

Percent Damage Estimation Tables

The SDE requires the inspector to estimate the percent of damage for various building components. The information compiled below can be used with the SDE worksheet to quickly calculate substantial damage.

The following table is intended to be used as a screening tool so that the property owner is notified as soon as possible as to the potential status of their property. Often a more detailed assessment is warranted and more detailed damage percentages should be determined on an as-needed basis. **The percentages in the table are based on 1-story house without a basement that has experienced medium-height freshwater flooding of limited duration.**

Please note that a more thorough damage estimation guide for both residential and non-residential structures can be found in Appendix E, "Guidance for Estimating Percent Damage for Residential Structures," and Appendix F, "Guidance for Estimating Percent Damage for Non-Residential Structures," in **FEMA P-784 Substantial Damage Estimator User Manual and Field Workbook**.

Estimated Percentage Damage Range

	0% - 25%	25% - 50%	50% - 75%	75% - 100%	
FOUNDATION	<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>	<ul style="list-style-type: none"> • Water level does not rise to the level of the bottom of the first floor of the structure. • No scouring at the footings. • Some undermining but no visible cracking at concrete slab. 	<ul style="list-style-type: none"> • Water level rises just above first floor level. • Limited scouring at the footings. • Soils are saturated. • Undermining of the concrete slab, especially at corners - hairline cracks only. 	<ul style="list-style-type: none"> • Water level is 4-7 feet against the outside of the building. • Limited scouring at the footings. • Soils are saturated and unstable. • Cracks noted on or along the foundation walls. • Significant undermining of the concrete slab – significant cracking is visible. 	<ul style="list-style-type: none"> • Water level is 7 feet or higher against the outside of the building. • Limited scouring at the footings. • Foundation is notably cracked and/or displaced. Structure has been knocked off its foundation. • Portions of the foundation are damaged or missing. • Significant undermining of the concrete slab - major cracking and separation of the concrete slab.
SUPERSTRUCTURE	<p>For wood frame & masonry. 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>	<ul style="list-style-type: none"> • Water level does not rise to the level of the bottom of the first floor of the structure. • No damage to the roof framing. 	<ul style="list-style-type: none"> • Water level rises just above first floor level. • Damage to the exterior walls is limited. • Damage to the roof framing is limited. 	<ul style="list-style-type: none"> • Water level is up to 3 feet high on the first floor level. • Some damage to exterior walls. • Significant damage to sections of the roof framing. 	<ul style="list-style-type: none"> • Water is over 3 feet high on the first floor level of the house. • Significant damage to exterior walls. • Significant damage to the main portion or multiple sections of the roof framing.

Estimated Percentage Damage Range

	0% - 25%	25% - 50%	50% - 75%	75% - 100%	
ROOF COVERING	<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>	<ul style="list-style-type: none"> • Minor wind damage to the roof coverings. • Main surface areas are unaffected. • Flashings are intact. • No damage to the roof sheathing. 	<ul style="list-style-type: none"> • Some damaged areas of the roof from high-winds or damage from debris. • Some sections of the roof covering are missing or loose. • Some damage to the flashings. • Minimal damage to the roof sheathing. 	<ul style="list-style-type: none"> • Significant damaged areas of the roof from high winds or damage from debris. • Significant sections of the roof covering are missing or loose. • Damage to the flashings allows some water infiltration at joints and roof penetrations. • Significant damage to the roof sheathing - some areas of the sheathing will need replacement. 	<ul style="list-style-type: none"> • Large damaged areas of the roof from high winds or damage from debris. • Major sections of the roof covering are missing or loose. • Damage to the flashings allows significant water infiltration at joints and roof penetrations. • Major damage to the roof sheathing - most of the roof sheathing will need replacement.
EXTERIOR FINISH	<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. Insulation is installed at the flooring beneath the lowest floor level and throughout the walls and ceilings.</p>	<ul style="list-style-type: none"> • Water level is less than 6 inches above the lowest floor level. • The duration of the floodwaters is limited - less than 12 hours. 	<ul style="list-style-type: none"> • Water level is between 6 and 18 inches above the lowest floor level. • The duration of the floodwaters is limited - less than 12 hours. 	<ul style="list-style-type: none"> • Water level is between 18 inches and 3 feet above the lowest floor level. • The duration of the floodwaters is more than 12 hours. 	<ul style="list-style-type: none"> • Water level is more than 3 feet above the lowest floor level. • The duration of the floodwaters is more than 12 hours.

Estimated Percentage Damage Range

	0% - 25%	25% - 50%	50% - 75%	75% - 100%
INTERIOR FINISH				
<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. Materials include low-grade wood/plastic composites, soft woods, and hard woods. Finishes include paint, stain, or varnish.</p>	<ul style="list-style-type: none"> Water level does not rise to the level of the first floor structure. The duration of the floodwaters is limited - less than 12 hours. 	<ul style="list-style-type: none"> Water level rises just above the first floor level. The duration of the floodwaters is limited - less than 12 hours. 	<ul style="list-style-type: none"> Water level is up to 3 feet above the first floor level. The duration of the floodwaters is more than 12 hours. 	<ul style="list-style-type: none"> Water is more than 3 feet above the first floor level of the house. The duration of the floodwaters is more than 12 hours.
DOORS AND WINDOWS				
<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. (This section does not include paint or stain.)</p>	<ul style="list-style-type: none"> Water level rises just to the floor structure of the first floor level. The duration of the floodwaters is limited - less than 12 hours. 	<ul style="list-style-type: none"> Water level is just above the first floor. The duration of the floodwaters is limited - less than 12 hours. 	<ul style="list-style-type: none"> Water rises to at least 12 inches above the first floor level. The duration of the floodwaters is more than 12 hours. 	<ul style="list-style-type: none"> Water rises more than 12 inches above the first floor level. The duration of the floodwaters is more than 12 hours.

Estimated Percentage Damage Range

0% - 25%	25% - 50%	50% - 75%	75% - 100%
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CABINETS AND COUNTERTOPS

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 man-made 'cultured stone' surface.

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| <ul style="list-style-type: none"> • Water level is less than 4 inches above the finished floor level. | <ul style="list-style-type: none"> • Water level is between 4 and 12 inches above the finished floor level. • Flood duration is short - no prolonged exposure to water or contaminants. | <ul style="list-style-type: none"> • Water level is between 1 foot and 3 feet above the finished floor level. • Flood duration is longer than 12 hours - prolonged exposure to water and contaminants. | <ul style="list-style-type: none"> • Water level is more than 3 feet above finished floor level. • Flood duration is longer than 12 hours - prolonged exposure to water and contaminants. |
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FLOOR FINISH

Materials for floor finish include: carpet, hardwood, vinyl composition tile, sheet vinyl floor cover, ceramic tile, and marble. Sub-flooring is also included. 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.

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| <ul style="list-style-type: none"> • Water level does not rise to the level of the bottom of the first floor structure. • No damage to the floor sheathing. | <ul style="list-style-type: none"> • Water level rises just to the first floor level. • Water level inundates the sub-flooring but does not rise to the finished floor materials. • Minimal damage to the floor sheathing. | <ul style="list-style-type: none"> • Water level is above the first floor. • Water level inundates above the sub-flooring and finished floor materials. • Significant damage to the floor sheathing - some areas of the sheathing will need replacement. | <ul style="list-style-type: none"> • Water level is well above the first floor. • Water level inundates above the sub-flooring and finished floor materials. • Major damage to the floor sheathing - most of the floor sheathing will need replacement. |
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Estimated Percentage Damage Range

	0% - 25%	25% - 50%	50% - 75%	75% - 100%
PLUMBING				
<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>	<ul style="list-style-type: none"> Water level is less than 6 inches above the lowest floor level. 	<ul style="list-style-type: none"> Water level is between 6 inches and 18 inches above the lowest floor level. Flood duration is short - no prolonged exposure to water or contaminants. 	<ul style="list-style-type: none"> Water level is between 18 inches and 3 feet above the lowest floor level. Flood duration is longer than 12 hours - prolonged exposure to water and contaminants. 	<ul style="list-style-type: none"> Water level is more than 3 feet above the lowest floor level. Flood duration is longer than 12 hours - prolonged exposure to water and contaminants.
ELECTRICAL				
<p>100- to 200-amp electrical service providing circuit breaker panels and distribution wiring. 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>	<ul style="list-style-type: none"> Water level is less than 12 inches above the finished floor level. Minor electrical components and limited wiring are inundated but remain below normal receptacle height. 	<ul style="list-style-type: none"> Water level is between 12 inches and 18 inches above the finished floor level. A significant number of wiring components and limited wiring are inundated, floodwaters above the normal receptacle height. 	<ul style="list-style-type: none"> Water level is between 18 inches and 3 feet above the lowest floor level. A significant number of wiring components and a significant amount of wiring is inundated - floodwaters above normal wall switch height. 	<ul style="list-style-type: none"> Water level is more than 3 feet above the lowest floor level. Most of the wiring components and a significant amount of wiring are inundated - floodwaters above normal wall switch height.

Estimated Percentage Damage Range

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APPLIANCES				
<p>Common, built-in appliances that would be included are the dishwasher, hot water tank, and some stoves.</p>	<ul style="list-style-type: none"> Water level is less than 6 inches above the finished floor level. Water level is in the floor area of the appliances but not into the equipment operating system. The appliances may be cleaned and reconditioned. 	<ul style="list-style-type: none"> Water level is between 6 inches and 12 inches above the finished floor level. Water level is in the floor area of the appliances and into the equipment operating system. Some of the appliances will need to be replaced. 	<ul style="list-style-type: none"> Water level is between 12 inches and 18 inches above the finished floor level. Water level is in the floor area of the appliances and into the equipment operating system. Most of the appliances will need to be replaced. 	<ul style="list-style-type: none"> Water level is between 18 inches and 3 feet above the finished floor level. Water level is in the floor area of the appliances and into the equipment operating system. All of the appliances will need to be replaced.
HVAC				
<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. The percent damaged will be less for a boiler. 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.</p>	<ul style="list-style-type: none"> Water level is less than 6 inches above the lowest floor level. Water level is in the lower ducts but not into the air handler or equipment operating system. 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. 	<ul style="list-style-type: none"> Water level is between 6 inches and 12 inches above the finished floor level. Water level is into the lower ducts and the air handler, but not into the equipment operating system. 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. 	<ul style="list-style-type: none"> Water level is between 12 inches and 3 feet above the finished floor level. Water level is into the lower ducts, air handler, and the equipment operating system. The fuel-fired equipment (burners/controls) is inundated. The condenser unit needs to be replaced. 	<ul style="list-style-type: none"> Water level is more than 3 feet above the lowest floor level. Water level is into the duct distribution system, air handler, and the equipment operating system. The fuel-fired equipment (burners/controls) is inundated. The condenser unit needs to be replaced.