

Substantial Damage Estimator Best Practices

Approaches for Using FEMA's Substantial Damage Estimator Tool

Prepared for:



FEMA

Federal Emergency Management Agency
500 C Street, SW
Washington, D.C. 20472

August 2017

Table of Contents

1. Introduction	1
2. Planning for Data Collection	1
2.1 Pre-Populating the SDE Database.....	1
2.2 Use of Community Address, Tax, Plat, Survey Map, or Location Data.....	2
2.3 Collection of Data Not Required by SDE.....	3
2.4 SDE Data Entry for a One-and-a-Half-Story Residential Structure	4
2.5 Selecting a Best Fit Structure Use for Non-Residential Structures.....	5
2.6 Data Collection Triage Challenge.....	6
3. Field Work	7
3.1 Differences between Residential and Non-Residential Assessments	7
3.2 Lack of Posted or Marked Addresses	9
3.3 GPS Data.....	10
3.4 Digital Photograph Standards	11
3.5 Obtaining Digital Photographs for Structures in an SDE Inventory.....	12
3.6 Pilot Inspections and Estimating Percent Damaged.....	14
4. SDE Data Quality Assurance Reviews	16

1. Introduction

This document provides suggested approaches for dealing with some of the challenging situations users may encounter while obtaining data to be used within the Federal Emergency Management Agency (FEMA) Substantial Damage Estimator (SDE) tool. The SDE tool was designed to help Federal, State, and local officials collect and manage the data required to make Substantial Damage determinations in accordance with the requirements of the National Flood Insurance Program (NFIP) as adopted by the communities.

After a disaster, the complexity of field conditions and the need to prepare for and perform SDE inspections to assess damage can provide numerous challenges. This document contains suggested solutions for some of the common challenges that SDE users may encounter. The information and methods can be used or modified as needed by users when developing SDE-based inventories of potentially substantially damaged residential and non-residential structures.

The guidance is organized into three phases of SDE data collection management:

1. Planning Data Collection
2. Field Work
3. SDE Quality Assurance Reviews

2. Planning for Data Collection

2.1 Pre-Populating the SDE Database

Challenge

The SDE Manager would like to pre-populate the SDE tool with community data to save time and improve accuracy when the inspectors are entering individual assessment data. Having a complete inventory of properties within a community's regulatory floodplain allows for rapid data collection and more immediate use of damage assessments to develop recovery priorities. Users can also readily import previous SDE assessment data and manage their database across multiple events.

Suggested Solution

The SDE tool includes an *Enterprise Import* function that can be used to import property data from tables saved in either an .xls (Microsoft Excel) or .csv (Comma Separated Value) format. This function is useful for importing large numbers of properties because it allows the user to add multiple fields to the tool for all assessments at one time. The user would need to create a table containing the community data in one of the allowed formats and identify key community data fields that correspond to the pre-defined fields in the SDE tool. It is not necessary for the column headers of the community data fields to be the same as the pre-defined SDE fields, but it

will make the importing process easier. If users have access to pre-existing databases of property data, these databases can often be adapted for importing into SDE.

Refer to Section 3.8.2 of the SDE User Manual, August 2017, for additional guidance on using the SDE *Enterprise Import* function.

Note: Assessment data for use within an SDE inventory can only be imported into the tool from an SDE database. Non-SDE property data can be imported using the *Enterprise Import* function. SDE assessment data cannot be imported into the tool using the *Enterprise Import* function.

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 data (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.

Procedures

1. Identify existing, databases, or sources for address, property, and parcel or tax information.
2. Collect or compile information into a single spreadsheet (saved as either an .xls or .csv file).
3. Choose up to 24 pre-defined data fields, such as owner name, address, city, county/parish, state, etc., to import.
4. Perform a one-time “mapping” function to assign a link between data fields in the import data and the corresponding pre-defined data fields in the SDE tool.
 - a. Each field to be imported from a non-SDE database must be mapped (or linked) to a data field found in the SDE “Map Your Data” portion of the Enterprise Import window. For example, the field that stores the community name in the data source to be imported may be titled “TaxCommunityName” while the SDE target data field is titled “City.” To ensure that the import data populates the correct data field in the SDE tool, the user must map the link between these two data fields. To do this, navigate to the *City* field under Map Your Data and select *TaxCommunityName* from the *Select a Field* drop-down list. The two fields have now been linked for import.
 - b. If a field within the import file requires parsing (i.e., separation of data within a single field), the method in which it should be parsed must also be chosen from an SDE drop-down list. For example, if the owner’s first and last name are in one field in the import file, the tool requires the user to identify the parsing as “[First] [Last]” in either the *Owner’s First Name* or *Owner’s Last Name* data fields in the tool, so that the data may be imported properly into the correct fields within the SDE tool.

2.2 Use of Community Address, Tax, Plat, Survey Map, or Location Data

Challenge

Inspection teams must be able to:

- Locate areas and structures to be inspected on a map
- Tie available community property data to the structures that are found in the field

If structures to be inspected lack posted addresses, the inspectors will require an address, tax parcel, survey plat, or other map to cross-reference the structure found in the field with a community-recognized name or number. This is also true for pre-loaded structure data. Without a cross-reference map that allows the inspectors to verify a structure name or address, the pre-loaded data has limited value in the field. Even aerial imagery or topographic maps will have limited value for identifying specific structures without some means of tying the community data to the structures or properties on the field maps (refer to Section 3.2 for further guidance on unmarked addresses).

Suggested Solution

The SDE Manager should determine if structure information and maps are available and how these data can be used in the field to verify structure locations.

Procedures

1. Check these potential sources of data:
 - a. Community or county/parish building official or engineer
 - b. Community or county/parish surveyor
 - c. Community or county/parish floodplain manager
 - d. County/parish tax assessor
 - e. State surveyor or State survey office

Aerial photographs, county/parish highway maps, parcel maps, and local street maps without addresses can also be useful to help orient the inspection teams in unfamiliar areas.

2. Search for maps with:
 - a. Structure addresses
 - b. Subdivision or individual lot plat maps
 - c. Tax parcel identification numbers and a reference map
3. Verify, prior to the start of field work, that the data will be sufficient to help the inspectors locate inspection areas and find structures.

2.3 Collection of Data Not Required by SDE

Challenge

Based on the typical architecture of the structures in the inspection areas, the inspectors may need to record relevant structure data that do not match an existing data field in the SDE tool.

Suggested Solution

Before starting data collection, the SDE Manager should determine whether the inspectors will need to collect data that is not normally collected in the SDE tool. For example, the base cost for elevated structures may vary based on the height of the structure above the ground. This data point is not required by the SDE tool, but should be recorded by the inspectors in an agreed-upon data field in the SDE tool so that post-data-collection processing and quality assurance (QA) reviews can be completed based on the correct parameters.

Procedures

1. The inspectors can record data such as structure elevation data in the ***Residence Information*** comment box on the **Structure/Damage/NFIP Info** (or second) tab of the SDE tool.
2. The ***Residence Information*** data field allows free-form text entries, and therefore, the SDE Manager and the inspectors need to agree on the format and level of detail (e.g., no decimals vs. two decimal places) of the data added to the comment box.

2.4 SDE Data Entry for a One-and-a-Half-Story Residential Structure

Challenge

The SDE tool does not include an option to select a one-and-a-half-story residential structure.

A typical one-and-a-half-story structure includes an aboveground lower (or first) level with the main living space (kitchen, bathroom, and master bedroom) and a partial upper level that has less 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 interior walls (and forms part of the 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. Refer to Section 3.12.2.2 of the SDE User Manual for additional information on data entry for one-and-a-half-story residences.

Suggested Solution

In the SDE tool, users should select a single-family residence with two or more stories for inspections involving a one-and-a-half-story residential structure. The additional floor space and features (electrical, HVAC, insulation, drywall, and plumbing) will be closer to those of a two-story structure than a one-story structure. Users should also enter the data into the SDE square-foot calculator tool using the dimensions for the lower floor and a value of 1.5 for the number of

stories. 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.

Procedures

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 tool.
2. Enter the dimensions of the lower floor and use 1.5 for the number of stories in the SDE square footage calculator.

2.5 Selecting a Best Fit Structure Use for Non-Residential Structures

Challenge

The selection of a non-residential structure type is based on structure use and the number of stories. The list of 22 non-residential structure uses in the SDE tool does not contain all possible structure uses that inspectors may encounter in the field. The list could easily exceed 100 different uses, but such a large list of non-residential structure uses would be overwhelming and impractical for most SDE users, especially for those without a background in non-residential construction or inspection.

The 22 non-residential structure use options provide a balance between too many and too few structure 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 contained on the current list.

Suggested Solution

Users should select the structure use that best fits the structure being inspected. Consider the structure use and whether it is more like a factory, a warehouse, or an office building. Users should also consider the structure materials (schools and hospitals are built with 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).

For example, the list of non-residential structure uses for schools has 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 two-story high school because the number of stories and the layout of classrooms would be similar between a middle school and high school.

Another example of a structure use not in the tool is a medical office. Of the two most obvious choices for a structure use, an office building would be a better fit than a hospital because medical offices typically include layouts and structure materials similar to office buildings. Also, hospitals are generally considered to be critical facilities and would require higher quality designs to remain functional during and after a disaster.

Procedure

As recommended above, select the structure use that best fits the structure being inspected.

2.6 Data Collection Triage Challenge

The SDE Manager and the inspectors need to plan the inspection areas and the sequence of inspections to ensure a complete and efficient data collection. In addition, the inspectors need to know which areas or structures will require access permission or an appointment through advance coordination.

Suggested Solution

Before starting data collection, the SDE Manager should drive through the damaged areas in the floodplain to estimate the number of structures requiring inspection and the areas with a high concentration of damaged structures. The manager should also assess all areas to be inventoried to determine a general schedule of inspections that accounts for the areas with temporary or full-time access issues. Temporary access issues include physical limitations, such as flooding, debris, active debris removal operations, or downed power lines. Areas with full-time access issues include gated communities, government facilities, schools, hospitals, and industrial parks. These normally require advance coordination, permission to enter the site or structures, and appointments.

The advance reconnaissance will also benefit the overall inventory work by providing the inspectors with alternative inspection areas if planned locations are inaccessible because of unforeseen temporary access issues.

Procedures

1. Schedule of inspections:
 - a. Drive through the damaged areas of the floodplain to determine the quantity and types of structures to be inspected, level of damage, and health and safety issues (weakened floors, contaminated water, mosquitos, snakes, downed power lines, etc.).
 - Estimate the number of residential and non-residential structures to be inspected.
 - If the number of non-residential structures to be inspected is small, consider designating one or possibly two teams as non-residential inspection teams because non-residential structures will usually require more time for inspections and structures may be located further apart than residential structures.
 - b. Develop a schedule of inspections by neighborhoods and target dates. Target dates may need to be revised based on the progress of the inspection teams.
 - c. Consider the accessibility of the inspection areas.
 - d. Determine priority inspection areas (if any).

- e. Limit inspections to areas within the designated 100-year floodplain (per the NFIP requirements).
 - f. Notify police and other local officials of inspection areas and the proposed schedule.
2. Areas with accessibility issues include:
- a. Areas with physical limitations
 - b. Inundated or debris-covered roads
 - c. Roads with severe pavement damage or missing or damaged bridges or other crossings
 - d. Downed power lines
 - e. Debris clean-up activities
 - f. Areas requiring off-road access
 - g. Islands requiring access by boat
3. Areas requiring permission or appointments:

These areas may require anywhere from a few hours to a few days advance coordination to gain access.

- a. Private residential developments, gated communities, individual gated lots
- b. Businesses
- c. Industrial facilities or parks
- d. Schools or college campuses
- e. Local, State, or Federal government facilities

The SDE Manager needs to know the number of structures to be inspected at closed locations so that an adequate number of inspection teams can be sent to the site.

Consider delaying inspections for areas with physical limitations or requiring advance coordination until later in the inspection schedule when the SDE Manager has had time to verify that safe and reasonably clear access is available again or has been able to gain access permission from structure owners or managers.

3. Field Work

3.1 Differences between Residential and Non-Residential Assessments

Challenge

Inspectors may not use the correct assessment form for a structure being inspected because the current use is different than the original use. An example would be a home that has been

converted into an office for professional services, such as a hair salon, law office, or tax preparation office.

Suggested Solution

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 in the SDE tool, the inspectors should consider the original design, building materials, and planned use of the structure. If it appears to be a residence, then a residential assessment form should be used.

For purposes of the SDE data collection and entry, Table 3-1 notes the differences between residential and non-residential assessments. The differences between the two types of structures are not based on use or appearance, but on the design and building materials used in the structures.

Table 3-1: Residential vs. Non-Residential Assessments

Residential Assessments	Non-Residential Assessments
<ul style="list-style-type: none"> • Single-family (SF), stick-built structures 	<ul style="list-style-type: none"> • Non-residential structures such as office buildings, factories, schools, hospitals, etc.
<ul style="list-style-type: none"> • Row houses or townhouses, duplex residences 	<ul style="list-style-type: none"> • Apartment buildings
<ul style="list-style-type: none"> • Manufactured houses (MHs) 	<ul style="list-style-type: none"> • Condominiums with single-floor units above or below <p>Note: Condominiums with multiple floors, but without separate units above or below should be evaluated as a townhouse and data should be entered using a residential assessment form.</p>

Businesses located in a traditional SF home or a MH does 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 the SDE tool 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 townhouses. 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 while in the SDE tool without the need to delete the incorrect assessment type and replace it with the proper assessment.

3.2 Lack of Posted or Marked Addresses

Challenge

In some rural areas, users may encounter structures without posted addresses or anything visible to match tax or other community data. However, all structures need to have some type of identifier for performing an assessment and attaching global positioning system (GPS) data and structure photographs in the SDE tool. Preparing assessments without an identifier and then attempting to attach GPS coordinates and photographs to a specific structure later after many inspections have been completed is extremely difficult, and errors could require a return visit to the field to either verify or recollect data for structures previously inspected.

Suggested Solution

The inspectors can use temporary ID numbers for damaged structures, allowing them to complete inspections and organize the SDE database until more complete structure information is available. A properly managed temporary structure identification system consists of three separate data identifiers for a specific structure: a temporary ID number, GPS coordinates, and photographs.

The intent of using a temporary ID number is that the SDE Manager, inspectors, other local officials, and structure owners all know that they are discussing the same structure in the post-data-collection environment. The temporary ID numbers should be entered in the SDE tool in the **Street Number** data field, under Building Address on the **Address** (or first) tab. Once more detailed information is available; users can open the SDE database and replace the temporary ID number with the correct structure address or tax ID number.

Procedures

1. Organize inspection staff into two-person teams.
2. Deploy each team to a defined geographic area.
3. Assign a range of ID numbers to each inspection team to use on structures with no visible address before starting field work.
 - a. For example, Team 1 could use the numbers between 1000 and 1999. Under this approach, the first structure would be recorded as “1001” plus the street name and the next structure without an address would be identified as “1002” and so forth.

- b. Team 2 would use “2001” and the street name for their first structure followed by “2002,” while Team 3 would use “3001,” etc.
4. Record GPS coordinates for each structure.
5. Obtain two photographs for each structure.
6. Record available street name, suffix, city, state, county/parish and zip code on the SDE **Address** tab.

Refer to the “Suggested Solution” under Section 3.5 regarding the use of a dry-erase board in the structure photograph for either the structure address or temporary ID number. This can provide an additional cross-reference between the structure and the recorded data.

3.3 GPS Data

Challenge

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

Suggested Solution

Recommended Level of Accuracy:

The GPS coordinate data (latitude and longitude) should be accurate to at least five (5) decimal places and 10 feet (or 3 meters) horizontally, with a 95 percent level of accuracy. This level of accuracy is needed so that the recorded GPS data are valid for only one structure, and anyone using those coordinates will be able to locate the same 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. This will facilitate importing and plotting the data on local or other georeferenced maps.

A sample reading of GPS data would look like this:

Latitude: 32.63369, Longitude: - 91.05556

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

Equipment

Note of Caution

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

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

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. WAAS corrects for GPS signal errors caused by ionospheric disturbances, timing, and satellite orbit errors.

Procedures

It is recommended that users without a WAAS GPS unit follow the same procedures to calibrate the GPS unit and verify the data.

1. Verify the calibration of the GPS units:
 - a. All inspectors should gather in one location each morning to obtain and verify coordinate data for that location on each hand-held GPS unit.
 - b. GPS readings should agree within five (5) decimal points for the same location.
 - c. This verification should be done on a daily basis.
 - d. GPS units that do not match the coordinates obtained by other GPS units during the daily test should be recalibrated or replaced.
2. A thick tree canopy above a structure or dense vegetation or foliage around it may limit the number of satellites available for recording GPS coordinate data. When dense foliage or a thick tree canopy is present, the inspector should either move to a different part of the property that has 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 and limited to a single structure.

3.4 Digital Photograph Standards

Challenge

There are no specific SDE requirements for the size and resolution of digital photographs attached to SDE assessments. In addition, the larger the digital files and the more photographs attached per inspection, the larger the SDE database becomes, and the slower the tool may operate when either attaching photographs to inspections or moving between assessments.

Suggested Solution

Digital photographs should be a maximum of 640 pixels wide by 480 pixels high (640 x 480), and each individual photograph should be 3 megabytes or less in file size. SDE photographs should be obtained in JPG or JPEG format, because it shows a good level of detail for curbside photographs and has a smaller file size than other digital photograph formats. There should be two digital photographs obtained per structure for different views.

High-resolution photographs will have larger file sizes that could adversely affect the operating speed of the SDE tool, especially

Digital Photographs

Although individual photograph file sizes may not seem large, their collective size and storage requirements will grow as more assessments are added and the inventory file size increases.

if there is a large quantity of such photographs. The higher (or better) the resolution of the photograph, the larger the digital file attached to the inspection.

Procedures

1. Review the manufacturer instructions for the digital camera or camera-enabled tablet to learn how to set the photograph resolution and size.
2. Set the digital photograph to 640 pixels wide by 480 pixels high.
3. Every day, verify that the photograph resolution has not changed, especially if the camera ran out of power or was reset during the previous use.

3.5 Obtaining Digital Photographs for Structures in an SDE Inventory

Challenge

After returning from the field, it may be determined that some digital photographs are too dark, washed out by sunlight, or obtained too far from the structures to be usable. Photographs may also not be usable because of dense foliage on the top, front, or sides that obscures structure features, rendering the structure undistinguishable from other similar structures nearby.

Suggested Solutions

Inspectors should try to frame the photograph so that the structure fills a majority of the view and is readily recognizable to the structure owner or anyone else who views the structure from the point where the photograph was taken. Taking photographs from curbside or the driveway of the structure is recommended unless the structure is set back too far from the street to make a photograph legible.

The purpose of obtaining two photographs per structure is to identify the structure being inspected, not to record all of the damage.

Use of an Address Board

Depending on the preferences of the SDE Manager, a small (11" x 14" maximum size), white dry-erase board can be used as an address board to cross-reference the photographs to the structure. The inspectors can use a dark, dry erase marker to write the following on the board:

- Street number (i.e., address number) or temporary structure ID number
- Street name
- Street suffix (such as Street, Avenue, Road)
- Inspector name or team number
- Inspection date

The board can be held by one of the inspectors in either of the lower corners of one of the structure photographs. Additional inspections on the same street will only require a change in the street number or structure ID number when moving from one structure to the next.

Procedures

1. The inspectors should try to obtain corner views of the structure to show two sides in each view. In this manner, all four of the sides for a rectangular-shaped structure can be obtained with only two photographs.
2. When heavy vegetation is present, the inspectors should obtain additional photographs or close-up shots where the structure outline extends beyond the edges of the photograph. Obtaining photographs of more than one side of the structure may also help.
3. For structures with more than two photographs, the SDE Manager can determine which and how many photographs to retain with the assessment after the inspectors return from the field.
4. For elevated structures, inspectors should try to get an object such as a vehicle, another inspector, a nearby structure sitting at ground level, or a tape measure in the photograph to provide a perspective on the relative height of the structure above ground.
5. If a high water mark on the structure or a debris line on an adjacent fence or vegetation is visible, inspectors should try to capture it in one of the photographs.
6. If bright sunshine is a problem, take the photograph from a different angle to avoid an illegible photograph.
7. As a routine procedure, **the inspectors should review the photographs before leaving the structure to ensure that the photographs are clear and show the correct structure.** This will avoid the need to return to the site later to obtain better photographs.
8. The SDE Manager can provide guidance for the inspectors for structure owners that refuse an inspection or specifically request that photographs not be taken. The normal options for this situation are to either not obtain photographs or obtain them from a public right-of-way such as a public street.

The sample photographs in Figure 3-1 show two views of the same structure from different corners. The photographs also show a high water mark, structure displacement, and some of the damage.

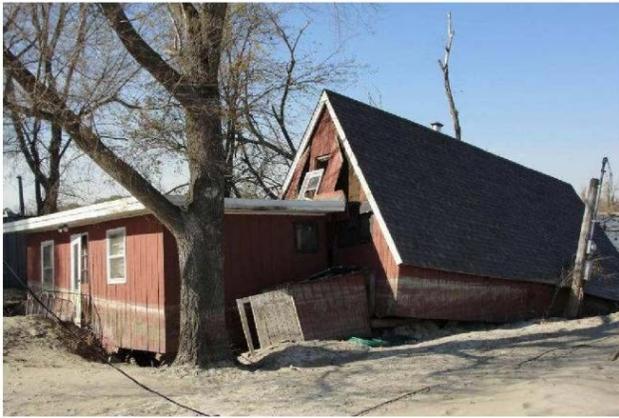


Figure 3-1. Two views of the same structure

3.6 Pilot Inspections and Estimating Percent Damaged

Challenge

All inspectors, including experienced and new staff need to understand the SDE requirements as well as the expectations of the SDE Manager for the inspections and data collection. In addition, the inspectors need to understand how to estimate the percent damaged for both residential and non-residential elements in a consistent manner.

Pilot inspections are discussed in more detail in Section 4.1 of the FEMA *Substantial Damage Estimator (SDE) Field Workbook: Preparing Structure Inventories Using the SDE Tool* (Version 3.0, August 2017).

Suggested Solution

The SDE Manager should review two or three structures in the field with all the inspectors as pilot inspections on the first day of inspections. The purpose of pilot inspections is to review the SDE data requirements for valid assessments. The SDE Manager should also hand out and

review the contents of Appendices E and F from 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). Appendix E contains a resource guide for estimating percent damaged for four ranges for each element for residential structures, and Appendix F contains a similar resource for estimating percent damaged by element for non-residential structures.

Procedures

1. Review the field safety requirements, site access procedures, data evaluation and entry, and data required for a valid assessment.
2. Review the data to be ignored (structure color, contents or landscaping damage, lot size, etc.) for SDE data collection.
3. Point out the 12 residential and 7 non-residential elements for each of the pilot structures.
4. Explain that the percent damaged per element should be entered in increments of 5 to 10 percent.
5. After the initial two or three structures are evaluated as a group, have each team collect data for two to three more structures on their own so the collected data can be evaluated later as a group.
6. Encourage each two-person team to rotate activities so that each inspector understands all aspects of the data collection and data entry objectives for the inventory work. Team members can take turns identifying the percent damaged by element while also recording the structure dimensions, obtaining GPS coordinates, and taking photographs.
7. Review the data from all of the first day inspections as a group exercise to identify data issues and consistency, verify completeness, review estimates of percent damaged, and evaluate photograph quality.
8. Stress to the teams that the data collection and data entry is a team effort and that everyone will approach it differently based on his or her own experience. This is not a competition to see which team completes the most inspections.

The data completeness, consistency, and quality obtained during the first 3 days of inspections are critical to the overall quality and credibility of the SDE inventory. The SDE Manager and inspectors must all be “on the same page.” Inconsistencies and problems with data collection can quickly multiply and create a large problem requiring hours or days of revisions to the SDE data if the initial data issues are not identified and corrected within the first few days.

4. SDE Data Quality Assurance Reviews

Challenge

The completeness, consistency, and quality of the data in a completed SDE inventory are critical to the credibility of the inspection process and Substantial Damage determinations for elected officials and structure owners. Therefore, SDE data must be reviewed for these issues to verify that the community has a complete and accurate SDE database prior to starting post-Substantial Damage determination activities. These activities include requirements that substantially damaged structures be brought into compliance with the local floodplain management ordinance and building code.

Suggested Solution

As soon as the data comes in from the field, the SDE Manager or a designated QA lead should perform some QA reviews for each inspector or team to ensure that the data are usable. As mentioned previously, this is especially critical during the first 3 days of inspections to minimize the impact of poor or incomplete data on the entire SDE inventory.

The recommended reviews below should be considered as the minimum reviews needed to verify a reliable SDE database. They are by no means an all-inclusive list of the data that could be reviewed for quality and consistency.

Recommended QA Reviews

1. Plot all of the GPS coordinates on a georeferenced map or GIS overlay to verify that all the coordinates match the inspection area.
2. Review photographs for legibility and consistency with the requirements set by the SDE Manager.
3. Confirm agreement between the photograph and the structure information (e.g., an assessment for a two-story residential structure cannot have a photograph showing a one-story house).
4. Review the entire database for duplicate records from the current or previous days. This can be done by searching for duplicate addresses or ID numbers.
5. Verify that the correct base cost data and depreciation percentage based on structure type were entered into the tool.
6. Verify that the users have entered reasonable percent damages based on the depth and duration of flooding above the lowest floor for the structures throughout the inventory area.
7. Verify that the correct community name and NFIP information were entered into the tool and are consistent for all assessments within the same community.

8. Check that the street name is spelled the same for all entries on that street and that the street suffix is correct.
9. Verify that all data requested by the SDE Manager has been entered and is consistent where applicable (e.g., comment boxes, name and date of the source for the base cost data).
10. If the teams are still in the field collecting data, communicate the errors to the inspectors and how to properly complete future assessments to prevent reoccurrences of the errors.