

Buyer's Guide to Resilient Homes

How to Strengthen Your Home Against Natural Disasters



Welcome to Resilient Homebuying

How would you feel if a natural disaster destroyed your new home, but your neighbor's home survived? Would you wonder what made the difference? Would you think it was just bad luck?

At the Federal Alliance for Safe Homes (FLASH), we call this the “Tale of Two Homes,” and we have seen it unfold countless times. Earthquakes, floods, hurricanes, tornadoes, or wildfires strike communities, and many homes resist the shaking, wind, water, or fire. The families inside these homes are resilient. They bounce back swiftly and get on with their lives. Yet other homes are damaged and destroyed. Those families endure an expensive, long road to recovery. Some never make it back to “normal.”

The most important lesson from this story is that no matter how it turns out, it's not just about luck. When homes survive disasters, it is almost always because someone made responsible decisions about how and where to build. They likely followed a modern building code, and inspectors verified that things were done the right way. But how do you, the buyer, find the right home?



The Buyer's Guide to Resilient Homes has the information you need to identify homes that will still be standing after the disaster.

The guide will take you beyond aesthetics like curb appeal and stainless steel appliances to focus on the risks where you live and how your home should perform when tested by nature. You will learn how to identify inspectors or realtors who can help you determine a home's safety potential. You will discover features and upgrades that make it safer and stronger. We'll even help you understand how insurance provides financial security so you have the resources to recover.

We hope you will find this guide helpful as you begin your search for a new home. We know that having the right information at the right time is key to safeguarding your family from disasters of all kinds. Possibly the most critical time to focus on resilience is when you are buying a home. With the guide in hand, you may not be able to control the weather, but you can take charge of your future by knowing what to expect when disasters strike. You will not only be safer; you will be resilient no matter what you face.







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Will the Home You're Buying Survive the Next Disaster?



Not If, But When

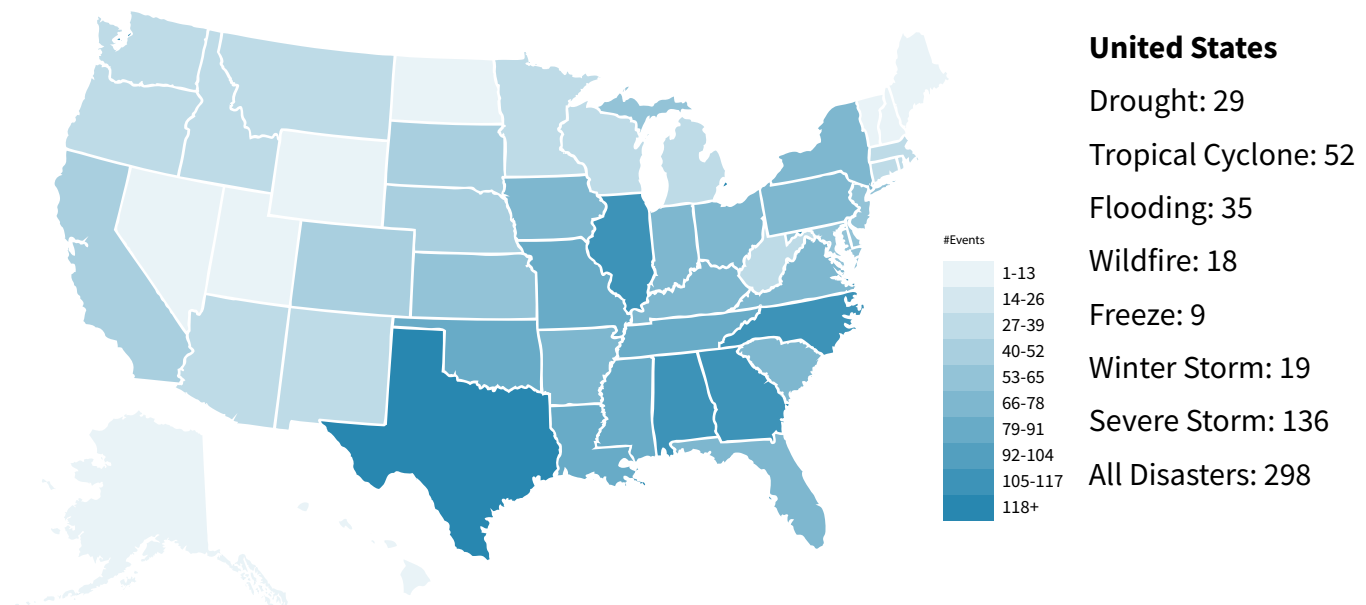
No matter where you're buying, natural disasters will threaten your home

Things to Keep in Mind

- Every state and territory faces one or more natural hazards that bring disaster risk and can vary significantly in severity.
- Disasters disrupt thousands of lives every year and have lasting emotional, financial, and physical impacts.
- Codes are continuously updated to capture new research that improves home safety and performance, so older homes built to out-of-date codes may be more vulnerable because they lack the latest innovation like increased energy efficiency or hurricane resistance.

No community is without some risk from disasters caused by natural hazards (the most common being wind, water, fire, and earthquake). Nationally, disasters disrupt tens of thousands of lives and livelihoods every year, causing lasting emotional, financial, and physical impacts on people and property. That is why it is essential to determine how resilient or vulnerable your potential home and community are **before** deciding where to live.

1980-2021* Billion-Dollar Weather and Climate Disasters (CPI-Adjusted)



Source: NOAA National Centers for Environmental Information

Please note that the map reflects a summation of billion-dollar events for each state affected (i.e., it does not mean that each state shown suffered at least \$1 billion in losses for each event). Also, the map only captures major events, and smaller events still adversely affect people and property.

*as of July 9, 2021

History and science offer insight into where and how disasters may occur, but most still happen without significant warning.

New homes are not necessarily stronger than older homes; there is much more to the story. The quality of the building code, construction methods, products, home location, use of beyond-code standards such as the FORTIFIED Home™ program, and the building inspection effectiveness at the time of construction can all affect home performance.

Fortunately, finding the right location with well-enforced, modern building codes can make a big difference and reduce potential damage. The stronger your home, the faster you and your family will recover after disaster strikes.

This guide will help you ask the right questions and learn more about what your current or future home can handle should the worst happen. After reading this guide, you will understand:

- The performance of your potential home during catastrophic events
- Perils that place your home at risk
- Resilient home improvement options
- Impact on home insurance costs or savings
- The total cost of ownership

Many aspects of homebuying focus on cosmetic features like granite countertops, but looking beyond the aesthetics and buying a well-built home will provide more lasting benefits and value.

The stronger your home, the faster you and your family will recover after disaster strikes.





Why Buy Resilient

Consider the benefits of resilient home construction and location

Things to Keep in Mind

- Two homes can be built identically, but one may have higher risk of disaster because of its specific site or location.
- Decorative features are desirable, but resilience features increase safety, durability, and peace of mind.
- Resilient features provide financial benefits through losses avoided and insurance savings.
- Economic analysis shows that increased consumer awareness of resilience options leads to increased market value for resilient homes.

Some communities may have a higher risk of disasters than others. The next section **“The Home Selection Process”** will give you tools to learn more about the disaster history and potential in locations across the United States.

The relative strong or weak construction of surrounding homes can affect potential damage to your home in a disaster. For example, windborne debris from a weak neighboring home can damage your home.

But even at the neighborhood level, some locations may be more resilient than others. For example, waterfront homes, homes in the wildland-urban interface prone to wildfires, or homes close to earthquake fault lines can have a higher risk of flooding, storm surge, wildfire, or earthquake damage, respectively. But other considerations can mean more or less resilient properties, as well. For instance, one lot may be higher in elevation than the surrounding area, making it less likely to flood than the other lots. Additionally, homes in areas prone to landslides or liquefaction may suffer more damage than homes on stable soil.



Half the challenge is choosing the location; the other half is finding a well-built home. The more vulnerable the location, the more attention must be given to how the home was built.

For example, Californians may be at risk from earthquakes and wildfires. This guide will provide tips on how to search for prospective homes built with earthquake-resistant methods that make it more likely to survive and fire-resistant materials that make it less likely to ignite. The same can be said for homes at risk for flooding. Homes that are elevated higher than floodwaters can protect people and belongings.

After determining the natural disasters in the area where you are house hunting, you can identify ideal construction solutions. For example, homes in tornado-prone areas may include a tornado shelter or tornado safe room. If the shelter or safe room is constructed consistent with FEMA guidance or tested and approved to meet the International Code Council 500 standard, it can provide near-absolute protection in tornadoes up to 250 miles-per-hour. Another example is the use of impact-resistant garage doors in hurricane-prone areas, as the garage door is typically the first component to fail during severe winds. Homes in flood-prone areas should be constructed above the expected flooding level. This guide will identify many of those construction solutions.

No matter where you buy, it is essential to consider homes built or upgraded using the latest model building codes and standards as codes are continually improved with research and scientific insights. Codes provide life safety and offer construction methods that address disasters like earthquakes, floods, hurricanes, wildfires, and even winter freeze.

Builders and communities that adopt and enforce current model codes recognize that a small upfront investment in better building methods provides homeowners with greater long-term value because the actual cost of homeownership is much more than the purchase price.

When calculating the true cost, consider energy efficiency, durability to avoid frequent or unnecessary maintenance, and disaster-resistant features that prevent losses from severe weather and earthquakes. Resilience features can make a home more desirable to prospective buyers and increase your home's real estate market value as the economic case for resilience is not just about the losses you avoid or insurance savings you enjoy. A study by economist Kevin Simmons found that homes with tornado safe rooms in Oklahoma real estate markets enjoyed a sales price increase of 3.5% or an average of \$4,200.

Become a Resilient-Smart Detective

Consider resilience as you begin the homebuying process

Things to Keep in Mind

- Check the building code followed (if any) when the home was constructed.
- Disclosure regulations vary by state, and some states don't require disclosure of information about all hazard risks.
- Professionals like builders, realtors, and even inspectors may not be aware of resilience options, so it is important for buyers to make it a priority.
- Find out if the neighborhood or home has experienced damage. Was it caused by a disaster?

Homes should be constructed with disaster risk in mind, and buyers can compare safety features, expected performance, and ratings just as they do when purchasing a car.

Can the roof withstand high winds?

Is the decking material noncombustible?

Will the walls resist the shaking of an earthquake?

Evaluating your home's potential to survive weather events will help protect what's most important in your life: your family, your possessions, and your home.

This guide will help you identify and evaluate the features that affect the risk of both a home's location and its construction. Using the checklists for various homes you are considering allows you to compare which one is more resilient than others. Combined with other home choice considerations important to your family, this helps you make smarter decisions.



For the same price, do you buy the larger home at a lower elevation near the river, or the stronger and slightly smaller elevated home?

You can become better aware of the upfront risks and costs (such as insurance) and later improvements you may need to budget for, and you can enjoy increased safety and peace of mind, as well as potentially lower insurance premiums, annual and future home operating and repair expenses, and upgrade costs.

Start your homebuying journey by finding the right team. If you are working with a realtor, express your interest in finding resilient properties and ask about their ability to help you. Consider hiring an inspector. If you have a family member or friend familiar with home construction, ask them to help you.

The adage “buyer beware” is the best rule of thumb to follow when homebuying. Professionals in the homebuying process, including realtors, are not routinely trained or tested on resilience factors, and they may not understand the information necessary to help you evaluate home resilience.

Begin with the basic resilience checklist (Appendix I) to ask questions regarding each home you consider purchasing. Information disclosure regulations vary from state to state and may not reveal all hazard risks. For example, some states require requirements of past flood damage; however, many do not.

Tip: States with realtor disclosure requirements include California and Texas



Some of the critical questions outlined in the basic resilience checklist may include:

1. Has this home experienced any insurance claim caused by common (water leak) or disaster-related (flooding, etc.) losses?
2. If repairs were necessary following the loss, what was the cost of the repairs?
3. Have the current homeowners had difficulty securing insurance for the home due to hazards like sinkholes?

If the answer to any of these types of questions is yes, request documentation of the repairs made along with the name of the repair contractor or company.

Modern building codes ensure that your home is built using the latest practices and standards to protect against disasters like earthquakes, floods, hurricanes, tornadoes, and wildfires.



Visit [Inspect2Protect.org](https://inspect2protect.org) to find the current building codes adopted in your local area, disaster history for your community, historical code information, and potential upgrade options to make your home safer and stronger.



A photograph of a row of houses with a green overlay. The houses are two-story with gabled roofs and front porches. The text "The Home Selection Process" is centered in white. At the top, there is a horizontal bar with five colored segments: purple, orange, yellow, green, and blue.

The Home Selection Process

Starting the Search

Look for resilience information and find the right team

Things to Keep in Mind

- Include resilience factors in your home search from the beginning and be sure to research the disaster history.
- Realtors and sellers may not know or be required to disclose information about hazard risk voluntarily.
- Professional home inspectors often don't address hazard vulnerability unless it relates to required construction regulations or building codes.
- Know the resilience questions to ask your realtor, home inspector, mortgage broker, and insurance agent (see checklists in Appendix II).

The first step to finding and purchasing a resilient home is understanding what risks you may face where you are buying.

You can start your search at [Inspect2Protect.org](https://www.inspect2protect.org)* to identify the building codes used in the community, including whether it has adopted the International Residential Code (IRC) and International Building Code (IBC) models. You can also review the disaster history of the community, as well as historical code information and retrofit recommendations specific to the home's current building code status. Try searching online for the address of the home and do the same search for all the perils, including earthquake, flood, hurricane, tornado, or wildfire.

*Inspect2Protect.org is funded by DHS Science & Technology Directorate, Systems Engineering and Standards Division, as well as FEMA.



The first step to finding and purchasing a resilient home is understanding what risks you may face where you are buying.

You may also want to contact your local building or planning department to learn about the code enforcement requirements as they may be voluntary, mandatory, or nonexistent.

Consider also the disaster history for the broader area beyond your community. Just because a community hasn't experienced disaster already doesn't mean it won't in the future.

Various tools show areas of past and expected weather or other disaster events, including these maps and resources:



- **Earthquake:** seismic design category (earthquake design in the International Residential Code), seismic-hazard maps (USGS – earthquake potential shaking), fault map (USGS – interactive quaternary faults database), and landslide map (USGS – landslide inventory)



- **Flood:** FEMA Flood Map Service Center (flood maps and other products)



- **Hurricane:** hurricane-prone regions (hurricane design in the International Residential Code), select windborne debris region (hurricane and high-wind design in the International Residential Code), windborne debris region (hurricane and high-wind design in the International Residential Code), U.S. Hurricane Return Periods (NHC NOAA – frequency of return hurricanes), and CONUS Hurricane Strike Density Maps (NHC NOAA – history of hurricane strikes).



- **Tornado:** U.S. Tornado Climatology (NOAA – various tornado resources)



- **Wildfire:** Wildfire Hazard Potential map (USDA Forest Service, Fire Modeling Institute) and Wildfire Risk to Communities map

You also can review the state or territory’s hazard mitigation plan. Local jurisdictions may have a hazard mitigation plan, as well.

Once you’ve completed your research, ask your realtor, mortgage broker, insurance company, or agent (and home inspector) what disasters have occurred or are typical for the community or neighborhood you are considering.

Professionals may not be required to disclose disaster history unless you ask. Write down your questions and their answers. Use your list to evaluate each professional you need to assist you in your home search and purchase.

Finally, your home inspector may not address your prospective home’s ability to withstand any disaster unless specifically related to the building code or home construction methods. However, you can ask the inspector to use the disaster-specific checklists (Appendix II) to help you learn more about the presence or absence of disaster-resistant home features and overall risk profile. You can also use those checklists to identify retrofits and upgrades that will make your prospective home stronger and more disaster resistant.



Check the building codes, disaster history, and recommended retrofits for the home.

Selecting a Resilient Community

Think beyond the school zone to find a resilient community

Things to Keep in Mind

- Understanding the historic and current building codes in a community helps you gauge resilience.
- Research previous disaster events in the area like repetitive flooding.
- Your home's location within the community and its construction and siting features can make a big difference in its performance during a disaster.

Community resilience comes from various factors, including adoption and enforcement of current model building codes, participation in the Community Rating System, designation as a NOAA StormReady Community, and much more. Community features can influence resilience even if your individual home is built using up-to-date building codes.



**Is the community only accessible by one bridge/road that could be damaged in an earthquake or flood or suffer severe congestion if everyone is told to evacuate?
Can emergency vehicles easily access your neighborhood?**

These factors reflect the building code quality and enforcement, inspections followed to construct a home, management of neighborhood common areas for stormwater flow and wildfire fuel control, and community investment in things like emergency management and utility line maintenance.

Before a disaster, policies and practices vary widely and can either help or hinder disaster recovery and impact quality of life in affected communities.

The state, territory, or local jurisdiction's hazard mitigation plan can provide insights on identified hazards and actions taken by the community to reduce the impact of disasters.

Another way to gauge your community's overall resilience is to contact your insurance agent or company. They can advise you on your prospective home's insurability, identify the building code effectiveness grading schedule, and counsel you on specific challenges like flooding or sinkholes. They likely can provide you with information on discounts for following modern building codes and any surcharges for insurability challenges due to high disaster activity.

Selecting the Right Home for You

Create a shortlist of homes the right way

Things to Keep in Mind

- Run through resilience checklists for each potential home choice and include critical details (year built, building code used, etc.).
- Understand key features to look for as you choose a home that may be vulnerable to disaster.
- Understand the retrofit and upgrade options that will make your new home disaster-resistant.

Ask the right questions and identify homes that will best suit your family's needs today and someday when disasters strike. You can begin by answering the questions in the basic resilience checklist (Appendix I) and then reviewing the disaster-specific checklists (Appendix II). Once you complete these checklists, you will have created a working profile for your prospective home.

For example, if you are shopping for a new home in earthquake country, you will want to first identify the building code used because modern seismic building codes provide far superior structural performance in earthquakes. If you learn that your prospective home was constructed using an outdated code in a seismic zone, the disaster-specific checklists will help you identify the types of retrofits and upgrades that can bring your home up to current standards. Some of the suggested retrofits and upgrades in earthquake country include bracing cripple walls, reinforcing roof-to-wall connections, and identifying problematic soft and weak story construction.



Make a working profile for all prospective homes to gauge their resilience potential.

Selecting the Right Home for You

Create the right budget for resilience when qualifying for a mortgage

Things to Keep in Mind

- Understand the total cost of ownership with resilience in mind.
- Know what to include in budgeting for both cosmetic and resilience improvements.
- Consider different types of mortgages (green/energy-efficient, renovation, etc.) that could help incorporate resilience into your home after closing.
- Consult with a mortgage broker to explore options that support resilience.

Most homebuyer's guides offer details about how to determine what you can afford when buying a new home. They cover homeownership costs and explain down payment requirements, income qualifications, and the monthly amount paid for Principal, Interest, Taxes, and Insurance, commonly known as PITI. The calculation may consider cosmetic improvements like kitchen cabinets or bathroom remodeling but frequently overlooks resilience or strengthening upgrades, which means it does not calculate the total cost of ownership in the context of resilience.



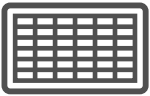
If a hurricane damages your home, will you be able to afford the percentage deductible required under most homeowners policies? For a home insured for \$200,000 with a 5% hurricane deductible, you would be responsible for the first \$10,000 payment for repairs before insurance is applied.



If you are thinking ahead about resilience, you might consider installing hurricane shutters instead to help avoid those potential losses altogether. In that case, you might enjoy annual insurance savings if you live in Florida or other states with discount programs for resilient features. Such savings can even pay back the cost of hurricane shutters over time.



If you live in an earthquake-prone region, you could ask your inspector to check the cripple walls in your basement. Bracing them is relatively inexpensive but can prevent collapsed walls when an earthquake strikes. If you live in California, you may even qualify for the California Earthquake Authority “Brace + Bolt” grant program.



Installing flood vents may make your new home more resilient and save you money with flood insurance discounts, as well.

Some private and government grant and loan programs will underwrite resilience features and retrofits. You may find that you are eligible for different types of mortgages (Green/Energy-Efficient, FHA 203k Rehab Loan, etc.) that incorporate energy efficiency or disaster resilience upgrades into your new home. Ask your mortgage broker to identify options, including borrowing extra cash to cover retrofits like installing hurricane shutters and an impact-resistant garage door.

No matter where you are looking to buy, you should create a budget that includes the amount needed immediately and for later projects or retrofits to create a resilient structure. Use the disaster-specific checklists (Appendix II) to identify resilience upgrades and estimate their costs.



Make a budget that includes what you need now and later for resilience upgrades.

Leveraging Your Home Inspection

Take advantage of the home inspection to learn more about resilience features

Things to Keep in Mind

- Get a home inspection and understand its limitations related to disaster resilience.
- Ask your home inspector to run through the relevant disaster-specific checklists for the area.
- Talk to the neighbors about disaster history, and check out any homeowners' association (HOA) covenants about retrofits.

When you put in an offer, include the right contingencies, including a home inspection. Your mortgage company may not require a home inspection. Still, if issues are found during the inspection, you may be able to cancel, renegotiate, or request repairs depending on what is stated in your offer. You may consider a pre-offer inspection. A realtor or lawyer can provide more information about offers and home inspections.

Know the limits of a home inspection and what questions to ask. Customary home inspections may not address the risks nor reflect how prepared or unprepared your home is for disasters. Use the disaster-specific checklists (Appendix II) to get your resilience questions answered.



Identify and understand any homeowners' association (HOA) covenants, if applicable. There could be rules regarding deployment of hurricane shutters, special surcharges for planned management of common areas, or contingency surcharges in the event of a disaster.

Also, consider talking to neighbors to learn more about any significant events in the home or neighborhood. Share any disaster-specific checklists (Appendix II) with your home inspector and ask them to answer each peril's questions that affect the community where your new home is located.



Finding the Right Insurance Coverage

Determine how disaster risk and home construction impact policy needs

Things to Keep in Mind

- Adequate home insurance is essential to resilience.
- Determine if you need separate policies for wind, earthquake, or flood.
- Understand how the home's construction and location affects your policy and which features qualify for discounts.

Having the right amount of home insurance is critical to resilience and your ability to bounce back after a disaster, so take time to understand the different factors before you buy.

For example, you will typically need separate policies to cover different disaster events like earthquakes and flooding. And most hurricane policies carry percentage deductibles, so you should establish an emergency fund to pay the deductible if a hurricane strikes. Older buildings may have to be updated to meet newer building codes if substantial damage occurs, so it is essential to know how much coverage you will have if that happens.

Your insurance company or agent can walk you through the contingencies associated with insuring your new home. However, it is critical to speak with someone before you commit to buy. Knowing details about your prospective home's construction, mitigation features, and other features can help you better understand how your home details affect your insurance policy and potential discounts.

For example, flood insurance requires a 30-day waiting period, and flood losses often occur well outside the mandatory flood insurance area. Flood insurance is an excellent economic investment — whether it is required or not. For example, the 2019 Florida average annual FEMA flood insurance premium was \$700.

Fortunately, policies outside the mandatory purchase area can be very affordable. The emerging private flood insurance marketplace offers competitively priced policies, as well.

A row of houses with a warm, golden-hour glow. The houses are multi-story with gabled roofs and porches. The scene is bathed in a soft, orange light, suggesting late afternoon or early morning. The foreground is a green lawn, and a paved path is visible on the right. The sky is a clear, pale blue.

Maintaining Your Home

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After Your Home Purchase Is Complete

Know the basics of resilience-related home maintenance

Things to Keep in Mind

- Simple activities will keep your home ready for disasters of all kinds.

Record the details and warranties for all home appliances and services, including your resilience features. If you have features that require activation (for example, portable generators, hurricane panels or shutters, or gas shut-off valves), be sure you know how to deploy and operate them. Have them serviced on their recommended schedule.

Test systems like lightning and surge protection regularly and refresh any battery-operated devices as needed and schedules indicate.

Gather your family and ensure that everyone knows how to operate any resilience features safely. Use your phone to create a custom “how-to” video tour of your home, showing exactly how everything works, and share it with each family member.



When You're Planning Renovations

Make disaster-resilient upgrades when renovating your home

Things to Keep in Mind

- Create a savings plan for major upgrades that could increase the resilience and value of your home.

Create a funding or savings plan for significant upgrade projects you identified through your research and checklists.

Identify resilience projects that can align with ordinary home maintenance like re-roofing. Remember, many retrofits can offer multiple upgrades in one project. For example, during re-roofing, you can add a sealed roof deck to protect from high winds and rainwater intrusion, as well as Class A (most fire-resistant) impact-resistant shingles for wildfire and hail.

Sample Resilient Roof Upgrades - Don't forget these resilience upgrades when you are re-roofing	
Wind	Sealed Roof Deck & Roof-to-Wall Connectors
Wildfire	Fire-Resistive Shingles
Hail	Impact-Resistant Shingles

Roofs 20 years or older are typically harder to insure. If you are able to insure an older roof, you may only qualify for “actual cash value” reimbursement coverage as opposed to replacement cost coverage. This is one of the many reasons that it is critical to consider roof age when selecting your new home.

Look for low-cost/high-impact resilience projects like installing impact-resistant, design-pressure-rated garage doors for high wind; caulking and re-flashing around windows and doors to prevent water penetration; or yard cleanup to remove vegetation or debris that could become fuel for a wildfire or windborne debris.

Visit [FLASH.org](https://www.flash.org) for more ways to improve your new home's resilience against the perils you face in your area.

Stay Resilient Out There

Make disaster-resilient upgrades when renovating your home

You deserve a home that not only fills you with a sense of pride, but also protects your family and investment. We hope that this guide is helpful as you make informed choices during one of life's most exciting times: the purchase of a new home.

We created this guide to help you ensure that your home tells a “tale” of survival and resilience when the next disaster comes. We hope that you will share it with others to help overcome the ever-increasing threat of disasters that we confront across our country nearly every day.

The Federal Alliance for Safe Homes (FLASH) and our partners have dedicated more than two decades to our mission of strengthening homes and safeguarding families from disasters of all kinds, and we stand by ready to help you.

Happy house hunting!



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Appendix I

Basic Resilience Checklist





Step 1: Start the Search

Start your homebuying journey by finding the right team.

- If you are working with realtors, ask them to assist or recommend someone who can help with your checklist.
- If you have a family member or friend familiar with home construction, ask them to help you complete the checklist.
- Consider hiring an inspector.



Step 2: Select a Resilient Community by Checking for Common Perils

Visit [Inspect2Protect.org](https://inspect2protect.org) and determine if your community uses current model building codes. The site will also provide you with a disaster history for the area and a list of suggested renovations, retrofits, and upgrades that can make your home safer and stronger. You can also contact the local community building, planning, or zoning department to determine the codes used and ask the questions outlined below.

Hurricane: Is the home in a hurricane-prone area, windborne debris region, or storm surge evacuation zone?

- Does your state or local government require disclosure of hazards and past damages by either the owner or realtor?
- Are there any city/county/jurisdiction planning projects that could affect the resilience of the area?

Flood: Is the home in a flood zone? If so, what type? Has the neighborhood experienced flooding? Repetitive flooding? See FEMA Flood Service Maps in Resources (Appendix V).

- Does your state or local government require disclosure of hazards and past damages by either the owner or realtor?
- Are there any city/county/jurisdiction planning projects that could affect the resilience of the area?

Wildfire: What is the wildfire history in the area? Frequency? See Wildfire Risk to Communities in Resources (Appendix V).

- Does your state or local government require disclosure of hazards and past damages by either the owner or realtor?
- Are there any city/county/jurisdiction planning projects that could affect the resilience of the area?

Earthquake: What is the earthquake potential/history of the area? Check the fault rupture, landslide, liquefaction, seismic, and tsunami inundation maps. See USGS Earthquake Hazards in Resources (Appendix V).

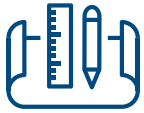
- Does your state or local government require disclosure of hazards and past damages by either the owner or realtor?
- Are there any city/county/jurisdiction planning projects that could affect the resilience of the area?

Tornado: Are there frequent tornadoes?

- Does your state or local government require disclosure of hazards and past damages by either the owner or realtor?
- Are there any city/county/jurisdiction planning projects that could affect the resilience of the area?

These additional questions can help you develop a disaster risk profile for your new home:

- Is the home sited well on the lot? For example, if the home is in a flood-prone area, does it sit at a higher elevation compared to surrounding properties?
- If the neighborhood has experienced a disaster, how did the neighboring homes fare?
- Does the HOA have any programs that boost neighborhood disaster resilience? For example, are there community wildfire mitigation days when volunteers clean up common areas to reduce debris and fuels?



Step 3: Select the Right Home for You by Checking Its Disaster Resilience Potential

Evaluate the resilience potential of the home with these universal questions and the disaster-specific checklists based on common disasters for the area:

- What month and year was the home built?
- Was the home constructed following a building code?
 - If so, which one? Find the code status online at [Inspect2Protect.org](https://www.inspect2protect.org). If the status is not available, contact the local building, planning, or zoning department.
- Has the home experienced damage from a past disaster?
 - If so, is there documentation that it was fully restored?
- Why is the home being sold? How long has it been on the market?
- Have additions/renovations to the home been properly permitted?
- Are there pictures of the construction progress from when the home was built, especially interior walls and framing?
- How old are the roof, electrical system, plumbing system, heating/air conditioning, and major appliances? Note most insurers will require a specific inspection of these systems for homes that are 20 years or older.
- Does the home disclosure document reveal past or existing problems?
- Has the existing homeowner filed any insurance claims? Is the current owner aware of any insurance claims by previous owners?



Step 4: Create a Budget and Secure Financing for Resilience Options

Create a budget to include resilience upgrades and maintenance. Examples may include adding hurricane shutters or replacing wooden decks with non-combustible materials in a wildfire zone. Review the disaster-specific checklists (Appendix II) or visit [Inspect2Protect.org](https://www.inspect2protect.org) to identify recommended retrofits and upgrades. Choose a mortgage lender that will allow you to borrow extra for retrofitting and resilience upgrades.



Step 5: Put in an Offer with Resilience Contingencies in Mind

Review the disaster-specific checklists (Appendix II) to identify the right contingencies and include them in your offer contract. Be sure to require a home inspection.

- Earthquake
- Flood
- Hurricane
- Tornado
- Wildfire



Step 6: Get a Home Inspection and Appraisal

Typical home inspections do not address a home's ability to survive disaster damage. Instead, they focus on the general conditions and systems like HVAC, electrical, and plumbing.

- Ask your home inspector to address the questions in the disaster-specific checklists (Appendix II).
- Attend the home inspection.
- Review the appraisal keeping in mind the potential cost of recommended resilience upgrades.



Step 7: Find the Right Insurance Coverage

Check with your insurance agent or company before buying a home to determine your annual costs. You may need to purchase separate policies for wind, earthquake, and flood.

- How does the home's construction type or building code affect your policy's cost and availability?
- Are there any credits or discounts for homes with resilient features?



Step 8: Get the Keys

Complete the final walk-through and follow closing day reminders.

- Did the seller complete any necessary repairs identified during the inspection?



Step 9: Maintain Your Home

Create an annual household project and maintenance plan to sustain your new resilient home.

Your plan should include location-specific activities like these:

- Check and maintain caulking and flashing around windows and doors to prevent water intrusion, save energy, and lower your electric bill.
- Keep gutters clear of leaves and debris to ensure adequate water flow during heavy rains and severe storms, as well as ignitability from embers.
- Keep trees limbed and shrubs pruned to prevent dead plant material from becoming windborne debris or wildfire fuel.
- Secure contents inside your home to increase safety and prevent damage due to shaking during earthquakes.



Step 10: Plan and Save for Future Projects

Identify the most effective resilience features for the perils you face in your new community.

- For example, consider shutters in hurricane zones, bracing cripple walls and chimneys in earthquake zones, installing a safe room in tornado areas, replacing combustible building and deck materials for non-combustible ones in wildfire zones, and more. Review the disaster-specific checklists (Appendix II) or visit [Inspect2Protect.org](https://www.inspect2protect.org) to identify recommended retrofits, renovations, and upgrades.
- Prioritize projects based on weaknesses in your home. Consider the resilience value that the project adds to your home, the relative cost, best time of the year to schedule or perform the work, and any other factors unique to your needs.
- Document resilience projects you complete. If you decide to sell your home, you will be able to share the documented resilience upgrades with prospective buyers.

Appendix II

Disaster-Specific Checklists





Want to use the checklists as you visit and evaluate potential homes? Download and print the fillable checklists at BuyersGuidetoResilientHomes.org/checklists.



Earthquake

Review these considerations with your real estate agent, home inspector, contractor, or other trusted advisor if the home is likely to experience an earthquake.

Location Checklist

- Is the home in an earthquake-prone region? See USGS Earthquake Hazards in Resources (Appendix V). YES NO
 - » Earthquake hazard maps identify seismic design categories (SDCs) that show the likelihood of different intensity shaking and provide insights into earthquake risk.
- Is the home in an earthquake fault zone? YES NO
 - » Avoid homes in an earthquake fault zone, homes at risk of liquefaction or moving like a liquid during earthquake shaking (including homes built on filled land), or homes at risk of a landslide from an earthquake.
- Is the home in tsunami inundation, hazard, or evacuation zones? YES NO

If you answered yes to any of the above questions, speak with a qualified, licensed engineer, inspector, or local code official to determine the best course of action to protect your home from disasters OR consider a home in another location.

Construction Checklist

Home shape and design are critical for earthquake resilience. Use the checklist below to determine if your home is built to be resilient to potential disasters.

- The home is not located on a hillside or at the base of a hillside.
 - Homes on hillsides, including those at the base of hillsides, are highly vulnerable to earthquake-related damage.
- The home is located on hard rock as opposed to soft, loose solid which may shake with more intensity.
- The house is constructed with regular wall design.
 - Irregular wall design or shapes can result in more damage during an earthquake.
- Living areas over garages (soft stories) are properly supported.

- The foundation sill plate is anchored adequately.
- Cripple walls supporting the home above grade and/or the basement are built and braced properly.
- Pier-and-post foundations are braced.

Check these wall features:

- Hold-down connectors secure the wall's base to the floor and foundations.
 - For wood-frame or light gauge steel construction, structural panels for sheathing with a proper attachment pattern provide important protection from earthquake shaking.
- For masonry walls, all cells with rebar reinforcement are grouted and consolidated.
- Concrete, masonry walls, and insulated concrete forms are reinforced with reinforcing steel.
- Wall coverings like masonry, brick, and stone that add weight to a home are anchored correctly.
- Homes made of wood have shear walls or a moment-resistant frame.
- Masonry is reinforced to be resistant to earthquake shaking.

Check the roof-to-wall and wall-to-foundation connections to ensure they are:

- Made using the correct product
- Adequately spaced
- Properly installed

Check masonry and stone veneers:

- Masonry or stone veneers above four feet tall, such as those on fireplaces or exterior facades, are reinforced and resilient to earthquake damage.
 - Masonry or the flue liner may be cracked from an earthquake even without signs of damage.

Evaluate external structures:

- Balconies and decks have been evaluated by an engineer to identify strengthening retrofits if needed.
 - Balconies and decks increase the earthquake load on the home and can lead to damage.

Check roof features:

- Roof sheathing and coverings are properly installed.
 - Properly installed roof sheathing and coverings can help avoid damage during earthquake shaking. Improperly installed roof coverings, especially heavy types like slate and tile, could fall during an earthquake and cause injury.

Depending on the age of the home, you may want to undertake certain structural retrofits and upgrades at

the time of purchase. Earthquake-specific options include:

- Reinforcing exterior unreinforced masonry walls.
- Strengthening soft and weak story construction.
- Reinforcing cripple walls.
- Upgrading foundation connections.
- Reinforcing brick and masonry chimneys.
- Reinforcing crawl spaces.
- Bracing the water heater.
- Installing an automatic gas shut-off valve.

Maintain your home to keep it ready for an earthquake by:

- Securing heavy objects that could fall and cause injury during an earthquake.
- Installing latches on cabinet doors to help prevent the contents from falling out.
- Installing bracing or a thin wire across the front of shelves to keep contents in place.
- Securing major appliances and electronics.
- Securing heavy furniture and electronics with flexible fasteners to prevent them from falling in living or sleeping areas or blocking exits.
- Installing flexible connectors on gas appliances to help avoid detached gas lines in earthquake shaking.
- Locating the gas shut-off valve, familiarizing yourself with how to use it, and keeping a gas valve wrench accessible.

Ensure all items hanging on walls are secure by:

- Ensuring heavy items are not hung above places where people are seated or sleeping.
- Using closed hooks or earthquake putty to hang items.
- Ensuring eye hooks penetrate the wall and the studs.
- Using two hooks to provide more stability for large pictures and mirrors.
- Ensuring mounting hardware is securely fastened to the frame.

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Flood

Review these considerations with your real estate agent, home inspector, contractor, or other trusted advisor if the home is likely to experience a flood.

Location Checklist

- Is the home likely to flood? See FEMA Flood Service Maps in Resources (Appendix V). YES NO
- Is the home located in a FEMA-designated flood zone? YES NO
 - » Zones beginning with V or A indicate the highest level of risk. Zones B, C, and X have a moderate to low risk, but be aware that these designations may change and that flood zone designations do not capture the full potential of flood risk in a given location.
- Is there a flood history of your potential home and homes nearby? YES NO
- Was the location once a floodplain, swamp, filled creek, riverbed, lake, or part of the sea or ocean? YES NO
- Is the home located near a dam, levee, or other water defense infrastructure whose failure or malfunction could result in flooding? YES NO
- Is the home located near a tsunami inundation, hazard, or evacuation zone? YES NO

If you answered yes to any of the above questions, speak with a qualified, licensed engineer, inspector, or local code official to determine the best course of action to protect your home from disasters OR consider a home in another location.

Construction Checklist

Determine the flood zone of the home and note that homes outside of a flood zone can still flood, especially in hurricanes. The best flood preparedness plan includes structural mitigation, as well as flood insurance.

- Hydrostatic flood vents are installed.
 - A home's elevation certificate will provide information like the number and location of vents and the total amount of vented space.
- You have an elevation certificate that reflects the base flood elevation (BFE) or expected flood level

for the property.

- If you don't have this information, you may be able to secure it from local floodplain officials, the planning and zoning office, or the builder; or you can hire a licensed surveyor to prepare one.
- The home is built on an elevated foundation.
 - If so, is it a pile, pier, or another type of foundation? YES NO
- Appliances, including the water heater, air conditioning unit, and furnace, are above projected level of flooding for the location.
- Receptacles, lights, and switches are elevated above the base flood evaluation (BFE) or expected flood level.
- There is a backflow valve to prevent sewage from coming back into the home in case the municipal system fails due to flooding.

Depending on the age of the home, you may want to undertake certain structural retrofits and upgrades at the time of purchase. Flood-specific options include:

- Elevating the lowest floor.
- Providing flood protection for utilities and mechanical equipment.
- Installing backflow preventers.
- Installing flood vents.
- Anchoring fuel tanks.
- Adding a sump pump with backup power.
- Improving the basement/foundation wall drainage.

Maintain your home to keep it ready for a flood by:

- Checking the water flow around the property after a storm to ensure proper rainwater flow and drainage away from the home.
- Cleaning gutters and positioning downspouts to allow water to flow away from your home's foundation.
- Securing any loose items in your yard as they can become water-borne debris during flooding from storm surge or rising water.
- Anchoring fuel tanks and other outside appliances or placing them on platforms as they can detach, float, and spill hazardous waste.

Want to use the checklists as you visit and evaluate potential homes? Download and print the fillable checklists at BuyersGuidetoResilientHomes.org/checklists.



Hurricane

Review these considerations with your real estate agent, home inspector, contractor, or other trusted advisor if the home is likely to experience a hurricane.

Location Checklist

- Is the home in an area that has experienced or is predicted to experience hurricanes? YES NO
- Is the home located in a storm surge evacuation zone? YES NO

If you answered yes to any of the above questions, speak with a qualified, licensed engineer, inspector, or local code official to determine the best course of action to protect your home from disasters OR consider a home in another location.

Construction Checklist

- The windows, doors, and garage doors are rated for design pressure or impact.
 - Impact-rated means that they can withstand debris (trees, building materials, etc.) traveling at high speeds.
 - If there are no impact-resistant windows or impact-rated doors, you can choose from a wide variety of tested and approved hurricane shutters and panels to protect openings.

You can strengthen the garage door system by:

- Ensuring that the tracks are secure and rollers are not loose.
- Inspecting the mounting around the door for loose or missing screws.
- Having a certified garage door installation company inspect and upgrade the door for high wind, or replace it with one designed for impact and cyclic pressure.

Check to see if the roof was constructed with high winds in mind:

- The roof coverings (shingles, metal, or tile) are rated for high winds or impact.
- The roof decking was properly installed with a dense nailing pattern.
- The roof is in good condition with no signs of moisture or rotten wood visible from inside the attic.

- A secondary water barrier was installed, such as an ice and water shield or a fully-adhered roof deck membrane.
- The roof is hip style, not gable style.
 - Hip is more aerodynamic than a gable-style roof and better resists uplift from high wind.
- The attic ventilation openings (soffit vents, ridge vents, off-ridge vents, gable rake vents, turbines) are rated to withstand water intrusions in high winds.
- The soffits are in good condition and are fastened to the home or to nailing strips at an appropriate interval.
- Porches and patio roofs are properly anchored and attached to the main structure.
 - Improperly-anchored porch columns can cause building weakness and lead to failure when high winds lift them.

Make sure the home components are connected and adequately tied together by ensuring:

- The roof deck is adequately attached to the framing.
 - Check inside the attic for “shiners,” or rows of nails that missed the framing. Shiners may mean that the deck needs reinforcing with closed cell spray foam applied to the underside of the deck.
- The roof is connected to the wall with closely spaced metal connectors that are properly installed per the manufacturer’s specifications.
- The walls are connected to the foundation using anchor bolts or other embedded anchors as opposed to “cut” nails.

Consider wall features and material types:

- The wall coverings are constructed from a material that can withstand hurricane-force winds.
 - Common residential wall covering options include brick, fiber cement siding, stucco, vinyl, and wood.
- Finishes inside and out are solidly backed and installed over continuous concrete or concrete masonry substrate, which enhances structural integrity while reducing gaps, seams, and the potential for air infiltration.
 - Using concrete systems can eliminate the need for separate sheathing and framing components, reduce complexity, and simplify the required labor.
- Any masonry or concrete block walls are constructed with reinforced steel.
- Wood-frame construction has plywood or OSB sheathing to provide added wind resistance.

Is the home prepared for potential flooding? Review the flood checklist. YES NO

Depending on the age of the home, you may want to undertake certain structural retrofits and upgrades at the time of purchase. Hurricane-specific options include:

- Bracing gable-end walls.
- Bracing soffit covers.
- Upgrading to a wind-resistant roof covering.
- Purchasing window protection like tested and approved hurricane shutters or temporary emergency panels.
- Replacing the garage door with an impact-rated product or install an after-market bracing kit.
- Strengthening the roof deck connection.
- Strengthening the roof-to-wall connections by installing hurricane clips or straps.
- Installing a secondary water barrier.
- Improving anchorage of attached roof structures on carports and porches.

Maintain your home to keep it ready for a hurricane by:

- Trimming tree limbs back from extending over your home. Hire a professional arborist if trees pose a risk to the home or if trimming requires professional equipment and assistance.
- Using lightweight mulch instead of rock or gravel in landscaping and using fire-resistant materials if you live in both a hurricane and wildfire risk area.
- Strengthening your soffits by applying a bead of polyurethane sealant between the wall and the trim where soffit panels are installed.
- Cleaning gutters and downspouts to allow water to flow away from your home's foundation.
- Checking your roof for damaged, missing, or loose shingles or tiles, using binoculars to safely make observations from the ground. Make sure shingles are not curled, broken, or slightly lifted.
- Securing loose items in your yard ahead of expected severe weather.
- Checking the operation and maintenance of the impact shutter systems. If the shutters are removable, verify all of the hardware is available. Ensure that the anchoring systems are free of corrosion or damage.

Want to use the checklists as you visit and evaluate potential homes? Download and print the fillable checklists at BuyersGuidetoResilientHomes.org/checklists.



Tornado

Review these considerations with your real estate agent, home inspector, contractor, or other trusted advisor if the home is likely to experience a tornado.

Location Checklist

- Is the home in an area that frequently experiences tornadoes? YES NO

If you answered yes to the above question, speak with a qualified, licensed engineer, inspector, or local code official to determine the best course of action to protect your home from disasters OR consider a home in another location.

Construction Checklist

- The home has a safe room or storm shelter conforming to FEMA P-320 or P-361, or ICC 500.
- The windows, doors, and garage doors are rated for design pressure or impact.
 - Impact-rated means that they can withstand debris (trees, building materials, etc.) traveling at high speeds.

You can strengthen the garage door system by:

- Ensuring that the tracks are secure, and rollers are not loose.
- Inspecting the mounting around the door for loose or missing screws.
- Having a certified garage door installation company inspect the door and upgrade the door for high wind or replace the door with one designed for impact and cyclic pressure.

Check to see if the roof was constructed with high winds in mind:

- The roof coverings (shingles, metal, or tile) are high-wind-rated or impact-rated.
- The roof decking was properly installed with a dense nailing pattern.
- The roof is in good condition with no signs of moisture or rotten wood visible from inside the attic.
- A secondary water barrier was installed, such as an ice and water shield or a fully-adhered roof deck membrane.
- The roof is hip-style.

- Hip is more aerodynamic than a gable-style roof and better resists uplift from high wind.
- The attic ventilation openings (soffit vents, ridge vents, off-ridge vents, gable rake vents, turbines) are rated to withstand water intrusion in high winds.
- The soffits are in good condition. They are fastened to the home or to nailing strips at an appropriate interval.
- Porch and patio roofs are properly anchored and attached to the main structure.
- Porch columns are anchored.
 - Improperly-anchored porch columns can cause building weakness and lead to failure when high winds lift them.
- The home components are connected and adequately tied together.

Check to see if the home components are connected and adequately tied together:

- The roof deck is adequately attached to the framing.
 - Check inside the attic and look for “shiners,” or rows of nails that missed the framing. Shiners may indicate that the deck needs reinforcing with closed cell spray foam applied to the underside of the deck.
- The roof is connected to the wall with closely spaced metal connectors that are properly installed per the manufacturer’s specifications.
- The walls are connected to the foundation using anchor bolts or other embedded anchors as opposed to “cut” nails.

Consider wall features and material types:

- Wall coverings can withstand high winds.
 - Common residential wall coverings options include brick, fiber cement siding, stucco, vinyl, and wood.
- Finishes inside and out are solidly backed and installed over continuous concrete or concrete masonry substrate, which enhances structural integrity while reducing gaps, seams, and the potential for air infiltration.
 - Using concrete systems can eliminate the need for separate sheathing and framing components, reduce complexity, and simplify the required labor.
- Ensure any masonry or concrete block walls are constructed with reinforced steel.
- Wood-frame construction has plywood or OSB sheathing to provide added wind resistance.

Depending on the age of the home, you may want to undertake certain structural retrofits and upgrades at the time of purchase. Tornado-specific options include:

- Installing a tornado safe room complying to FEMA P-320, or purchase and install a storm shelter that meets the ICC 500 criteria.
- Replacing windows and doors with impact-rated products.
- Installing a high-pressure-rated garage door.
- Strengthening roof-to-wall connections.
- Strengthening roof sheathing connections.
- Reinforcing brick masonry chimneys with continuous reinforced steel bracing and framing anchors.
- Improving anchorage of attached roof structures on carports and porches.

Maintain your home to keep it ready for a tornado by:

- Trimming tree limbs back from extending over your home. Hire a professional arborist if trees pose a home risk or if trimming requires professional equipment and assistance.
- Using lightweight mulch instead of rock or gravel.
- Strengthening your soffits by applying a bead of polyurethane sealant between the wall and the trim where soffit panels are inserted.
- Checking your roof for damaged, missing, or loose shingles or tiles, using binoculars to safely make observations from the ground. Make sure shingles are not curled, broken, or slightly lifted.
- Securing loose items in your yard ahead of expected severe weather.
- Checking the operation and maintenance of the impact shutter systems. If the shutters are removable, verify all of the hardware is available. Ensure that the anchoring systems are free of corrosion or damage.

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Wildfire

Review these considerations with your real estate agent, home inspector, contractor, or other trusted advisor if the home is likely to experience a wildfire.

Location Checklist

- Is the home subject to building codes or land use ordinances that incorporate wildfire safety measures? YES NO
- Is the home located in or near a forest or an area with dense vegetation? YES NO
- Has the home experienced wildfires in the past? YES NO
- Is the home on a slope where fire travels faster? YES NO
- Are the neighboring homes fire-resistant? YES NO
- Does the community have the infrastructure (including roads and water supplies that can be used by firefighters) to respond to a wildfire? YES NO

If you answered yes to questions 1-4 or no to questions 5 and 6, speak with a qualified, licensed engineer, inspector, or local code official to determine the best course of action to protect your home from disasters OR consider a home in another location.

Construction Checklist

- The construction materials used on the home (e.g., roof coverings, siding, and fencing) are made of non-combustible or fire-resistant materials.
 - Concrete, fiber-cement panels or siding, stucco, masonry, metal, and fire-retardant-treated wood siding or panels are recommended for the exterior walls.
 - The most fire-resistant roof coverings include asphalt fiberglass composition shingles, concrete, and flat/barrel-shaped tiles (Class A).
 - Shutters should be fire-resistant.
 - Multi-pane windows or tempered safety glass are good options compared to annealed, ceramic, and plastic.

- Metal window frames are recommended over wood.
- Exterior doors should be metal or solid wood with an adequate fire rating.
- Avoid using a wooden garage door, especially if it does not have a solid core.
- Decks, porches, and fences are made of non-combustible or fire-resistant materials.
- There is a spark arrestor in each chimney or stovepipe to prevent large embers from escaping (or entering).
- Eaves, soffits, and vents are protected from wildfire.
- There are no overhangs or minimal overhangs, as this can mitigate soffit fire risks and the potential for trapping embers and hot gasses.
- There is fire-resistant and non-combustible landscaping and defensible space within 100 feet of the home.
 - Immediate Zone (0-5 feet from the home)
 - Intermediate Zone (5-30 feet from the home)
 - Extended Zone (30-100 feet from the home)
- Utility and equipment connections are underground.
 - If utility and equipment connections aren't underground, gaps and penetrations in exterior walls and roofs are sealed with fire-resistant materials.
- The home has residential fire sprinklers.
 - If so, ask your insurance professional to see if you qualify for a discount.

Depending on the age of the home, you may want to undertake certain structural retrofits and upgrades at the time of purchase. Wildfire-specific options include:

- Installing a fire-resistive roof covering.
- Replacing non-metal vent materials.
- Covering attic vents, crawl space vents, vents in enclosures below decks, and chimneys with wire mesh.
- Installing non-combustible (metal) leaf guards over gutters.
- Upgrading to noncombustible siding.
- Upgrading to residential fire sprinklers.
- Ensuring fuel storage vessels are adequately distanced from the home.

- Protecting eaves, overhangs, and soffits with fire-resistant materials.
- Upgrading to heat- and flame-resistant windows.

Maintain your home to keep it ready for a wildfire by creating a defensible space of up to 100 feet around the home by:

- Immediate Zone (0-5 feet from the home)
 - Cleaning roofs and gutters of dead leaves, debris, and pine needles.
 - Replacing or repairing any loose or missing shingles, or roof tiles.
 - Reducing embers that could pass through vents in the eaves by installing $\frac{1}{8}$ inch metal mesh screening.
 - Cleaning debris from exterior attic vents and installing $\frac{1}{8}$ inch metal mesh screening to reduce embers.
 - Covering the underside of decks and crawl spaces with non-combustible materials or metal mesh to prevent the accumulation of combustible debris and slow the entry of embers, especially if your home is elevated above grade.
 - Repairing or replacing damaged or loose window screens and any broken windows.
 - Moving any flammable material away from wall exteriors (e.g., mulch, flammable plants, leaves and needles, firewood piles, etc.) and removing anything stored underneath decks or porches.
 - Do not store propane grills, propane cylinders, or other flammable liquids next to your home.
- Intermediate Zone (5-30 feet from the home)
 - Clearing vegetation from under large stationary propane tanks.
 - Creating fuel breaks with driveways, walkways/paths, patios, and decks.
 - Keeping lawns and native grasses mowed to a height of four inches.
 - Removing ladder fuels (vegetation under trees) so a surface fire cannot reach the crowns.
 - Pruning trees up to 6-10 feet from the ground.
 - For shorter trees, don't exceed $\frac{1}{3}$ of the overall tree height.
 - Spacing trees with a minimum of 18 feet between crowns, increasing the distance with the percentage of slope.
 - Planning tree placement to ensure the mature canopy is no closer than 10 feet from the edge of the home.

- Limiting trees and shrubs to small clusters of a few each to break up the continuity of the vegetation across the landscape.
- Extended Zone (30-100 feet from the home)
 - Disposing of heavy accumulations of ground litter or debris.
 - Removing dead plant and tree materials.
 - Removing small conifers growing between mature trees.
 - Removing vegetation next to storage sheds or other outbuildings within this area.
 - Trees 30 to 60 feet from the home should have at least 12 feet between canopy tops; trees 60 to 100 feet from the home should have at least 6 feet between the canopy tops.
 - The distances listed for crown spacing are suggested based on NFPA 1144. However, the crown spacing needed to reduce crown fire potential could be significantly greater due to slope, the species of trees involved, and other site-specific conditions. Check with your local forestry professional to get advice on what is appropriate for your property.

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Appendix III

Recommended Retrofits by Disaster



Peril	Mitigation Name	How	Why	Cost
Earthquake	Reinforce exterior unreinforced masonry walls	Strengthen unreinforced masonry walls by bolting the walls to a new interior steel frame or by adding reinforcing. A licensed engineer is required to properly determine retrofit options.	Prevents building collapse.	\$\$\$ - \$\$\$\$
Earthquake	Strengthen soft and weak story construction	Homes and buildings with first floor open areas or buildings with parking underneath (garage apartments) are considered “soft story” construction. These structures are especially vulnerable to collapse in earthquakes because the stiffness of one story is substantially less than that of the stories above. Licensed engineers can determine proper retrofit options for these buildings.	Prevents building collapse.	\$\$\$ - \$\$\$\$
Earthquake	Reinforce cripple walls	Cripple walls are relatively short frame walls that extend from the top of the foundation to the bottom of the first floor of a home. Brace the cripple walls of wood-framed crawl spaces by adding plywood or diagonal sheathing to the stud walls.	Prevents collapse of cripple walls, extended disruption of all utilities and services, and possible building collapse.	\$\$ - \$\$\$
Earthquake	Upgrade foundation connections	Connect the home to the foundation with properly installed anchor bolts and steel plate washers at intervals of 4’ on center.	Prevents home from shifting off the foundation and possible collapse.	\$\$ - \$\$\$
Earthquake	Reinforce brick & masonry chimneys	Upgrade masonry chimneys with continuous reinforced steel bracing and framing anchors at each above grade floor, roof, and ceiling level. The footing should be at least as deep as that of the surrounding footings. A licensed contractor should perform this type of work to ensure it is done safely and meets the requirements of the building code.	Prevents chimney collapse.	\$\$ - \$\$\$
Earthquake	Reinforce crawl spaces	In crawl spaces, add anchor bolts through sill plates into the concrete foundation below to improve the connection between the wood framing of the house and its concrete foundation.	Prevents home from shifting off the foundation and possible collapse.	\$ - \$\$
Earthquake	Brace water heater	Anchor water heater to wall structure and connect it to plumbing with flexible piping to prevent dislodgement and broken pipes.	Prevents water damage if water heater is dislodged or tips over.	\$ - \$\$

Earthquake	Install an automatic gas shut-off valve	Have automatic gas shutoff valve installed between gas supply and house.	Reduces chances of fire following an earthquake due to the release of natural gas from broken gas lines in the home.	\$ - \$\$
Flood	Elevate the lowest floor	Consult a professional engineer to evaluate home elevation options to ensure that the lowest floor is at or above the base flood elevation or the design flood elevation, whichever is higher.	Reduces potential flooding inside the home.	\$\$\$\$
Flood	Provide flood protection for utilities and mechanical equipment	Elevate appliances, water heaters, air conditioning units, furnaces, and other critical utilities at least one foot above the base flood elevation or the design flood elevation, whichever is higher.	Protects mechanical equipment from floodwater and reduces electrical shock hazards.	\$\$ - \$\$\$
Flood	Install backflow preventers	Consult a licensed plumber to determine if backflow systems are feasible and to identify types allowed by the building code in your area.	Prevents sewage from flowing back into the home during a flood.	\$ - \$\$
Flood	Install flood vents	Install engineered hydrostatic vents (flood vents) in the unoccupied areas of your home, such as the garage, storage areas, or crawlspace below the base flood elevation. This will allow water to enter and exit the structure at the same rate.	Prevents condition that causes wall collapse when weight and force of floodwaters are focused on only one wall.	\$\$\$
Flood	Anchor fuel tanks	Attach above-ground tanks inside or outside your property to a large concrete slab with adequate weight to resist the force of floodwaters. Outside tanks can also be anchored with straps attached to a concrete slab by using turnbuckles.	Prevents ruptured fuel supply lines and resulting oil and gas spillage as well as wall and property damage from dislodged tanks.	\$ - \$\$\$
Flood	Add a sump pump with backup power	Install a sump pump with battery backup to protect areas around mechanical equipment and utilities located in the basement. You may need a generator to ensure power is available to operate the pump for an extended period after a flood.	Prevents water from collecting in the basement by discharging it to the outdoors.	\$ - \$\$
Flood	Improve basement/foundation wall drainage	Improve grading around the house to ensure that water drains away from your home. Add French drains if needed to ensure that water does not collect and stand near basement walls.	Prevents or reduces water intrusion into basements or ponding near or under the house.	\$ - \$\$\$

Hurricane	Brace gable-end walls	Hire a professional to brace any gable-end walls taller than 4 feet so that loads on the gable-end walls are distributed over multiple roof trusses or rafters, through the ceiling and roof sheathing, to the side walls.	Resists lateral forces on the gable end wall and prevents roof collapse.	\$\$ - \$\$\$
Hurricane	Brace soffit covers	The most common soffit failure cause is inadequate or incorrect attachment or installation. Fix this problem by installing wood backing or supports to use as an attachment point for soffits. If you cannot install wood supports, secure the soffit at 12-inch intervals with adhesives or other methods.	Keeping soffit covers in place greatly reduces the amount of water blown into the attic resulting in damaged or collapsed ceilings and damage to interior walls and building contents.	\$ - \$\$\$
Hurricane	Upgrade to wind-resistant roof cover	Ensure roof coverings are high wind-rated and attached properly regardless of the type (tiles, shingles, or metal).	Helps prevent roof covering from blowing off during a hurricane which can lead to significant water entry to the attic and collapsing ceilings.	\$\$ - \$\$\$
Hurricane	Window and door protection	Install pressure and large missile impact-rated products such as 1. Permanently-mounted hurricane shutters; 2. Temporary panels made from metal or other materials with permanently installed mounting hardware; or 3. Replacement products to significantly increase protection for windows, entry doors. Garage doors can be replaced, fitted with bracing kits provided by the manufacturer, or braced at mid-point or quarter-points with after-market kits.	Resists windborne debris impacts from flying missiles, tree limbs, roofing, or other building material that break windows, blow doors in, and breach garage doors. Prevents wind-driven rain from entering the home and stops internal pressurization inside the home, which can lead to roof failure.	\$\$ - \$\$\$
Hurricane	Strengthen roof deck connection	When reroofing, increase your roof deck attachment strength by having the roofer re-nail, add nails, and/or upgrade the nails to ring shank nails as appropriate to meet current code requirements for high-wind areas. If you are not reroofing and still want to strengthen your roof deck attachment, it can be done using a closed-cell spray foam adhesive or a Do-It-Yourself application of AFG-01 rated sub-floor adhesive along both sides of the intersection of the roof deck and rafters or truss.	Significantly reduces the chance of having part of your roof deck blown off creating a hole where wind and water can enter and destroy the interior of your home. If a closed-cell spray foam adhesive solution is selected, having it also sprayed over joints between the roof decking provides a secondary water barrier.	\$\$ - \$\$\$
Hurricane	Strengthen roof-to-wall connections: Install hurricane clips or straps	Anchor roof-to-wall connections securely using hurricane straps or clips at every wall-to-rafter or wall-to-truss connection to ensure the roof stays in place when severe winds blow. Do this during reroofing or by removing the soffit covers to access and upgrade existing connections.	Prevents the roof framing and trusses from disconnecting from the wall during high winds and hurricanes that can lead to loss of the whole roof or a large segment of it.	\$\$ - \$\$\$

Hurricane	Install a secondary water barrier	If reroofing, seal your roof deck by having the roofer install flashing tape over the joints between decking, cover the entire roof with a self-adhesive membrane, or apply two layers of wind-resistant underlayment attached with a high density of capped nails. If not reroofing, seal your roof deck by having a closed-cell polyurethane spray foam adhesive applied over all joints between decking on the underside of the roof deck. If the spray foam adhesive is also applied along both sides of the intersection between the roof deck and the rafters or trusses, it will improve the roof deck attachment to the roof structure.	A secondary water barrier will keep water out of your roof, attic, and home if part or all of your roof cover is damaged or blown off during a storm.	\$\$ - \$\$\$\$
Hurricane	Improve anchorage of attached structures	Make sure that attached structures such as carport and porch roofs are adequately restrained from wind uplift by ensuring that the roof structure is attached to columns and that the columns are anchored to the foundations.	Prevents attached structures from being lifted by winds and blown away or collapsing - both of which can damage the main structure - your home.	\$\$ - \$\$\$
Tornado	Install a safe room	Build a safe room that follows FEMA P-320 guidance or purchase and install a storm shelter that meets ICC 500 criteria.	Tornado safe rooms or storm shelters provide life safety refuge during extreme wind events like tornadoes.	\$\$ - \$\$\$\$
Tornado	Replace windows and doors with impact-rated products	Install pressure and large missile impact-rated windows and doors.	Resists windborne debris impacts from flying missiles, tree limbs, roofing, or other building material that break windows, blow doors in, and breach garage doors. Prevents wind-driven rain from entering the home and stops internal pressurization inside the home, which can lead to roof failure.	\$\$ - \$\$\$\$
Tornado	Install high pressure-rated garage door	Garage doors can be replaced with wind-rated garage doors, fitted with bracing kits provided by the manufacturer, or braced at mid-point or quarter-points with after-market kits.	Stops internal pressurization from occurring inside the home, which can lead to roof failure.	\$\$ - \$\$\$
Tornado	Strengthen roof-to-wall connections	Anchor roof-to-wall connections securely using hurricane straps or clips at every wall-to-rafter or wall-to-truss connection to ensure the roof stays in place when severe winds blow. Do this during reroofing or by removing the soffit covers to access and upgrade existing connections.	Prevents the roof framing and trusses from disconnecting from the wall during high winds and hurricanes that can lead to loss of the whole roof or a large segment of it.	\$\$ - \$\$\$\$

Tornado	Strengthen roof sheathing connections	When reroofing, increase your roof deck attachment strength by having the roofer re-nail, add nails, and/or upgrade the nails to ring shank nails as appropriate to meet current code requirements for high-wind areas. If you are not reroofing and still want to strengthen your roof deck attachment, it can be done using a closed-cell spray foam adhesive or a Do-It-Yourself application of AFG-01 rated sub-floor adhesive along both sides of the intersection of the roof deck and rafters or truss.	Significantly reduces the chance of having part of your roof deck blown off, creating a hole where wind and water can enter and destroy the interior of your home. If a closed-cell spray foam adhesive solution is selected, having it also sprayed over joints between the roof decking provides a secondary water barrier.	\$\$ - \$\$\$\$
Tornado	Reinforce brick masonry chimneys	Upgrade masonry chimneys with continuous reinforced steel bracing and framing anchors at each above grade floor, roof, and ceiling level. The footing should be at least as deep as that of the surrounding footings. A licensed contractor should perform this type of work to ensure it is done safely and meets the requirements of the building code.	Prevents chimney collapse.	\$\$ - \$\$\$
Tornado	Improve anchorage of attached structures	Make sure that attached structures such as carport and porch roofs are adequately restrained from wind uplift by ensuring that the roof structure is attached to columns and that the columns are anchored to the foundations.	Prevents attached structures from being lifted by winds and blown away or collapsing - both of which can damage the main structure - your home.	\$\$ - \$\$\$
Wildfire	Provide a fire-resistant roof cover	Reroof using a Class A fire-resistive roof covering - type does not matter (tiles, shingles, or metal), or have roof evaluated to ensure that vulnerabilities don't exist that would void the Class A rating (e.g., barrel tile roof without bird-stops).	Significantly reduces chances of ignition of the home from embers and burning debris landing on the roof.	\$\$ - \$\$\$\$
Wildfire	Replace non-metal vent materials	Replace any non-metal ridge vents or wall louvers with metal vents.	Prevents melting, ignition, or disintegration of components that can lead to ember and flame entry into the house.	\$\$ - \$\$\$
Wildfire	Cover attic vents, crawlspace vents, vents in enclosures below decks, and chimneys with wire mesh	Install metal screens if existing vent openings do not have screens or if the screen openings are larger than 1/4inch. For chimneys, install a welded wire or woven wire mesh spark arrestor.	Stops embers from entering and spreading fires to the interior of the home.	\$

Wildfire	Install non-combustible (metal) leaf guards over gutters	Use gutters and downspouts constructed of non-combustible materials (ex: galvanized steel, copper, and aluminum). Install metal-mesh screens or metal hoods that fit into the gutter. Leaf guards may not prevent all kinds of debris from accumulating, so regularly check for debris that may need to be removed and that the leaf guard has not become dislodged.	Reduces the chance of embers igniting leaves and debris in the gutter.	\$
Wildfire	Upgrade to non-combustible siding	Replace exterior wall coverings that are combustible, and susceptible to melting, or can readily transmit heat. Replace with fiber-cement panels or siding or exterior fire-retardant-treated wood siding or panels. Concrete, stucco, and masonry can also be used.	Prevents the exterior walls from igniting due to radiant and convective wildfire heat.	\$\$ - \$\$\$
Wildfire	Upgrade to residential fire sprinklers	Interior fire sprinklers for single-family homes are smaller than traditional commercial or industrial fire sprinklers. You can purchase various styles and colors, and they can be mounted flush with the ceiling or concealed behind covers. Include protection of areas near exterior windows and your garage in your sprinkler system design. Consider installing interior sprinklers when replacing or upgrading your roof sheathing, as it may reduce the cost.	Prevents spot fires that might result from embers entering through a broken window or through gaps around garage doors. The system can also protect against fires inside your house from events like kitchen fires and other internal ignition sources.	\$\$\$ - \$\$\$\$
Wildfire	Ensure fuel tank is adequately distanced from the home	Place fuel storage vessels 30 feet from your home, away from downhill slopes, and enclose vessels behind a non-combustible masonry wall. Bury pressurized storage vessels underground, if possible.	Protects the home from potential explosions.	\$\$\$
Wildfire	Protect eaves, overhangs, and soffits	Box in exposed rafter soffits using fire-resistant materials or replace existing eave and soffit covers with fire-resistant materials. Existing soffits like plywood can be covered with a non-combustible or fire-resistant material such as a fiber-cement board. Make sure that vents provided in the soffits are rated for resistance to flame and ember entry.	Reduces the chance of embers igniting a fire in the attic or walls of the home.	\$ - \$\$
Wildfire	Upgrade to heat and flame resistant windows	Replace single-pane windows and possibly dual pane windows with dual pane windows where at least one of the panes is tempered glass.	Reduces the chance of window breakage that could lead to ember and flame entry into your home.	\$\$\$ - \$\$\$\$

Winter Storm	Reinforce roof framing	Have trusses inspected to ensure they meet the required snow loads. A licensed engineer is required to properly determine retrofit options such as reinforcing roof members, connectors and adding bracing. Alternatively, hire a professional for roof snow removal.	Prevents roof collapse.	\$\$\$ - \$\$\$\$
Winter Storm	Provide ice barrier on the roof	If reroofing, consider installing a self-sealing ice and water barrier using two layers of cemented underlayment or a polymer-modified bitumen sheet.	Prevents ice dams at eaves that can cause meltwater backup under roof cover, damaging the roof sheathing and roof cover, and pouring into the attic where it will saturate insulation and damage ceilings or cause them to collapse.	\$\$
Winter Storm	Upgrade attic insulation	Upgrade attic insulation to at least the minimum R-value required by the building code for your area - make sure not to block attic ventilation from soffits.	Helps prevent ice dams at eaves and associated damage to roof covers, decking, ceilings, etc., by helping to ensure that the temperature of the roof surface away from the eaves remains similar to that at the eaves. Can also reduce heating costs.	\$\$ - \$\$\$
Winter Storm	Minimize heat release into the attic	Seal all openings that can allow heat and vapor to rise into the attic. Pay special attention to holes created from installing light fixtures and ceiling fans - add extra insulation above any recessed light fixtures. Insulate and seal around any access openings or doors into the attic space from conditioned space.	Helps prevent ice dams at eaves and associated damage to roof covers, decking, ceilings, etc., by helping to ensure that the temperature of the roof surface away from the eaves remains similar to that at the eaves.	\$ - \$\$
Winter Storm	Upgrade insulation for pipes	Improve the insulation of exposed pipes under cabinets located on exterior walls and in any unheated areas by adding rigid insulation between walls and pipes or by directly insulating pipes. Make sure any pipes in the attics are well insulated from cold attic air above the pipes.	Helps to prevent the bursting of pipes and the tremendous amount of water damage that occurs when this happens.	\$ - \$\$\$
Winter Storm	Upgrade insulation for walls	If remodeling, consider improving insulation in walls by replacing existing insulation with products having higher R-values or by increasing the wall cavity depth so additional insulation can be added.	Helps to prevent the bursting of pipes in the walls and the tremendous amount of water damage that occurs when this happens.	\$ - \$\$\$

Winter Storm	Seal air leaks in walls	Seal around window and door frames and around any wall penetrations such as by pipes, cables, and vents using caulks, spray foam sealants, or weather stripping.	Reduces cold air entry into wall cavities that can cause freezing of water pipes in exterior walls. It can also increase comfort in the home by reducing cold spots in walls, air infiltration through electrical outlets and can reduce heating costs.	\$ - \$\$
Winter Storm	Replace windows and doors with better insulating products	Replace windows with multi-pane, inert-gas-filled insulating windows. Choose insulated doors and storm doors.	Improves control of conditioned space while reducing costs of heating and cooling. Can reduce chances of damage during unusually cold and unusually long cold spells.	\$\$\$ - \$\$\$\$

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Appendix IV

Glossary



Actual cash value – An amount paid on a property claim that is normally calculated by estimating the replacement value of the insured property, then subtracting the depreciation. Depreciation is the amount a property has decreased in value over time since it was purchased. Depreciation considers factors like market conditions and wear and tear.

Anchor bolt – Mechanical connection like a bolt or screw used to anchor a building's walls to the foundation.

Appliances – Household items like washing machines and dryers that can be shaken during an earthquake. Securing them is essential to prevent shaking and potential fires from the electrical or gas connections coming loose.

Beyond-code – Any building regulation, standard, or design specification that is above the minimum requirements included in the building code.

Building code – A collection of regulations governing the design, construction, alteration, and maintenance of structures. They specify the minimum requirements to adequately safeguard the health, safety, and welfare of building occupants.

Building Code Effectiveness Grading Schedule (BCEGS) – A program of the Insurance Services Office, Inc. (ISO)[®], BCEGS is a tool used to measure the effectiveness of a jurisdiction's building code enforcement. The BCEGS program measures the adoption and enforcement of a community's building codes, emphasizing the reduction of losses from natural hazards.

Community Rating System Discounts – Provides premium discounts in those communities that undertake floodplain activities beyond the National Flood Insurance Program's basic requirements.

Connectors – Typically metal, these items are used to reinforce two framing members that are joined together. These connections can be used on wood, masonry, concrete, and steel.

Debris – Any material, including trees, branches, personal property, and building material, on public or private property that is directly deposited by the disaster. *(Source: FEMA)*

Defensible space – An area either natural or manmade where material capable of causing a fire to spread has been treated, cleared, reduced, or changed to act as a barrier between an advancing wildland fire and the loss to life, property, or resources. In practice, "defensible space" is defined as an area a minimum of 30 feet around a structure that is cleared of flammable brush or vegetation. *(Source: USDA Forest Service)*

Disaster kit – Also called an emergency kit, a disaster kit is a package of essential tools and supplies, including food and water prepared in advance to aid in survival in an emergency.

Deductible – The portion of loss paid by the policyholder. A deductible may be a specified dollar amount, a percentage of the insured amount, or a specified amount of time that must elapse before benefits are paid. The bigger the deductible, the lower the premium charged for the same coverage.

Earthquake – The sudden slip on a fault and the resulting ground shaking and radiated seismic energy caused by the slip, volcanic, or magmatic activity, or other sudden stress changes in the Earth.

(Source: USGS)

Earthquake insurance – Covers a building and its contents in the event of an earthquake. A special policy or endorsement exists because standard homeowners or most business policies do not cover earthquakes.

Emergency plan – The course of action developed in advance of an emergency regarding what steps will be taken to ensure safety and security immediately after the event.

Evacuation – The urgent, immediate egress or escape of people away from an area that contains an imminent threat, an ongoing threat, or a hazard to lives or property.

Fault – A fracture along which the blocks of crust on either side have moved relative to one another parallel to the fracture. *(Source: USGS)*

Flood – Any high flow, overflow, or inundation by water that causes or threatens damage or human life.

Flood insurance – Coverage for flood damage is available from the federal government under the National Flood Insurance Program but is sold by licensed insurance agents. Flood coverage is excluded under homeowner's policies and many commercial property policies. However, flood damage to automobiles is covered under the comprehensive portion of an automobile insurance policy.

FORTIFIED Home™ Program – A voluntary construction and re-roofing program designed to strengthen homes against specific types of severe weather like high winds, hail, hurricanes, and tornadoes. The program provides free access to construction standards, a network of contractors trained to provide the severe weather upgrades, and third-party verification that upgrades meet the standards required for a FORTIFIED designation certificate.

Foundation – Lower portion of a building structure that transfers its gravity loads to the Earth. It also serves as a means for anchoring the building during events that could cause the building to be moved or displaced.

Generator – A secondary device, typically internal combustion, that serves solely as a secondary source of mechanical or electrical power whenever the primary energy supply is disrupted or lost.

Homeowners insurance – The typical homeowners insurance policy covers the house, the garage, and other structures on the property, as well as personal possessions inside the house like furniture, appliances, and clothing, against a wide variety of perils including windstorms, fire, and theft. The extent of the perils covered depends on the type of policy. The policy's liability portion covers the homeowner for accidental injuries caused to third parties or their property, such as a guest slipping and falling down improperly maintained stairs. Coverage for flood and earthquake damage is typically excluded and must be purchased separately.

Hurricane – A tropical cyclone in which the maximum sustained surface wind (using the U.S. 1-minute average) is 74 mph or more. The term hurricane is used for Northern Hemisphere tropical cyclones east of the International Dateline to the Greenwich Meridian. The term typhoon is used for Pacific tropical cyclones north of the Equator west of the International Dateline.

Inundation – To cover with a flood or an overflow of water. For example, due to a tsunami.

Landslide – A movement of surface material down a slope. (Source: USGS)

Liquefaction – A process by which water-saturated sediment temporarily loses strength and acts as a fluid like when you wiggle your toes in the wet sand near the water at the beach. This effect can be caused by earthquake shaking. (Source: USGS)

Loss mitigation – Measures taken to reduce property damage.

Loss of Use – When a loss occurs due to a covered peril and a dwelling becomes uninhabitable, the cost of additional living expenses are covered and defined as “Loss of Use.” Loss of Use coverage reimburses additional living expenses, up to a stated limit, that the insured incurs to maintain a normal standard of living after a covered loss.

Mitigate – To cause to become less harsh or hostile; to make less severe or painful. In the case of natural disasters, mitigation is defined as the effort to reduce the loss of life and property by lessening the disaster’s impact.

National Flood Insurance Program – Federal government-sponsored program under which flood insurance is sold to homeowners and businesses.

Peril – A specific risk or cause of loss covered by an insurance policy, such as a fire, windstorm, flood, or theft. A named-peril policy covers the policyholder only for the risks listed in the policy in contrast to an all-risk policy, which covers all causes of loss except those specifically excluded.

Policy – A written contract for insurance between an insurance company and policyholder stating details of coverage.

Premium – The price of an insurance policy, typically charged annually or semiannually.

Rebar – Short for “reinforcement bar,” this is the steel reinforcing rod used as a concrete tension device.

Replacement cost – An amount paid on a property claim that is normally calculated by estimating the cost to replace or rebuild the insured house component exactly as it was or as close as possible, given the current cost of labor and materials.

Risk – The threat of damage, injury, or loss that is caused by disasters and that may be avoided through preemptive action like mitigation.

Secured shelving – The method of attaching interior shelves and storage racks to structural walls to prevent them from toppling over during an earthquake event. This can prevent both property damage and personal injury.

Seismic – Related to earthquakes or other vibrations of the Earth and its crust.

Tornado – A violently rotating column of air touching the ground, usually attached to the base of a thunderstorm.

Tsunami – A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, significant submarine slides or exploding volcanic islands.

(Source: USGS)

Unreinforced masonry – Masonry construction such as walls of concrete blocks or bricks that have no reinforcing bars of steel (rebar) internally to strengthen against tension forces.

Utilities – The items such as electricity, water, gas, and telephone connections that provide service to a home or business. During a disaster event, these can be lost for an unknown length of time.

Weather radio – The automated 24-hour network of VHF FM weather radio stations in the United States that broadcast weather information directly from a nearby National Weather Service office.

Wildland fire – Any nonstructural fire, other than prescribed fire, that occurs in the wildland. *(Source: USDA Forest Service)*

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Appendix V

Resources



Federal Emergency Management Agency (FEMA)

fema.gov

FEMA Earthquake Hazard Maps

fema.gov/emergency-managers/risk-management/earthquake/hazard-maps

FEMA Flood Service Maps

msc.fema.gov/portal/home

FEMA Summary of Disaster Declarations

fema.gov/data-visualization-summary-disaster-declarations-and-grants

FEMA P-1100 Volume 1

Vulnerability-Based Seismic Assessment and Retrofit of One- and Two-Family Dwellings

fema.gov/sites/default/files/2020-08/fema_seismic-retrofit-family-dwellings-prestandard_p-1100.pdf

FEMA P-50

Simplified Seismic Assessment of Detached, Single-Family, Wood-Frame Dwellings

atcouncil.org/images/files/FEMA_P-50.pdf

Firewise USA

nfpa.org/Public-Education/Fire-causes-and-risks/Wildfire/Firewise-USA

FORTIFIED Home™

fortifiedhome.org

#HurricaneStrong – National Hurricane Resilience Initiative

hurricanestrong.org

No Code. No Confidence. – Inspect2Protect

Inspect2Protect.org

Insurance Institute for Business and Home Safety (IBHS)

disastersafety.org

International Code Council (ICC)

iccsafe.org

National Association of Insurance Commissioners (NAIC) Consumer Resources

content.naic.org/consumer.htm

National Fire Protection Association (NFPA)

nfpa.org

National Flood Insurance Program (NFIP)

fema.gov/national-flood-insurance-program

National Institute of Building Sciences

Natural Hazard Mitigation Saves: 2019 Report

nibs.org/page/mitigationsaves

National Oceanic and Atmospheric Administration (NOAA)

Billion-Dollar Weather and Climate Disasters: Overview

ncdc.noaa.gov/billions

National Weather Service NWR Station Listing

weather.gov/nwr/station_listing

Resilience Action Fund (RAF)

buildingresilient.com

#TornadoStrong – National Tornado Resilience Initiative

tornado-strong.org

USGS Earthquake Hazards

usgs.gov/natural-hazards/earthquake-hazards/hazards

Wildfire Risk to Communities

wildfirerisk.org

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