



“SHELTERING IN PLACE”

Designing Facilities to Meet Severe Weather Conditions

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Introduction

Why Talk About Thunderstorms? They Produce...

▪ Tornadoes...

- ✓ Average of 70 fatalities and 1,500 injuries yr.
- ✓ Produce wind speeds in excess of 250 mph.
- ✓ Can be 1 mile wide and stay on ground over 50 miles.

▪ Tornado Watch...

- ✓ Tornadoes are possible.
- ✓ Remain alert and stay tuned to the radio or TV

▪ Tornado Warning...

- ✓ A tornado sighted or indicated by weather radar.
- ✓ Take shelter immediately.



▪ Lightning...

- ✓ An average of 80 fatalities and 300 injuries each yr.
- ✓ Occurs with all thunderstorms.

Introduction

Why Talk About Thunderstorms? They Produce...

▪ Strong Winds...

- ✓ Can exceed 100 mph.
- ✓ Can cause damage equal to a tornado.
- ✓ Can be extremely dangerous to aviation.



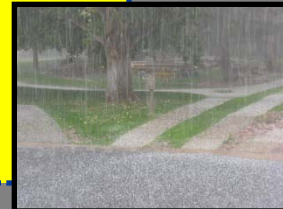
▪ Flash Flooding...

- ✓ Is the #1 cause of deaths associated with thunderstorms...more than 140 fatalities each yr.



▪ Hail...

- ✓ Causes more than \$1 billion in crop and property damage each year.



Tornadoes...

Are found most frequently in the United States.

- ✓ A tornado is a violently rotating column of air
- ✓ Tornadoes may appear transparent until dust and debris are picked up
- ✓ Average speed is 30 mph but may vary from stationary to 70 mph.
- ✓ Waterspouts are tornadoes which form over warm water.



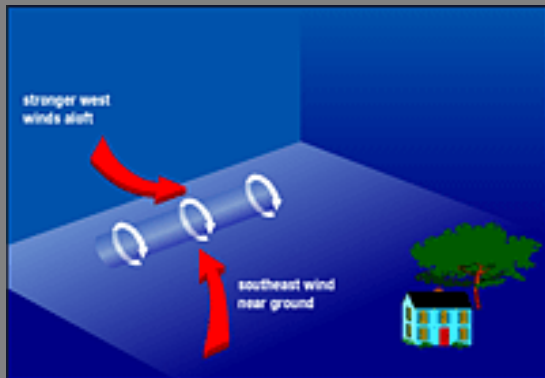
Tornadoes...

- ✓ Tornadoes can occur at any time of the yr.
- ✓ Tornado season for northern states are during late spring and summer.
- ✓ Most likely to occur between 3 and 9 p.m. but can happen any time.

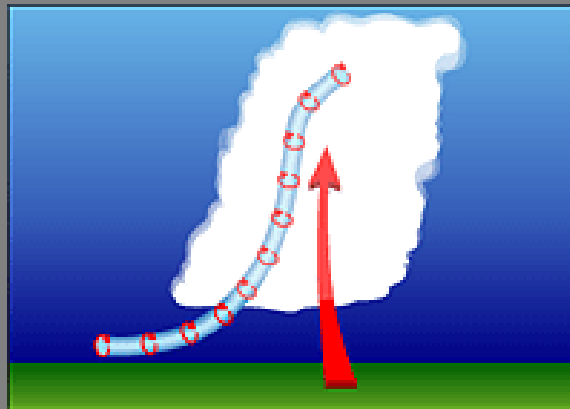


How Do Tornadoes Form?

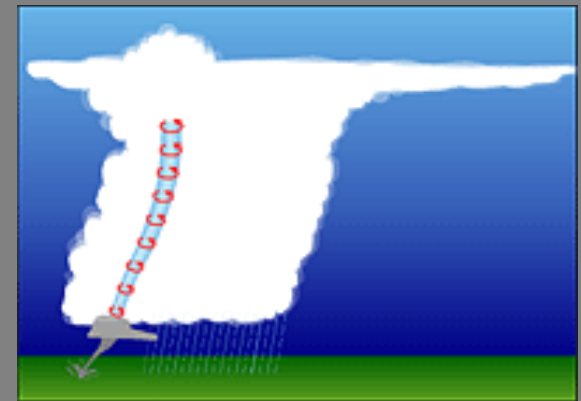
Change in wind direction and an increase in wind speed.



Rising air within the thunderstorm updraft.



An area of rotation, 2-6 mile wide extends through storm.



Graphics provided by "Nature's Most Violent Storms: A Preparedness Guide"

Tornadoes Take Many Shapes and Sizes

Weak

- 88% of tornadoes
- Less than 5% of tornado deaths
- Winds less than 110



Strong

- 11% of all tornadoes
- Nearly 30% of all tornado deaths
- Winds 110-205






Violent

- 1% of all tornadoes
- 70% of all tornado deaths
- Winds >than 205






Tornado Classifications

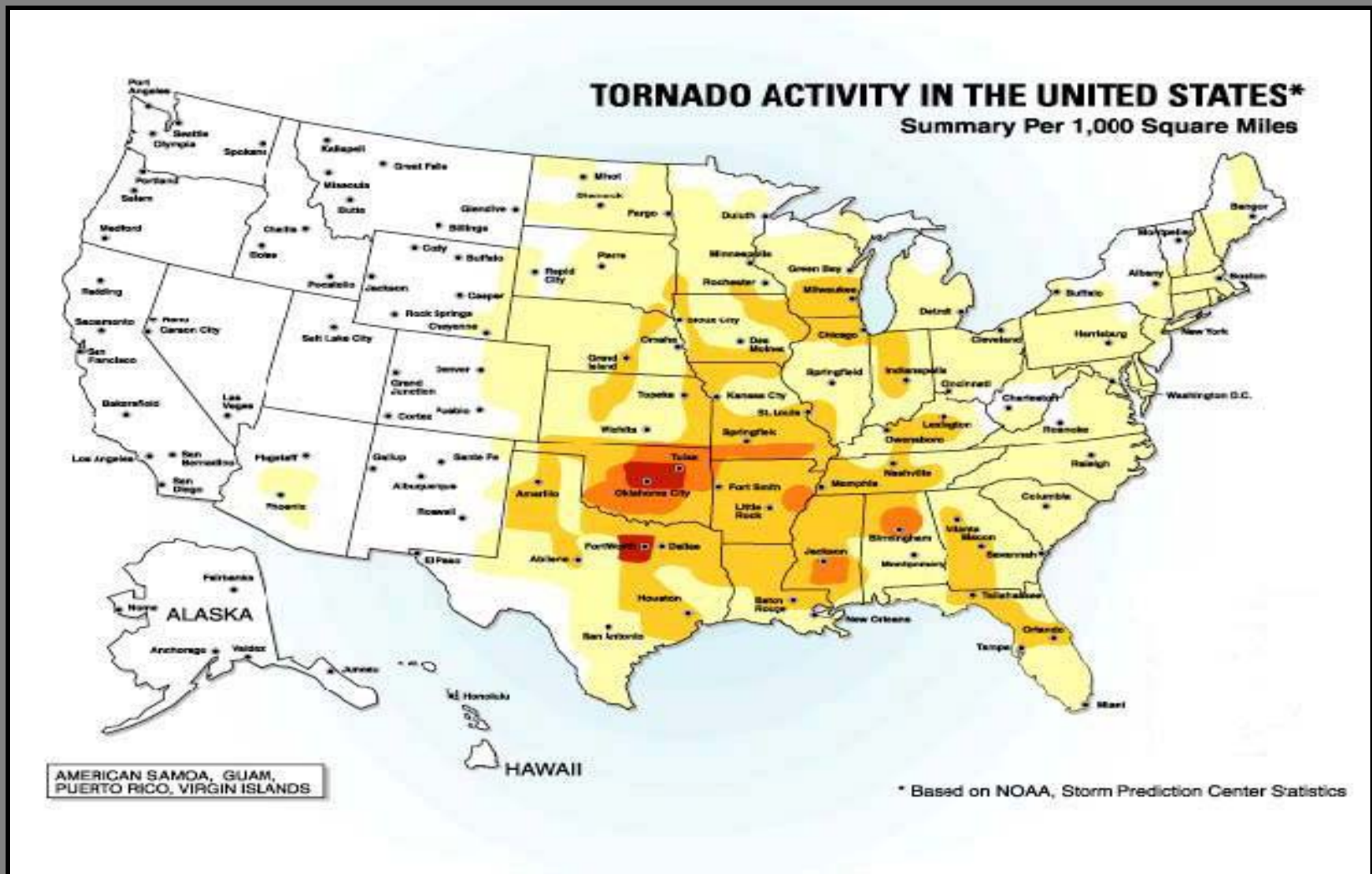
Fujita Scale

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F0		40-72 mph	Min damage to chimneys and trees
F1		73-112 mph	Peels surface off roofs and mobile homes
F2		113-157 mph	Roof structures are damaged, debris becomes airborne, large trees uprooted

Tornado Classifications

F-Scale Number	Intensity Phrase	Wind Speed	Type of Damage Done
F3		158-206 mph	Roof and some walls torn off and trees uprooted.
F4		207-260 mph	Houses leveled and commercial structures weakened
F5		261-318 mph	Houses leveled and excessive damage of commercial structures

Tornado Activity in the United States



Map provided by: "Taking Shelter From the Storm: Building a Safe Room Inside Your House"

How Often Do Tornadoes Occur

- ✓ Ohio averages 16 tornadoes and five fatalities per year.
- ✓ In 2001, there were eight tornadoes.
- ✓ Resulting in one injury and no deaths.



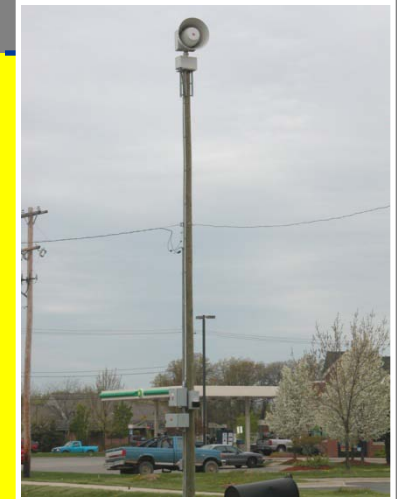
When Do Tornadoes Occur

- ✓ Any month of the year
- ✓ Peak in Ohio is from March to July
- ✓ May occur any time but most likely to occur between 2 PM and 10PM



When You Hear a Siren...

- ✓ **Seek safe shelter immediately.**
- ✓ **Turn on the TV and radio for emergency information**
- ✓ **Have available a battery operated radio and/or a tone alerting weather radio**



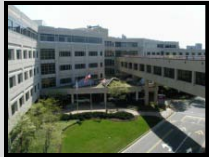
What To Do During A Tornado

Under a tornado **WARNING**, seek shelter immediately!

If you are in:

Then:

building,
school,
shopping
center, factory,
high-rise



Go to basement, cellar, lowest building level, center of an room/hallway, or closet. Away from corners, windows, doors, and outside walls.

Vehicle,
trailer,
mobile
home



Get out immediately and go to lowest floor of a sturdy, nearby building or a storm shelter.



**Outside with
no shelter**

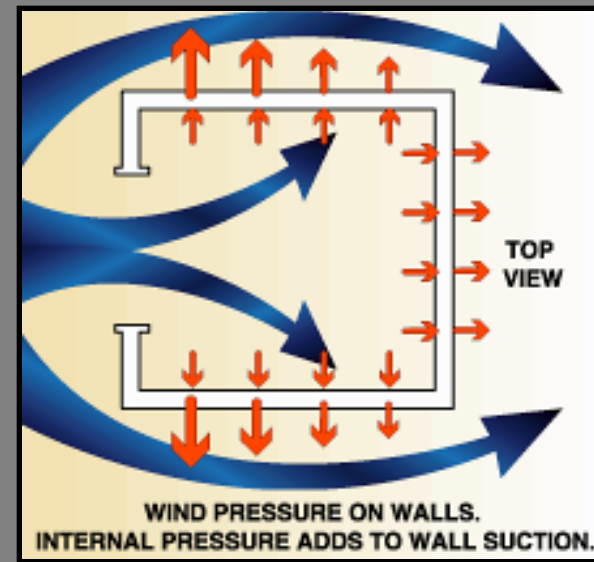
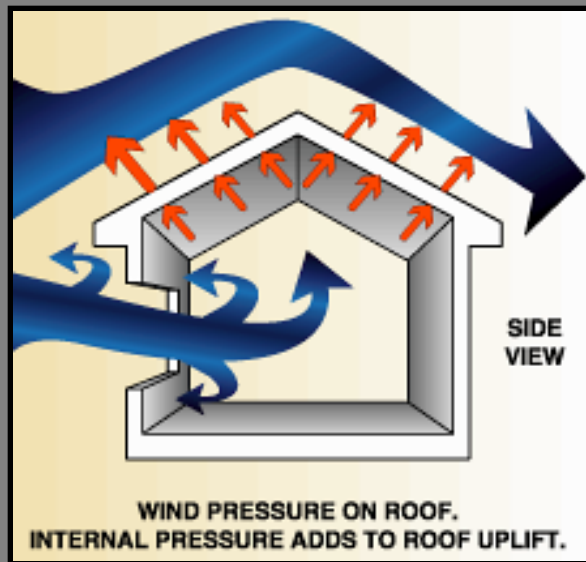
Lie flat in a ditch and cover your head with hands..

Planning Your Shelter

Building Damage

Wind speeds rapidly increase and decrease.

- ✓ An obstruction, such as a house, causes wind to change direction.
- ✓ Increased pressures and fluctuating wind speeds creates stress on the house .



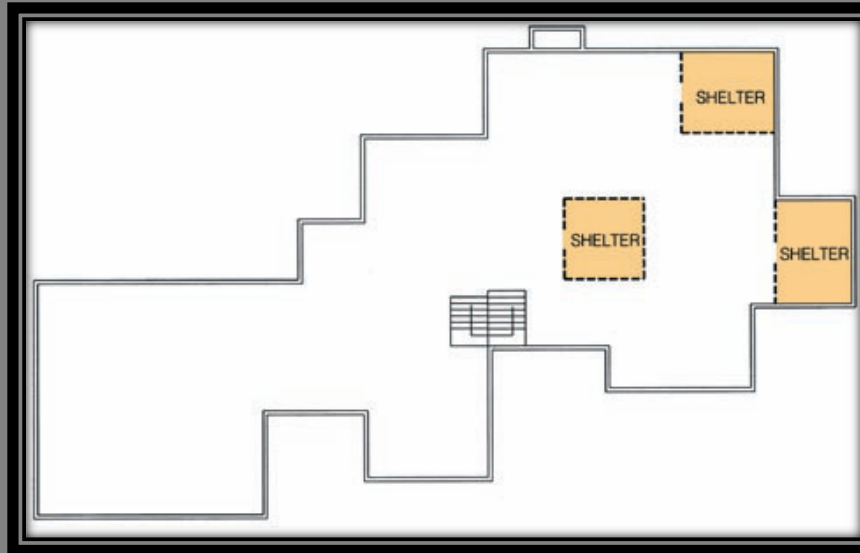
Graphics provided by: "Taking Shelter From the Storm: Building a Safe Room Inside Your House"

Planning Your Shelter

Floor Plan 1: Basement

Possible shelter locations in a basement include the following

- ✓ in a corner of the basement
- ✓ in a bathroom, closet, or other interior room in the basement
- ✓ in a freestanding addition to the basement



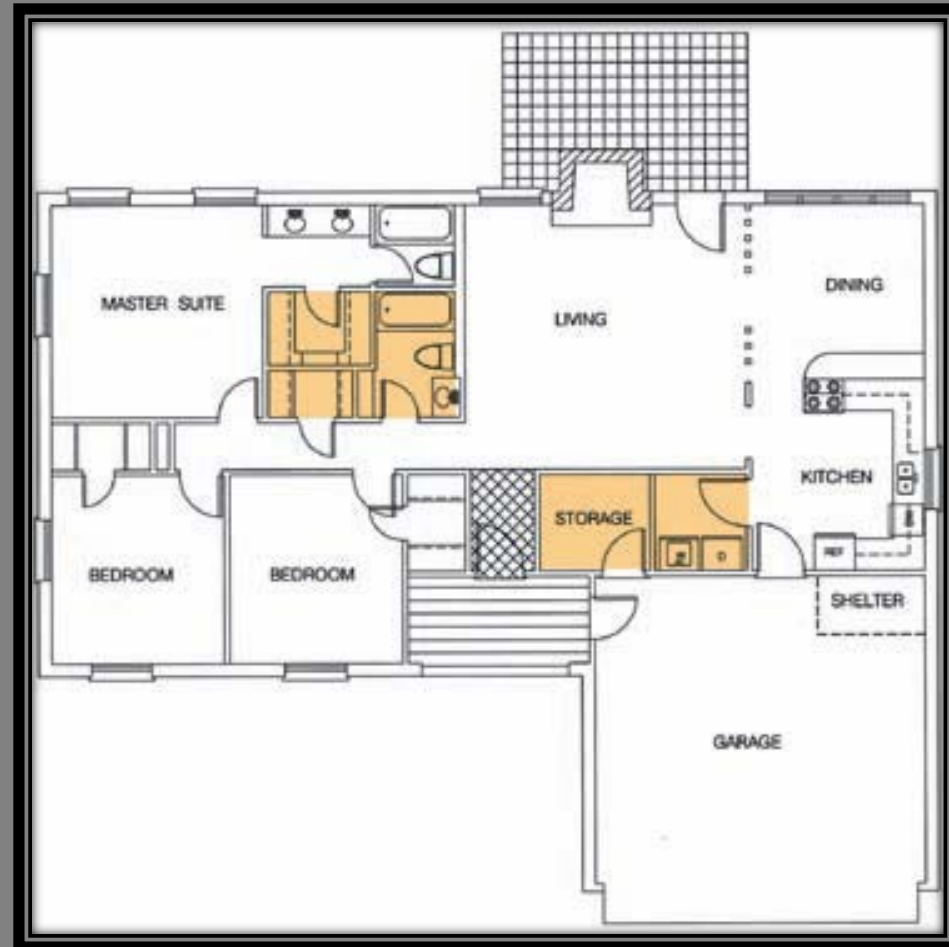
Plan provided by: "Taking Shelter From the Storm: Building a Safe Room Inside Your House"

Planning Your Shelter

Floor Plan 2: house on a slab-on-grade or crawlspace foundation

Possible shelter locations in a house on the first floor:

- ✓ bathroom
- ✓ closet
- ✓ storage room
- ✓ laundry room
- ✓ corner of the garage



Plan provided by: "Taking Shelter From the Storm: Building a Safe Room Inside Your House"

Questions and Answers

Information and Graphics contained in this presentation are taken from “*Nature’s Most Violent Storms: A Preparedness Guide*” and “*Taking Shelter From the Storm: Building a Safe Room Inside Your House.*”

For more in depth coverage of the information presented here, contact your local National Weather Service office, American Red Cross chapter, or the Federal Emergency Management Agency.

➤ Download brochures at:

www.nws.noaa.gov/om/brochures.shtm

➤ Preparedness information can be obtained from FEMA at:

www.fema.gov/library/prepandprev.shtm

➤ Download PDF version of “Taking Shelter From the Storm”:

<http://www.fema.gov/pdf/library/ism2.pdf>

