



HOW TO PREPARE FOR A TORNADO

AMERICA'S
PrepareAthon!
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TORNADO BASICS

Tornadoes are one of nature's most violent storms and can cause death, injury, and destruction within seconds. *How to Prepare for a Tornado* explains how to protect yourself and details the steps to take now so that you can act quickly at a time when every second counts.

WHAT

A tornado is a violently rotating column of air that extends from a thunderstorm to the ground and is often—although not always—visible as a funnel cloud. Once the tornado has passed, the National Weather Service (NWS) rates them using the Enhanced Fujita (EF) scale based on the severity of the damage and estimated wind speed. The scale goes from an EF0 tornado, which causes light damage, to an EF5 tornado, which causes total devastation. Lightning and hail are common in thunderstorms that produce tornadoes.

WHEN

Tornadoes can strike in any season, but occur most often in the spring and summer months. They can occur at all hours of the day and night, but are most likely to occur between 3 p.m. and 9 p.m.

WHERE

About 1,200 tornadoes hit the United States every year and every state is at risk. Most tornadoes in the United States occur east of the Rocky Mountains.

IMPACT

The destruction and injury caused by a tornado depends on the intensity, size, path, time of day, and amount of time they are on the ground. Wind from tornadoes can reach more than 200 miles per hour, and damage paths can be more than 1 mile wide and 50 miles long.

- Damage can range from light to catastrophic. Injuries can be minor, serious, or life-threatening. Fatalities can result even in the lower-rated tornadoes (EF0/EF1). Wind from tornadoes can cause structural damage, transform debris into deadly projectiles, move and destroy houses, de-bark trees, and roll cars.
- A tornado may disrupt transportation, power, water, gas, communications, and other services in its direct path and in neighboring areas.
- Heavy rains, flash flooding, and hail can occur from related thunderstorms.

YOUR GOAL FOR PROTECTION

Most injuries and fatalities from tornadoes are caused by being struck or cut by falling or wind-borne debris. When a tornado threatens, your goal is to go to the safest place for protection before the tornado hits and to take additional measures for personal cover.

BEST PROTECTION

The best protection in all tornadoes is provided by a structure built to the Federal Emergency Management Agency (FEMA) safe room or the International Code Council (ICC) 500 storm shelter standards. These structures provide near-absolute protection.



MODERATE PROTECTION

In a sturdy building, a small, interior, windowless room, such as a closet or bathroom, on the lowest level of the building provides moderate protection. A floor below ground is best. In these locations, use additional personal cover. Use what is available to cover yourself, such as a coat or blanket, and cover your head and neck with your arms. To make sure you know the safest location in a building, called the Best Available Refuge Area, get an evaluation by a qualified architect or structural engineer. This is the most commonly available protective action for tornadoes.

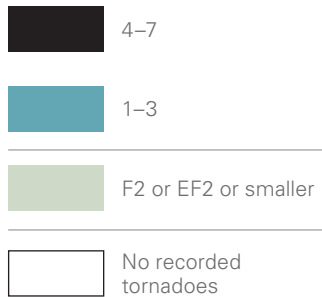


MINIMAL/INADEQUATE PROTECTION

Some locations do not provide protection from tornadoes, including: manufactured (mobile) homes/offices, the open space of open-plan buildings (e.g., malls, big retail stores, and gymnasiums), vehicles, and the outdoors.

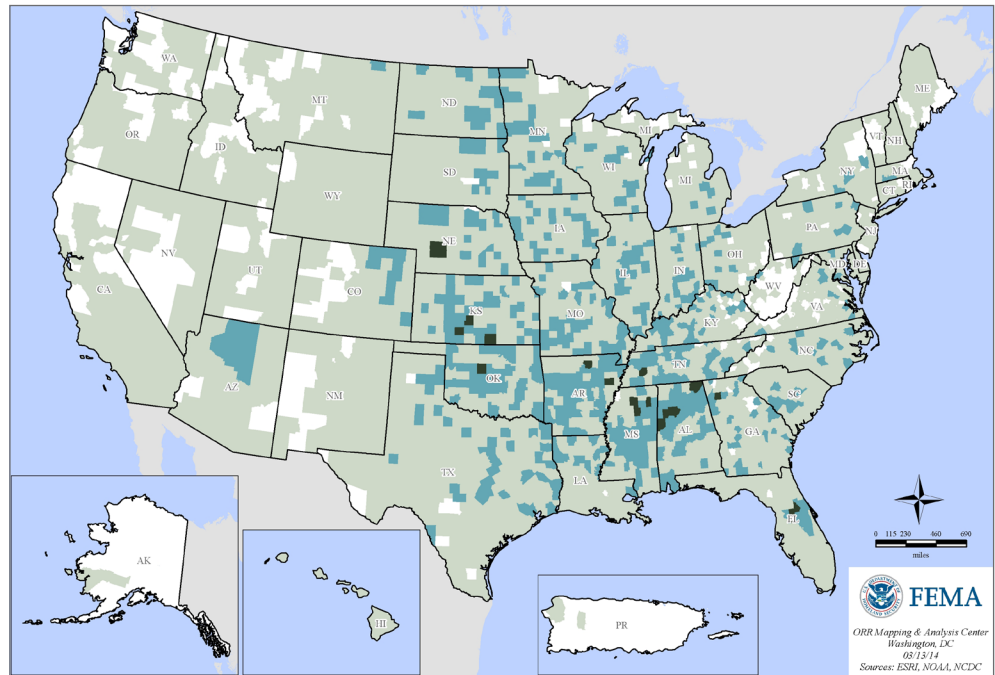
KNOW THE RISK

Frequency of F3* or EF3 or greater tornadoes



*The F-Scale (or Fujita Scale) was replaced with the EF-Scale (or Enhanced Fujita Scale) in 2007.

Tornado Activity by County: 1996–2013



WARNING SIGNS

Having advance notice that a tornado is approaching your area can give you the critical time needed to move to a place with better protection. Pay attention to weather reports and sign up for text alerts and smart phone apps that provide weather warnings.

It is important to remember that you may not always receive an official tornado alert in your area. You may need to use your judgment to seek protection when you see or hear a dangerous storm advancing. Know the tornado warning signs.

TORNADO WARNING SIGNS

1

A rotating, funnel-shaped cloud that extends from a thunderstorm toward the ground may be visible.

2

An approaching cloud of debris, especially at ground level, can mark the location of a tornado even if a funnel is not visible.

3

A loud roar that sounds similar to a freight train.

4

A strange quiet occurring within or shortly after a thunderstorm. The wind may die down and the air may become very still.

5

Debris dropping from the sky.

6

A change in the color of the sky.

EMERGENCY NOTIFICATIONS

NWS, part of the National Oceanic and Atmospheric Administration (NOAA), issues tornado alerts when weather conditions occur that make tornadoes more likely. Watches and warnings are science-based predictions that are intended to provide adequate time for action. Download the *Be Smart. Know Your Alerts and Warnings* document at www.ready.gov/prepare for a summary of available notifications.

TORNADO WATCH

NWS issues a **tornado watch** when weather conditions in an area indicate an increased risk for severe weather that may be capable of producing a tornado.

TORNADO WARNING

NWS issues a **tornado warning** when a tornado has been sighted or indicated by weather radar. **On average, tornado warnings are issued 13 minutes prior to the event,¹ but warning times vary greatly and may be much less.** Occasionally, tornadoes develop without detection, and no official warnings can be made before touchdown. Forecasters do their best to predict the path of a storm, but not all areas under a tornado warning will experience a tornado. Even if you have been through a tornado warning without experiencing any damage, remember that tornadoes are unpredictable and you should ALWAYS take immediate action when authorities issue a tornado warning.

¹ National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Tornadoes 101, www.noaa.gov/features/protecting/tornados101.html.

PROTECT YOURSELF BEFORE A TORNADO

TAKE ACTION NOW!

To ensure that you are able to act quickly and get the best available protection during a tornado, you need to plan ahead. There are steps you can take right now to lower the risk for you and your loved ones. *Planning and practicing specifically how and where you take cover for protection may save your life.*

KNOW

Know the areas that are prone to frequent and severe tornadoes. Learn whether you live, work, or travel through areas that are prone to frequent and severe tornadoes.

Know how to stay informed. Receiving timely information about weather conditions or other emergency events can make all the difference in knowing when to take action.

- Monitor weather reports provided by your local media.
- Many communities have text or email alerting systems for emergency notifications. To find out what alerts are available in your area, do an Internet search with your town, city, or county name and the word “alerts.”
- Consider buying a NOAA Weather Radio (NWR) All Hazards receiver, which receives broadcast alerts directly from the NWS. You can purchase these at many retail outlets, such as electronics and big box stores, or online. Some NWR receivers are designed to work with external notification devices with visual and vibrating alerts for people who are deaf or hard of hearing. For more information on NWR receivers, visit www.nws.noaa.gov/nwr/nwrrcvr.htm#programming.
- Think about how you will stay informed if there is a power outage. Have extra batteries for a battery-operated radio and your cell phone. Consider having a hand crank radio or cell phone charger.

Know where you would go to have the highest available level of protection from a tornado for every place where you spend a lot of time, such as home, work, school, or house of worship. Your level of protection from tornadoes depends on where you are when the tornado strikes as well as the intensity, size, and duration of the tornado. Because you cannot judge the intensity of a tornado in advance, you should always seek the highest level of protection available.

Your plan should include where you will go and how you will get there. If you or others you know have young children, elderly family members, family members with access or functional needs, service animals, or pets, you should plan now to ensure that everyone can get to a protective location. Community shelters are required to accommodate people with accessibility needs and service animals, but you will need to call the shelter in advance to ask about policies on bringing pets to the shelter.

BEST PROTECTION

Most buildings will be destroyed if hit directly by an EF3, EF4, or EF5 tornado, and can sustain significant damage from a lower-level tornado. FEMA safe rooms and ICC 500 storm shelters are designed to provide “near-absolute” protection against even the most extreme tornadoes, and only these safe rooms and storm shelters should be labeled “shelters” for tornado protection. These shelters can be constructed or installed in a home or small business, or they can be built on a larger scale as a community shelter.

If your home or small business is in an area prone to frequent and severe tornadoes, consider building or installing a FEMA safe room or ICC 500 storm shelter. In areas subject to extreme wind events, those responsible for public safety—including building owners, schools, hospitals, and neighborhood associations—should consider building accessible community safe rooms. People who live or work in structures with inadequate protection, such as mobile homes or buildings with long-span roofs, also should discuss the option of building a community safe room or shelter. Grants or loans for communities and homeowners may be available to support the construction of safe rooms. Communities may consider local legislation to require safe rooms in new construction and structural reinforcements for certain public buildings.

More information is available in two free FEMA publications:

- *Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business* (FEMA P-320, Third Edition, August 2008). www.fema.gov/media-library/assets/documents/2009?id=1536
- *Design and Construction Guidance for Community Safe Rooms* (FEMA P-361, Second Edition, August 2008). www.fema.gov/media-library/assets/documents/3140?id=1657

A copy of the *ICC/National Storm Shelter Association (NSSA) Standard for the Design and Construction of Storm Shelters* can be purchased and downloaded from this website: <http://shop.iccsafe.org/icc-500-2008-icc-nssa-standard-for-the-design-and-construction-of-storm-shelters-2.html>.

MODERATE PROTECTION

Although not specifically designed to protect against tornadoes, there are some areas in a sturdy building that may provide moderate protection, depending on the intensity of the tornado and how close it comes to your location. In a sturdy building, you should plan to go to a small, interior, windowless room, such as a closet or bathroom. This room should be on the lowest level of the building, underground is best. In a location with moderate protection, you should also plan to take additional steps to protect yourself from potential falling or wind-borne debris. You should cover yourself with any materials that may provide protection from debris, such as cushions, a sleeping bag, or a blanket. Kneel down and bend over into a ball, and cover your head and neck with your arms. Never leave a sturdy building to try to escape a tornado. These may also be the best available actions for buildings with long-spanned roofs.

Commercial property owners and building managers should ask qualified architects or structural engineers to identify the Best Available Refuge Area(s) in the building for moderate protection, especially for buildings with long-span roofs and large, open spaces, and buildings with many occupants. This may apply to business owners, landlords, and building managers of schools and government buildings. Contact the local building department, or the local chapter of a structural engineers association to ask for assistance. The FEMA publication *Tornado Protection: Selecting Refuge Area in Buildings* (FEMA P-431) presents case studies of three schools and guidance for selecting the safest area in existing buildings. This publication is available at www.fema.gov/media-library/assets/documents/2246?id=1563.

RESEARCH NOTE: PERSONAL COVER AND POSITIONING

- Research shows that additional personal cover, such as being under a table, covering your head and neck with your arms, or covering your body with a blanket or coat, is beneficial in locations that are not a FEMA safe room or ICC storm shelter. While personal cover is helpful, additional research is needed to validate the best type of personal cover in different circumstances.
- In addition, specific research is needed to examine whether wearing some types of helmets may provide additional protection for the head from wind-driven and falling debris. If you plan to wear a helmet, make sure to keep your helmet near your protective location. You should not take time to find a helmet after authorities have issued a tornado warning. Do not remove a helmet from an injured person because this could cause further injury. Only trained medical professionals should remove helmets.
- More research also is needed on the best way to position your body in different locations.



MINIMAL/INADEQUATE PROTECTION

If you spend time in locations that do not offer protection from tornadoes, such as manufactured (mobile) homes/offices, the open space of open-plan buildings (e.g., malls, big retail stores, and gymnasiums), vehicles, or the outdoors, plan ahead and be ready to change your plans during a tornado watch so you will be able to reach a different location for protection if needed.

PRACTICE

Practice moving quickly to the protective location in the places where you spend a lot of time.

Plan with others to conduct a tornado drill. Take note of how much time it takes to get to your protective location. Warning periods can vary significantly, but you should know how long you will need to reach the protective area. You will have greater success in getting to a shelter or other protective location quickly if you have identified this area beforehand and if you practice getting there. Like any drill, if you take the time to practice, you will have a greater chance of reacting quickly and appropriately in a real situation. Be sure to consider people with disabilities and others with access or functional needs.

Practice how you will communicate with family members. In a dangerous situation, your first thoughts will be the safety of your family and friends. In case you are not together when authorities issue a tornado watch or tornado warning, practice how you will communicate with each other. Remember that sending texts is often faster than making a phone call. Keep important numbers written down in your wallet, not just stored in your phone. It is sometimes easier to reach people outside your local area during an emergency, so choose an out-of-town contact for all family members to call or use social media. Decide where your household members will meet after the tornado. Visit www.ready.gov/make-a-plan for Household Communication Plan templates.

Practice first aid skills and emergency response actions through training classes.

In most circumstances, when someone is hurt, a person on the scene provides the first assistance, before professional help arrives. Learn and practice response skills now so you will know what to do.

- Each year, more than 3 million people gain the skills they need to prepare for and respond to emergencies through American Red Cross training classes, including first aid, automated external defibrillator (AED), and cardio-pulmonary resuscitation (CPR) training. Visit www.redcross.org/take-a-class to find

classes in your area. Download the American Red Cross First Aid App at www.redcross.org/mobile-apps/first-aid-app.

- The Community Emergency Response Team (CERT) Program expands the emergency response network by providing training in basic response skills to community members. CERT Basic Training educates people about disaster preparedness for hazards that may affect their area and trains them in basic disaster response skills, such as fire safety, light search and rescue, team organization, and disaster medical operations. Visit www.fema.gov/community-emergency-response-teams to find your local program.

STORE **Store the supplies you may need after the tornado passes.** Identify the things you would need most when you emerge from your protective location to find severe damage, no power, and no water. If possible, keep some of these items in your pre-identified protective locations at home, work, school, or your place of worship. You may need to keep other items in a “Go Bag” or other container to bring with you. For a full list of supplies for your emergency supply kit, visit www.ready.gov/build-a-kit. Here are some suggestions to consider:

- Battery-powered or crank-operated flashlight to inspect your home or office after the tornado has passed. If using a battery-powered flashlight, turn it on outside the building first because the battery could produce a spark and cause a fire if gas is present. Include spare batteries.
- Battery-powered or crank-operated radio to listen for emergency updates and news reports.
- First aid kit to address minor injuries.
- Complete change of clothing, including a long-sleeved shirt, long pants, work gloves, and sturdy, thick-soled shoes. These will protect you from further injury by broken glass, exposed nails, or other objects.
- Whistle or air horn to notify rescuers in case you are trapped by debris resulting from the tornado.
- Dust mask to protect you from inhaling particles and fine debris.
- Food and water for a day or two; consider specific dietary considerations.
- Your medications and medical supplies.
- If you have children, a special item (e.g., stuffed animal, book, game) to provide comfort.

Store the important documents you will need to start your recovery. Review your homeowners or renters insurance policy and prepare or update a list of your home’s contents by taking pictures or videotaping each room in the house. If your home or business sustains significant damage, you will need access to insurance and rental or mortgage agreements to file a claim or request assistance from government programs. During recovery, you may need access to personal information such as medical insurance and prescriptions. The Emergency Financial First Aid Kit (EFFAK) can help you identify the records you will want to keep safe, available at www.ready.gov/financialpreparedness. Store your records safely. Keep papers in a fireproof, waterproof box. If records are stored electronically, keep a backup drive in your fireproof, waterproof box or store files using a secure cloud-based service.

DISCUSS

Discuss what you have done to prepare with your family, friends, neighbors, and colleagues. Talking about preparedness with others will help you think through your plans. Share information about alerts and warnings and encourage others to sign up for notifications. Talking about disasters and helping others prepare makes everyone safer.

Discuss with community leaders how your community can reduce risk. Work with others in your community to request an evaluation of Best Available Refuge Areas in public locations and pursue community investments for FEMA safe rooms and ICC 500 storm shelters, especially in areas where frequent and severe tornadoes have occurred. For more information on mitigation options to reduce your community's risk, see *Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards* at www.fema.gov/media-library/assets/documents/30627?id=6938.

PROTECT YOURSELF DURING A TORNADO

During a storm, listen to local news and monitor your alerts to stay informed about tornado watches and warnings.

TORNADO WATCH

If NWS issues a tornado watch:

Tune in to NOAA Weather Radio All Hazards, local radio, and television weather reports and check alert notifications.

Review where you will go for protection and discuss with those around you. Change your plans, if necessary, to make sure you will be able to get to a protective location quickly.

Call anyone you know who may not be tuned-in or who may need assistance to reach a protective location.

Charge your cell phone in case the power goes out.

TORNADO WARNING

If NWS issues a tornado warning or if you see a tornado:



TAKE ACTION IMMEDIATELY!



If available, go to a FEMA safe room or ICC 500 storm shelter

OR

Go to a small, interior, windowless room in a sturdy building on the lowest level (underground is best) or to a Best Available Refuge Area. Take additional personal cover. Cover your head and neck with your arms and cover your body as best you can, e.g., with a coat or a blanket.

RESEARCH NOTE: VEHICLE OR DITCH

When a warning is issued, and it is not possible to get to a tornado shelter, to a sturdy building, or to an identified Best Available Refuge Area, there is no single recommendation for what last-resort action to take because many factors can affect your decision.

With new developments in automotive design, increases in the size and stability of newer vehicles, and safety glass, researchers are evaluating the relative minimal protection of being in a vehicle versus taking cover outdoors in an area lower than the surrounding ground or road level (e.g., a ditch), provided there is no flooding. Whether in a vehicle or outdoors, cover your head and neck with your arms and cover your body as best you can, with a coat or a blanket if possible. If taking cover in a vehicle, put the seatbelt on and try not to be under a freeway, road overpass, or trees. Do not attempt to outrun a tornado in a vehicle.

PROTECT YOURSELF AFTER A TORNADO

Tornadoes can cause death and injury and can destroy or make buildings and roads unsafe. Once the tornado has passed and the tornado warning is cancelled, use extreme caution.

INSIDE SAFETY

- Use extreme care when leaving a building. Do not use matches or lighters inside and leave immediately if you smell gas or see spills that could be flammable. Avoid debris and sharp objects.
- If you are trapped, stay where you are and cover your mouth with a cloth or mask to avoid breathing dust. Try not to move the debris around you or stir up dust. Send a text, if possible, or bang on a pipe or wall or use a whistle instead of shouting so that you do not breathe in dust.

OUTSIDE SAFETY

- Do not enter damaged buildings until local authorities tell you that it is safe.
- Stay away from downed power lines and report them to 911 or the power company's emergency number.
- Use caution during post-tornado clean-up, including debris removal, chainsaw use, and repairs. Wear boots or heavy shoes to protect your feet; injuries from exposed nails and debris are common after tornadoes.

COMMUNICATIONS

- Use local alerts, radios, and other information sources, such as FEMA or American Red Cross apps, to get information and advice as soon as it is available.
- Use text messaging or social media to communicate with family and friends. Telephones and cellular phone systems are often overwhelmed following a disaster, so use phones only for emergency calls.

MEDICAL

- Provide first aid, but do not move anyone who is seriously injured unless they are in immediate danger of death or further injury. If moving someone is necessary, hold the person's head and neck in the position in which you found them. If an injured person is wearing a helmet, do not remove it; this could cause further injury.

CARE FOR LOVED ONES

- Look for signs of depression or anxiety related to this experience, such as feeling physically and mentally drained; having difficulty making decisions or staying focused; becoming easily frustrated on a more frequent basis; feeling tired, sad, numb, lonely, or worried; or experiencing changes in appetite or sleep patterns. Seek help from local mental health providers if you detect signs in yourself or others.

INSURANCE

- Photograph damage to your property and contact your insurance agent. Do what you can to prevent further damage (e.g., putting a tarp on a damaged roof) that insurance may not cover.

RESOURCES

If you would like more information, the following resources may be helpful.

Design and Construction Guidance for Community Safe Rooms (FEMA P-361).

www.fema.gov/media-library/assets/documents/3140?id=1657

ICC/NSSA Standard for the Design and Construction of Storm Shelters for Purchase. <http://shop.iccsafe.org/icc-500-2008-icc-nssa-standard-for-the-design-and-construction-of-storm-shelters-2.html>

Protect Your Property from High Winds.

www.fema.gov/media-library/assets/documents/13270?id=3263

Substance Abuse and Mental Health Services Administration (SAMHSA)
Disaster-Specific Resources: Annotated Bibliography.

www.samhsa.gov/dtac/dbhis/dbhis_specific_bib.asp#disaster

www.samhsa.gov/dtac/dbhis/dbhis_specific_bib.asp#tornado

Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business (FEMA P-320, Third Edition, August 2008).

www.fema.gov/media-library/assets/documents/2009?id=1536

Thunderstorms, Tornadoes, Lightning... Nature's Most Violent Storms: A Preparedness Guide Including Tornado Safety Information for Schools.

www.nws.noaa.gov/om/severeweather/resources/ttl6-10.pdf

Tornado Protection: Selecting Refuge Area in Buildings (FEMA P-431, Second Edition, October 2009).

www.fema.gov/media-library/assets/documents/2246