

Damage Survey Worksheet

Type of Disaster: Survey Date / Street Name or Location:	County/City: , MI	Team Conducting Survey: Damage Type (Public or Private):
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Address or General Location	Degree of Damage				Type of Structure	Flood Level in Feet: B=basement F=first floor		Description of Damage (Include cost estimate for public facility damage. Include insurance coverage estimate for damage, if available / applicable. An alternative would be to use a simple alphabetic code for insurance coverage – e.g., N = no insurance; U = under insured; I = fully insured.)	Latitude / Longitude
	0	1	2	3		B	F		
TOTALS:	1	2	1	3					

<u>Degree of Damage:</u> 3 Destroyed (100% - not habitable or useable) (Flooding: 2+ feet of water on first floor for more than 1 day; for mobile homes, water above the floor level) 2 Major Damage (50% or more damage; not habitable / useable; requires extensive repairs) (Flooding: no basement – 2+ feet of water on first floor; basement – has caused structural damage) 1 Minor Damage (>50% damage; not habitable / useable, but can be made so in short time; minor repairs only) (Flooding: no basement – less than 2 feet of water on first floor; basement – less than 8 feet of water in basement) 0 Affected (Habitable / useable; requires mostly cosmetic repairs) (Flooding: no basement – minor access problems; basement – less than 1 foot of water in basement) IMPORTANT NOTE: After the survey is completed, this worksheet should be RETAINED locally for reference and follow-up by federal and state officials. Also, be sure to use SEPARATE WORKSHEETS for public and private damage, to eliminate any possibility of confusion.	<u>Type of Structure:</u> <i>Private Damage</i> S Single Family Home (primary residence) M Mobile/Manufactured Home (primary residence) A Apartment/Rental Unit (rental residence) V Vacation Home/Cottage (secondary residence) B Business (includes churches) <i>Public Damage</i> P (For public structures, also indicate the type of structure by name)
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Damage Survey Considerations: Degree of Damage Categories

The following classification system is consistent with FEMA PDA guidelines and should be used for classifying private and public damage. This information should be recorded on a damage survey worksheet and damage map(s), as per the examples found on pages 32-34 of EMD/MSP Publication 901.

- 3 DESTROYED:** Structure is not habitable / useable, and cannot be repaired to make habitable / useable. Structure is a total loss because the cost of repairs would likely exceed the replacement cost. Structure has complete failures to major components (i.e., basement walls / foundation, walls, roof, etc.). Generally, what is left will have to be bulldozed off or dismantled for new construction.

For flooding, structures that will not be economically repairable (i.e., pushed off foundation) can generally be considered destroyed. If the structure has 2 or more feet of water on the first floor and the water has remained in the structure for an extended period of time (more than one day), it is likely that the structure has incurred extensive damage to the walls and foundation and it can generally be considered destroyed. If the flood is of short duration (rapid rise and fall of the water) consideration can be given to classifying the damage as “major damage” (see below). Mobile homes that have water above the floor level can be considered destroyed. Mobile homes that have been swept from their foundations by flood waters can be considered destroyed.

EXAMPLES OF DESTROYED STRUCTURES:



- 2 MAJOR DAMAGE:** Structure has sustained structural or significant damage, is not habitable / useable, and requires extensive repairs before it can be used again. Damage involves the structural features affecting strength and safety (i.e., foundation; collapse of any part of a building; two or more severely cracked, bulging or slanting walls; substantial roof damage; building obviously not straight or level; collapsed roadbed or bridge deck; etc.). In general, has more than 50% damage to the structure and the damage will likely take more than 30 days to repair. **(Note: damage expressed as a percentage of structure replacement value.)**

For flooding, structures with no basement that have 2 or more feet of water covering the first floor can be considered to have major damage. (If the water has been in place for more than one day, more extensive damage may have occurred. Consideration can be given to classifying the damage as “destroyed” – see above.) For structures with basements, if the water has caused structural

damage to the basement (i.e., a collapsed basement wall), it can be considered major damage. For mobile homes, if water has soaked the bottom board or the home has shifted on its piers, it can be considered major damage.

EXAMPLES OF STRUCTURES WITH MAJOR DAMAGE:



- 1 MINOR DAMAGE:** Structure is damaged and not habitable / useable, but can be made habitable / useable in a short period of time. Examples: one wall or a section of roof damaged; minor problems in road or bridge deck; mobile home foundation has shifted or utility connections have been broken; etc. Generally has less than 50% damage to structure, and can be repaired within 30 days.

For flooding, structures with no basement that have less than 2 feet of water covering the first floor can be considered to have minor damage. For structures with basements, less than 8 feet of water in the basement and no structural damage can be considered minor damage. (If the water has been in place for more than one day, extensive foundation damage may have occurred. Consideration can be given to classifying the damage as “major damage” – see above.) For mobile homes, if water has flooded utilities and/or piers have shifted or washed out, it can be considered minor damage.

EXAMPLES OF STRUCTURES WITH MINOR DAMAGE:



0 AFFECTED: Structure is habitable / usable, but requires mostly cosmetic repairs to return it to pre-disaster condition. Examples: lost shingles or other minor roof problems; broken windows, walls or doors; debris blocking otherwise undamaged roadway; etc.

For flooding, in structures with basements, less than one foot of water in the basement can be considered affected. Structures with minor access problems due to flooding can also be considered affected. For mobile homes, if water is under but did not touch the unit, it can be considered affected.

EXAMPLES OF AFFECTED STRUCTURES:



Damage Classification: Rapid Evaluation Matrix

Damage Classification	Currently Habitable / Useable?	Approximate % of Damage	Flood Depth: Single / Multi-Family Home	Flood Depth: Mobile Home	Flood Duration: 1 Day or Less, Consider This Classification	Flood Duration: >1 Day, Consider This Classification
0 – Affected	Yes	Mostly cosmetic	B = <1 ft in basement NB = minor access problems	Minor access problems	0 – Affected	0 – Affected
1 – Minor Damage	No	Less than 50%	B = <8 ft in basement NB = <2 ft on 1 st floor	Flooded utilities / piers	1 – Minor Damage	2 – Major Damage
2 – Major Damage	No	50% or more	B = structural damage NB = 2+ ft on 1 st floor	Bottom board soaked / home shifted on piers	2 – Major Damage	3 – Destroyed
3 – Destroyed	No	100%	B = 2+ ft on 1 st floor for more than 1 day	Water above floor level / unit swept from foundation	2 – Major Damage	3 – Destroyed

Notes: B = structure with basement / flooding in basement; NB = structure with no basement / flooding on first floor; > = greater than; < = less than. Follow the chart from left to right, beginning with the left hand column. For non-flood disasters, use the first three columns to evaluate. For flood disasters, use all of the columns to evaluate. Damage is expressed as a percentage of structure replacement value.

Geospatial Data Collection

Whenever possible, geospatial coordinates (latitude and longitude) should be collected (in addition to the street address) for each damaged structure / facility (or clusters of damaged structures / facilities, as appropriate). This information can be entered in the last (far right hand) column of the damage survey worksheet. Collecting this information will assist the EMD/MSP in mapping the damaged areas using a GIS in the SEOC. For some public facility sites (e.g., drains, bridges, culverts, etc.) it will not be possible to include a street address so the geospatial coordinates will be the only method to accurately locate the damaged sites. (Note: if the community has already geo-located structures as part of the property assessment process, it will not be necessary to duplicate that effort in the field when conducting damage surveys.)

In general, geospatial data should be collected in the following manner:

- The standard datum of GPS latitude / longitude collection is the North American Datum of 1983 (NAD-83) or the World Geodetic System of 1984 (WGS-84) of the U.S. Defense Mapping Agency. Coordinates ideally will be in decimal degrees longitude and latitude with at least 6 decimal places for property locations and include a negative sign (-) to show west longitude or south latitude. For example: latitude 36.999221 longitude -109.044883. However, in most instances it will not be feasible to collect and report data in this manner. Therefore, it is acceptable to record the coordinates in the standard format of degrees, minutes and seconds. For example: latitude 36°42'36" longitude 085°81'18". The EMD/MSP can convert coordinates in this format to decimal format for database and map production purposes. It is also possible, on many GPS units, to simply enter the location as a "waypoint" and the coordinates can then be copied from the GPS unit to the EMD/MSP's GIS for database and map production.
- FEMA guidelines specify that geospatial coordinates (latitude and longitude) should be taken from one of the following places, listed in order of preference:
 - ✓ The front door of the structure;
 - ✓ The center of the beginning of the driveway, road, or access way that is used to access the property; or
 - ✓ From the westernmost or easternmost point of the property closest to the road or access way (either the SW, SE, NW or NE corner of the property). This specifically applies to areas / facilities / structures where actual addresses and easily recognizable property divisions may not exist.

Although collection of geospatial data is important to the State's assessment and response / recovery efforts, it is also important to remember that the actual assessment of the damaged facility is the ultimate purpose of the assessment effort. Therefore, keeping geospatial data collection as simple as possible is important to keeping the assessment operations on track and on time. It is very easy to get wrapped up in the intricacies of the geo-location process and ultimately forget the intended purpose of the assessment effort. Geospatial data collection helps ensure an accurate geographic portrayal of the damage; however, the actual assessment of the damage should remain the focus of the assessment effort. In some instances this may mean that **NO** geospatial data will be collected – depending on the situational circumstances and the time available for collecting information.

Attachment G: Disaster Debris Estimating Techniques

Note: The following guidelines can be used to aid in estimating the amounts of disaster debris on the ground. By using these measures and some simple mathematical calculations, good ballpark debris figures can be generated in a relatively short amount of time. Determining the amount and types of disaster debris is a necessary first step in setting up a debris removal and disposal operation, and in determining potential costs associated with Category A (Debris Removal and Disposal) work under the federal Public Assistance Grant Program (PAGP), or Section 19 of 1976 PA 390 state funding in the absence of federal PAGP funding. This information can be reported in the "Public Assistance (PA) Damages" section of the E Team Jurisdiction Situation Report (for local jurisdictions) and E Team Agency Situation Report (for state agencies). It can also be reported in the "Situation Summary" section of the E Team Incident Report if early debris estimates are generated.

Standard Acronyms / Terms: L = Length; W = Width; H = Height; CY = Cubic Yards; T = Tons; SF = Square Feet; C & D = construction and demolition debris (materials from damaged buildings / related); woody debris = downed trees / shrubbery

FORMULAS:

One story building: $L' \times W' \times H' / 27 = (\#) \text{ Cubic Yards} \times .33 \text{ (compaction factor)} = (\#) \text{ Cubic Yards}$

(For example: the formula for a building that is 100' long x 50' wide x 10' high is.... $100 \times 50 \times 10 / 27 = 1,852 \text{ CY} \times .33 = 611 \text{ CY}$)

Debris pile: $L' \times W' \times H' / 27 = (\#) \text{ Cubic Yards}$

(For example: the formula for a debris pile that is 50' long x 75' wide x 4' high is.... $50 \times 75 \times 4 / 27 = 556 \text{ CY}$)

QUICK REFERENCE TABLE - DEBRIS PILES:

Length (Ft.)	Width (Ft.)	Height (Ft.)	Volume (CY)	Tons (T) – C & D Debris	Tons (T) – Woody Debris	Approximate Size Reference
10	10	4	15	7.5	3.75	Small above ground pool
20	10	4	30	15	7.5	Medium above ground pool
30	10	4	45	22.5	11.25	Medium above ground pool
40	10	4	60	30	15	Large above ground pool
50	10	4	75	37.5	18.75	Large above ground pool

QUICK REFERENCE TABLE - TYPICAL 1 STORY HOUSE*:

House Size (SF)	Volume (CY)	Tons (T) – C & D Debris
1,800	175	87.5
2,000	195	97.5
2,200	215	107.5
2,400	235	117.5
2,600	255	127.5
2,800	275	137.5
Single wide mobile home	80	40
Double wide mobile home	160	80

Formula: Square feet x 8 (feet) / 27 x .33 (compaction factor) = CY. *Just C & D debris – does not account for vegetative cover around house. To account for vegetation, multiply CY total by 1.1 for light vegetation, 1.3 for medium vegetation, and 1.5 for heavy vegetation.

QUICK REFERENCE TABLE – OTHER:

Type of Debris	Volume (CY)	Tons (T)
Trees (15 @ 8" diameter)	40	10
House (2,000 SF with vegetation)**	300	150

**Provides a good all-around guideline which accounts for vegetative cover around the house.

Attachment H: Guidelines for Disaster Photography

Taking photographs and/or video footage of incident scenes is a critically important part of the damage assessment process, yet it is a skill that is often overlooked in damage assessment training. As a result, many incident scene images do not adequately identify the site or portray the nature and extent of the physical damage. These guidelines are meant to help minimize sub-standard disaster photography by providing a simple process to follow when shooting photographs and/or video footage in the field.

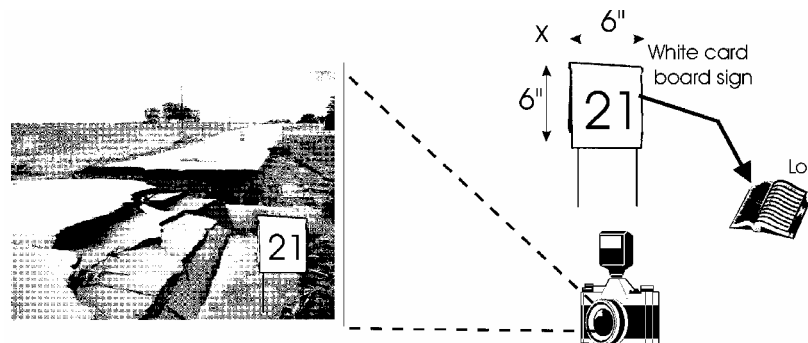
STEP 1: SITE IDENTIFICATION

Proper identification of the site being shot is the first step in the process. Even the best image is worthless if the person reviewing the photograph or video cannot determine where the image was taken. In most instances, the person that actually took the photo or shot the video footage in the field is not the person that ultimately ends up reviewing the images at a later time. In addition, in many disaster situations, it is not uncommon for dozens of sites to be photographed or video recorded, greatly increasing the likelihood that the person shooting the images may not remember where each and every image was taken. Therefore, there is a definite need to establish the identification of the site when it is actually being recorded in the field.

For **VIDEO IMAGES**, the person shooting the scene should verbally identify the name and general location of the site, as well as the date and time that the video is being shot. This should be done for every site being shot. That way, any chance for misinterpretation of the site location is eliminated. (Note: it is also important to remember to keep the camcorder as still as possible when shooting the footage, to avoid the “ocean motion” syndrome that is prevalent in many amateur videos. Unnecessary and excessive movement of the camcorder greatly detracts from the video images. In addition, unnecessary background conversation and noises should be kept to a minimum to provide for the best possible audio quality. Lastly, as a rule of thumb, you should not focus on a particular site image for more than 15 seconds. For example, you may want to show the “context” image for 15 seconds, the “curbside” image for 15 seconds, and the “close-up” image for 15 seconds. Focusing any longer on a site image will make the footage monotonous and unnecessarily long.)

For **PHOTOGRAPHIC IMAGES**, the photographer should assign a number to each site, and record that number and site location in a notebook. For example: **Site 1:** Smith Street Bridge, over the Green River; **Site 2:** Maple Drain culvert under River Road; **Site 3:** Oak Street Senior Center, Pine City; etc.

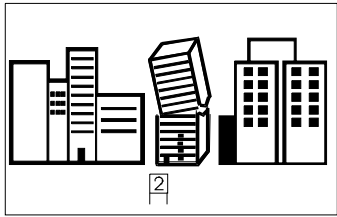
A small cardboard sign (approximately 6" X 6" in size), attached to a wire or wood stake, with the site number clearly marked in black permanent marker, should be placed in the ground at the edge of the site so that it is visible within the camera image frame. This sign will clearly identify the site in the photograph. The sign should be placed in such a manner that it will be in reasonable focus in the final photograph. Each site should be numbered chronologically in this manner, not each image. In other words, all images at site XYZ should be labeled with the number 1, all images at site PDQ should be labeled with the number 2, and so on. Numbering should be continuous, rather than starting over again at number 1 for each roll of film shot.



Each disaster site should be shot from a minimum of 3 different positions to ensure proper image documentation:

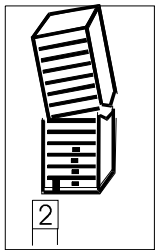
STEP 2: CONTEXT IMAGE

The context image will show the damaged site in relationship to other surrounding structures and land uses. In other words, this image would be shot from a distance such that the site in question, plus the immediate surrounding properties, can be easily viewed within the frame. Such an image would provide the “big picture” of where the site sits in relationship to everything around it. For example:



STEP 3: CURBSIDE IMAGE

The curbside image will show the damaged site as it would appear if you were standing in front of it in the street. The site should fill the image frame from edge to edge. For some sites, it may be necessary to stand a little further back than curbside to obtain the proper edge to edge image, but the principle remains the same. This image should contain only the site, and not the surrounding properties. This image will provide a mid-range view of the damage at the site. For example:



STEP 4: CLOSE-UP IMAGE

The close-up image will show the damaged site, or portion of the site, as it would appear if you were standing directly in front of it, approximately 5' - 15' away. This image would be particularly useful in highlighting specific details of the damage, such as focusing on a damaged doorway to a building or a hole in a roadway. In some cases, more than one close-up image will be necessary to adequately portray the damage. For example:

