 inches above the finished floor level.</p> <p>A significant number of wiring components and limited wiring are inundated, floodwaters above the normal receptacle height.</p>	<p>Water level is between 18 inches and 3 feet above the lowest floor level.</p> <p>A significant number of wiring components and a significant amount of wiring is inundated - floodwaters above normal wall switch height.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>Most of the wiring components and a significant amount of wiring are inundated - floodwaters above normal wall switch height.</p>
	Common Damage Details	<p>If the main electrical power source is located in the basement, the panel will need to be replaced. All outlets (receptacles, switches, and lights) located in the basement should be replaced. All receptacles, switches, and outlets located above the flood water high mark can be left in place and reused.</p>	<p>Modern Romex wiring that is inundated only for short durations (without wetting the ends/joints/terminations) can be dried and reused. Older nonmetallic cable (with impregnated braided sheathings) should be replaced when wetted. When chemical contaminants are suspected in the floodwaters, all inundated electrical wiring and components will require replacement.</p>	<p>Modern Romex wiring that is inundated only for short durations while wetting the ends/joints/terminations should be replaced. Older non-metallic cable (with impregnated braided sheathings) should be replaced when wetted. When chemical contaminants are suspected in the floodwaters, all inundated electrical wiring and components will require replacement.</p>	<p>Modern Romex wiring that is inundated only for long durations should be replaced. Older nonmetallic cable (with impregnated braided sheathings) should be replaced when wetted. When chemical contaminants are suspected in the floodwaters, all inundated electrical wiring and components will require replacement.</p>



Appliances		0-25%	25-50%	50-75%	Over 75%
Description	Common, built-in appliances that would be included are the dishwasher, hot water tank, and some stoves.	<p>Water level is less than 6 inches above the finished floor level.</p> <p>Water level is in the floor area of the appliances but not into the equipment operating system.</p> <p>The appliances may be cleaned and reconditioned.</p>	<p>Water level is between 6 inches and 12 inches above the finished floor level.</p> <p>Water level is in the floor area of the appliances and into the equipment operating system.</p> <p>Some of the appliances will need to be replaced.</p>	<p>Water level is between 12 inches and 18 inches above the finished floor level.</p> <p>Water level is in the floor area of the appliances and into the equipment operating system.</p> <p>Most of the appliances will need to be replaced.</p>	<p>Water level is between 18 inches and 3 feet above the finished floor level.</p> <p>Water level is in the floor area of the appliances and into the equipment operating system.</p> <p>All of the appliances will need to be replaced.</p>
	Common Damage	<p>If appliances (water heater, clothes washer/dryer) are located in the basement or under the floor spaces, these should be replaced. Appliances at or above the first-floor level should be cleaned and reconditioned, as needed. Gas-fired appliances should be checked by a service technician to verify whether the gas burners and controls and electric wiring systems were compromised. Replacement may be required.</p>	<p>If appliances (water heater, clothes washer/dryer) are located in the basement or the under floor spaces, these should be replaced. Appliances at or above the first-floor level should be cleaned and reconditioned, as needed. Gas-fired appliances should be checked by a service technician to verify whether the gas burners and controls and electric wiring systems were compromised. Replacement may be required. The clothes dryer and dishwasher systems and controls will likely be inundated and may require replacement.</p>	<p>All appliances located at or above the first-floor level should be cleaned and reconditioned, as needed. Gas-fired appliances should be checked by a service technician to verify whether the gas burners and controls and electric wiring systems were compromised. Replacement may be required. The clothes dryer and dishwasher systems and controls will be inundated and need to be replaced.</p>	<p>All appliances at or above the first floor level should be cleaned and reconditioned, as needed. Gas-fired appliances should be checked by a service technician to verify whether the gas burners and controls and electric wiring systems were compromised. Replace as necessary. The clothes dryer, washing machine, and dishwasher systems and controls will be inundated and need to be replaced.</p>

HVAC		0-25%	25-50%	50-75%	Over 75%
Description	<p>The base HVAC system is a forced-air heating system (furnace) with ductwork. The air handler system is located inside the thermal barrier of the house.</p> <p>The percent damaged will be less for a boiler. A boiler system has a sealed piping system to distribute the heat while the furnace uses a duct system. Ducts with water infiltration will need to be cleaned, repaired, and re-insulated. By contrast, a boiler piping system only needs to have the distribution piping clean and re-insulated. Note: Old duct and HVAC insulation may contain asbestos - use appropriate caution and adjust the costs for removal, if found.</p> <p>A gas-fired or oil-fired furnace located in a basement or crawlspace will require replacement of the furnace assembly as soon as 12 inches of floodwaters are present. This will require an adjustment of the percent damaged to 75%, as soon as the water reaches the firebox level of this heating equipment. A central air conditioner or heat pump will have a ducted air distribution system. The outside condenser unit(s) will require reconditioning after any flooding conditions.</p>	<p>Water level is less than 6 inches above the lowest floor level.</p> <p>Water level is in the lower ducts but not into the air handler or equipment operating system.</p> <p>The condenser unit may be reconditioned if the water level is less than 6 inches from the bottom of the appliance. If the condenser unit is located below the flood level, it will need to be replaced.</p>	<p>Water level is between 6 inches and 12 inches above the finished floor level.</p> <p>Water level is into the lower ducts and the air handler, but not into the equipment operating system.</p> <p>The condenser unit may be reconditioned if the water level is up to 12 inches from the bottom of the appliance. If the condenser unit is located below the flood level, it will need to be replaced.</p>	<p>Water level is between 12 inches and 3 feet above the finished floor level.</p> <p>Water level is into the lower ducts, air handler, and the equipment operating system.</p> <p>The fuel-fired equipment (burners/controls) is inundated.</p> <p>The condenser unit needs to be replaced.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>Water level is into the duct distribution system, air handler, and the equipment operating system.</p> <p>The fuel-fired equipment (burners/controls) is inundated.</p> <p>The condenser unit needs to be replaced.</p>
	Common Damage	<p>If HVAC equipment (furnace, air handler, heat pump) are located in the basement or the under floor areas, the equipment should be reconditioned or replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>	<p>If portions of the HVAC equipment (furnace, air handler, heat pump) are located in the basement or the under floor areas, the equipment should be reconditioned or replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>	<p>Portions of the HVAC equipment (furnace, air handler, heat pump) should be replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>	<p>All HVAC equipment (furnace, air handler, heat pump) should be replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>

**Appendix F**  
**Guidance for Estimating Percent Damage for Non-Residential Structures**

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**Basic Flooding Model Assumptions:**

1) Medium height freshwater flooding - limited duration. Some high-velocity action; possible wave action.

This guidance represents a starting point for inspectors to perform assessments on non-residential buildings. Because of the wide range of structure types, this guidance should be used as a rough estimation for a typical 1-story convenience store. Any variation from that should take into consideration the potential differences in each element.

2) The damage evaluation guidance in this should be taken as possible or likely indicators of the respective level of damage, but is not a definite representation of damage to a structure after a flood and wind event. Not all threshold markers may need to be met to achieve the level of damage indicated.

Foundation		Damage Threshold			
		0- 25%	25-50%	50-75%	Over 75%
Description	Continuous perimeter foundations, footings, and piers for internal beams and floor loads. Materials include masonry or concrete masonry units (CMUs) or piles.	<p>Water level rises just above first floor level.</p> <p>No scouring around foundation.</p> <p>Some undermining but no visible cracking at concrete slab.</p>	<p>Water level is 4-7 feet against the outside of the building.</p> <p>Limited scouring around foundation.</p> <p>Soils are saturated.</p> <p>Undermining of the foundation, especially at corners - hairline cracks only.</p>	<p>Water level is 7-10 feet against the outside of the building.</p> <p>Limited scouring around foundation.</p> <p>Soils are saturated and unstable.</p> <p>Cracks noted on or along the foundation walls.</p> <p>Significant undermining of the foundation - significant cracking is visible.</p>	<p>Water level is more than 10 feet against the outside of the building.</p> <p>Limited scouring around foundation.</p> <p>Foundation is notably cracked and/or displaced. Structure has been knocked off its foundation.</p> <p>Portions of the foundation are damaged or missing.</p> <p>Significant undermining of the foundation - major cracking and separation of the foundation.</p>
		<p>Threshold Markers</p>	<p>Common Damage</p>	<p>Short-term inundation to limited heights. Limited scouring and erosion - low-flow and low velocity floodwaters. No noticeable cracking of the masonry or displacement of the foundation walls.</p>	<p>Short-term inundation - foundation is inundated with flood waters but for a limited duration. Limited scouring or undermining of the foundation or footings is found. Minor cracking from some settlement but no displacement, heaving, or discontinuities of the structural support systems.</p>
	<p>Special Considerations for Coastal/High Velocity Floods</p>	<p>Coastal floods may have more evidence of scouring at the supports - the foundation system may be better designed to resist this scouring action.</p> <p>High-velocity floodwaters may create erosion/scouring that the building has not been designed to resist.</p>			

Superstructure (Wood Frame/Masonry)		0-25%	25-50%	50-75%	Over 75%
Description	<p>The wall support systems that extend from the foundation wall to the roof structure. Superstructures include the exterior wall sheathing panels, shear panels, or braced wall panels. This section also includes structural members that support the roof, but does not include roof sheathing.</p> <p>Wood frame construction: Lightweight lumber or metal studs Interior wall framing (without sheathing) Typical exterior structural panel wall sheathing is plywood or hardboard</p> <p>Masonry construction: Typically concrete or CMUs, with steel reinforcement. Typical exterior covers are stucco, siding (aluminum, vinyl, or wood), and masonry veneer</p>	<p>Water level does not rise to the level of the bottom of the first floor of the structure.</p> <p>No damage to the roof framing.</p> <p>No wind damage to the superstructure.</p>	<p>Water level rises just above first floor level.</p> <p>Damage to the exterior walls is limited.</p> <p>Damage to the roof framing is limited.</p>	<p>Water level is up to 3 feet high on the first floor level.</p> <p>Some damage to exterior walls.</p> <p>Some damage to sections of the roof framing.</p>	<p>Water is over 3 feet high on the first floor level of the building.</p> <p>Significant damage to exterior walls.</p> <p>Significant damage to the main portion or multiple sections of the roof framing. Pressurization and failure of framing connections.</p>
	Common Damage	<p>Minor damage to portions of the wall structure. Wall studs and sheathing suffered minor damage by contact with debris or from floodwater pressures against the structure. Minor missing or damaged sections of the roof structure. No deformation or distortion of the structural frame is evident.</p>	<p>Some missing sections or open damage to portions of the wall structure. Wall studs and sheathing suffered some damage by contact with debris or from floodwater pressures against the structure. Some missing or damaged sections of the roof structure. No deformation or distortion of the structural frame is evident.</p>	<p>Missing sections or open damage to some portions of the wall structure. Wall studs and sheathing damaged by contact, collision, or piercing with debris or from floodwater pressures against the structure. Some missing or damaged sections of the roof structure. Some deformation or distortion of the structural frame is evident.</p>	<p>Missing exterior wall(s) or open damage to large portions of the wall structure. Wall studs and sheathing damaged by contact, collision, or piercing with debris or from floodwater pressures against the structure. Large missing or damaged sections of the roof structure. Significant deformation or distortion of the structural frame is evident.</p>
	<p>Special Considerations for Coastal/High Velocity Floods</p>	<p>Coastal areas have higher wind conditions requiring additional exterior wall structural panels, shear walls, and braced wall panels.</p> <p>Damage to these wall structural systems would indicate a higher percent of damage, because they are already designed to resist higher wind conditions.</p>			

Roof Covering		0-25%	25-50%	50-75%	Over 75%
<b>Description</b>	<p>Roofing includes a lightweight composition shingle, tile roofs, metal roofs, or a built-up roof with gravel or rock cover material. Roofing does not include structural framing members such as rafters or prefabricated trusses that support the roof deck. The roof sheathing and flashing is included in this section.</p>	<p>Minor wind damage to the roof coverings.</p>	<p>Some damaged areas of the roof from high winds or damage from debris.</p>	<p>Significant damaged areas of the roof from high winds or damage from debris.</p>	<p>Large damaged areas of the roof from high winds or damage from debris.</p>
		<p>Main surface areas are unaffected.</p> <p>Flashings are intact.</p> <p>No damage to the roof sheathing.</p>	<p>Some sections of the roof covering are missing or loose.</p> <p>Some damage to the flashings.</p> <p>Minimal damage to the roof sheathing.</p>	<p>Significant sections of the roof covering are missing or loose.</p> <p>Damage to the flashings allows some water infiltration at joints and roof penetrations.</p> <p>Significant damage to the roof sheathing - some areas of the sheathing will need replacement.</p>	<p>Major sections of the roof covering are missing or loose.</p> <p>Damage to the flashings allows significant water infiltration at joints and roof penetrations.</p> <p>Major damage to the roof sheathing - most of the roof sheathing will need replacement.</p>
	<p>Roof covering mostly intact. Some minor damage - some torn or loose parts of covering in limited areas.</p>	<p>Some areas where the roof was damaged by high winds. Several small areas of exposed roof sheathing as a result of missing/damaged covering.</p>	<p>Some areas where the roof was damaged by high winds. Several small areas of exposed roof sheathing as a result of damaged covering. Some damage to the roof covering and sheathing due to debris falling or penetrating the roof assembly.</p>	<p>Major areas of the roof where the shingles/tile are missing, allowing rainwater to freely enter the building below. Significant damage to roof covering and roof sheathing from strong winds or windborne debris penetrating the roof assembly.</p>	
<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>	<p>Coastal areas have higher wind conditions requiring additional roof covering requirements.</p> <p>Damage to these roof coverings would indicate a higher percent of damage, because they are designed to resist higher wind conditions.</p> <p>Damage to the roofing is more likely during high-wind conditions due to the loss of protection from missing roof coverings. This will increase the percent of damage.</p> <p>It is also possible that the local building code will require that the entire roof covering be removed and replaced.</p>				

Interiors		0-25%	25-50%	50-75%	Over 75%	
Description	<p>Interiors include the partitions, interior doors, and surface finishes (for walls, floors, and ceilings).</p> <p>Materials include low-grade wood/plastic composites, soft woods, and hard woods. Finishes include paint, stain, or varnish.</p> <p>This item also covers any exterior and interior painted surfaces. This includes all interior painted surfaces, but not the building or repairs of the underlying surfaces. This also includes those exterior siding materials (and trim work) that need to be painted, but not those that have inherent coloring within the materials themselves (brick, stucco, EIFS).</p> <p><b>NOTE: Non-residential structures with multiple stories will receive less damage to this element than single-story structures, as the majority of interior finish for multi-story structures will likely not be on the ground floor.</b></p>	Threshold Markers	<p>Water level does not rise to the level of the first floor structure.</p> <p>The duration of the floodwaters is limited - less than 12 hours.</p>	<p>Water level rises just above the first floor level.</p> <p>The duration of the floodwaters is limited - less than 12 hours.</p>	<p>Water level is up to 3 feet above the first floor level.</p> <p>The duration of the floodwaters is more than 12 hours.</p>	<p>Water is more than 3 feet above the first floor level of the building.</p> <p>The duration of the floodwaters is more than 12 hours.</p>
		Common Damage	<p>Wicking of the water and high moisture conditions into the finished materials at the subflooring and at the bottom of the walls. Water staining and damage possible at baseboard and the casings at the bottoms of door openings. Some adjustment/repair/replacement may be necessary. No damage anticipated on door, cabinet, and window hardware. The baseboards and the bottom of the door casings may need to be cleaned and painted.</p>	<p>Water staining and damage likely at the baseboard and the casings at the bottoms of door openings. Some adjustment/repair/replacement may be necessary. Water damage at the lowest levels of the wall assembly - lower wall and trim may need to be removed and replaced. Minor damage anticipated on door, cabinet, and window hardware. After repairs to surfaces, the lower wall finishes, baseboards, and door casings will need to be primed and repainted. The bottoms of cabinet bases in bathrooms may require repainting.</p>	<p>Water staining and damage at the baseboards and the casings at door openings need to be replaced. Water damage at the lowest levels of the wall assembly - wall and trim, window sills and window aprons, wall paneling, wainscoting, and chair rails require removal and replacement. Wall surfaces should be removed to a height of 4 feet. Some damage anticipated on door, cabinet, and window hardware. Some replacement needed. After repairs to surfaces, the entire wall finishes, baseboards, and door and window casings will need to be primed and repainted, along with the vanity cabinets in the bathrooms. Both upper and lower paint-grade cabinets should be repainted where lower cabinets were repaired or replaced.</p>	<p>Water staining and damage at the baseboards, running trim, and casings at door and window openings need to be replaced. Water damage at all the levels of the wall assembly - wall and trim, window sills and window aprons, wall paneling, wainscoting, and chair rails require removal and replacement. Wall surfaces should be removed to a height of 8 feet. Significant damage anticipated on door, cabinet, and window hardware. Some replacement needed. After repairs to surfaces, the entire wall finishes, baseboards and door and window casings, and window sashes will need to be primed and repainted along with the vanity cabinets in the bathrooms. Repaint both upper and lower cabinets, where these are paint-grade cabinets.</p>
	<p><b>Special Considerations for Coastal/High Velocity Floods</b></p>		<p>Damage to the interior finishes are more likely during high-wind conditions due to the loss of protection from missing roof coverings and exterior finishes, and from subsequent water infiltration. The salt, erosion, and winds in coastal areas will have a damaging effect on the quality of exterior hardware. This will significantly increase the percent of damages.</p>			



Plumbing		0-25%	25-50%	50-75%	Over 75%
Description	<p>The plumbing system includes the incoming water service (municipal water supply or well service), the water heater, water distribution piping, fire protection system, and the wastewater system. Wastewater will be conveyed away from the structure by either a connection to the municipal sewer system or a septic system.</p> <p>When floodwaters saturate the soils, septic systems may be unable to discharge their waste, causing a back-up of the septic systems. If floodwaters raise above the level of the municipal sewer manhole covers, the sewage can back-up into the building through the sewer lines. Verify the condition of the potable water supply to determine if it can provide a safe water supply.</p>	<p>Water level is less than 6 inches above the lowest floor level.</p>	<p>Water level is between 6 inches and 18 inches above the lowest floor level.</p> <p>Flood duration is short - no prolonged exposure to water or contaminants.</p>	<p>Water level is between 18 inches and 3 feet above the lowest floor level.</p> <p>Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.</p>
		Common Damage	<p>Floor drains can backflow into the building. Under floor (or under slab) plumbing systems should be purged, cleaned, and sanitized. Any materials that might contain remnants of waste materials or other contaminants in the floodwaters will require replacement.</p>	<p>Floor drains, shower drains, bathtubs, and toilets can backflow into the building. Septic contamination is likely. Water heaters may need to be replaced.</p>	<p>Floor drains, shower drains, bathtubs, toilets, bathroom sinks, utility sinks, and toilets will backflow into the building. Septic contamination will occur. Water heaters will need to be replaced.</p>
	Special Considerations	<p>The plumbing systems in place in the buildings may vary significantly, and damage thresholds should account for the situation of the building being assessed.</p>			

Electrical		0-25%	25-50%	50-75%	Over 75%
Description	<p>Consists of all electrical components on the property site, such as electrical wiring, communications, conveyance, lighting, and security.</p> <p>A minimum number of outlets and lighting fixtures, sometimes quantified by local building code, begin to increase in number and application as the quality level of the structure increases. Structure type will also affect the amount of fixtures, wiring, and electrical equipment in the building, and therefore will significantly affect the percent damage to this element. For this example, equipment is assumed to be on the first floor. In multi-story buildings where equipment is on floors higher than where the flooding is occurring, these percent damage estimates would be significantly lower.</p>	<p>Water level is less than 12 inches above the finished floor level.</p> <p>Minor electrical components and limited wiring are inundated but remain below normal receptacle height.</p>	<p>Water level is between 12 inches and 18 inches above the finished floor level.</p> <p>A significant number of wiring components and limited wiring are inundated, and floodwaters are above the normal receptacle height.</p>	<p>Water level is between 18 inches and 3 feet above the lowest floor level.</p> <p>A significant number of wiring components and a significant amount of wiring is inundated - floodwaters are above normal wall switch height.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>Most of the wiring components and a significant amount of wiring are inundated - floodwaters are above normal wall switch height.</p>
	Common Damage Details	<p>If the main electrical power source is located in the basement, the panel will need to be replaced. All outlets (receptacles, switches and lights) located below grade should be replaced. All receptacles, switches, and outlets located above the flood water high mark can be left in place and reused.</p>	<p>Modern Romex wiring that is inundated only for short durations (without wetting the ends/joints/terminations) can be dried and reused. Older nonmetallic cable (with impregnated braided sheathings) should be replaced when wetted. When chemical contaminants are suspected in the floodwaters, all inundated electrical wiring and components will require replacement.</p>	<p>Modern Romex wiring that is inundated only for short durations while wetting the ends/joints/terminations should be replaced. Older non-metallic cable (with impregnated braided sheathings) should be replaced when wetted. When chemical contaminants are suspected in the floodwaters, all inundated electrical wiring and components will require replacement.</p>	<p>Modern Romex wiring that is inundated only for long durations should be replaced. Older nonmetallic cable (with impregnated braided sheathings) should be replaced when wetted. When chemical contaminants are suspected in the floodwaters, all inundated electrical wiring and components will require replacement.</p>
Special Considerations	<p>The electrical system in place and its location with respect to the building may vary significantly, and damage thresholds should account for the situation of the building being assessed.</p>				

HVAC		0-25%	25-50%	50-75%	Over 75%	
Description	Threshold Markers	<p>The base HVAC system is a forced-air heating system (furnace) with ductwork. The air handler system is located inside the thermal barrier of the building.</p> <p>The percent damaged will be less for a boiler. A boiler system has a sealed piping system to distribute the heat while the furnace uses a duct system. Ducts with water infiltration will need to be cleaned, repaired, and re-insulated. By contrast, a boiler piping system only needs to have the distribution piping clean and re-insulated. Note: Old duct and HVAC insulation may contain asbestos - use appropriate caution and adjust the costs for removal, if found.</p> <p>A gas-fired or oil-fired furnace located in a basement or crawlspace will require replacement of the furnace assembly as soon as 12 inches of floodwaters are present. This will require an adjustment of the percent damaged to 75%, as soon as the water reaches the firebox level of this heating equipment. A central air conditioner or heat pump will have a ducted air distribution system. The outside condenser unit(s) will require reconditioning after any flooding conditions.</p>	<p>Water level is less than 6 inches above the lowest floor level.</p> <p>Water level is in the lower ducts but not into the air handler or equipment operating system.</p> <p>The condenser unit may be reconditioned if the water level is less than 6 inches from the bottom of the appliance. If the condenser unit is located below the flood level, it needs to be replaced.</p> <p>Minor to no damage to exterior HVAC components.</p>	<p>Water level is between 6 inches and 12 inches above the finished floor level.</p> <p>Water level is into the lower ducts and the air handler, but not into the equipment operating system.</p> <p>The condenser unit may be reconditioned if the water level is up to 12 inches from the bottom of the appliance. If the condenser unit is located below the flood level, it needs to be replaced.</p> <p>Minor to some damage to exterior HVAC components.</p>	<p>Water level is between 12 inches and 3 feet above the finished floor level.</p> <p>Water level is into the lower ducts, air handler, and the equipment operating system.</p> <p>The fuel-fired equipment (burners/controls) is inundated.</p> <p>The condenser unit needs to be replaced.</p> <p>Some damage to some exterior HVAC components. Some components may have connection failures and some became windborne debris.</p>	<p>Water level is more than 3 feet above the lowest floor level.</p> <p>Water level is into the duct distribution system, air handler, and the equipment operating system.</p> <p>The fuel-fired equipment (burners/controls) is inundated.</p> <p>The condenser unit needs to be replaced.</p> <p>Significant damage to multiple exterior HVAC components. Components may have connection failures and components became windborne debris.</p>
		Common Damage	<p>If HVAC equipment (furnace, air handler, heat pump) are located in the basement or the under floor areas, the equipment should be reconditioned or replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>	<p>If portions of the HVAC equipment (furnace, air handler, heat pump) are located in the basement or the under floor areas, the equipment should be reconditioned or replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>	<p>Portions of the HVAC equipment (furnace, air handler, heat pump) should be replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>	<p>All HVAC equipment (furnace, air handler, heat pump) should be replaced. Water-inundated duct insulation should be removed and replaced. If the duct insulation is integral to the ducts (duct board or secured interior duct liners), the ducts should be replaced. All ducts that are being reused will require cleaning.</p>

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