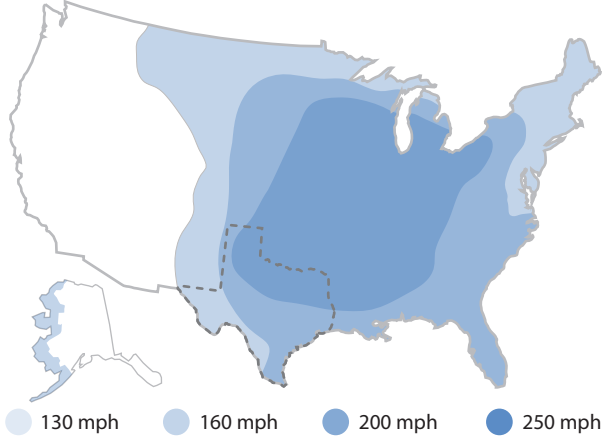
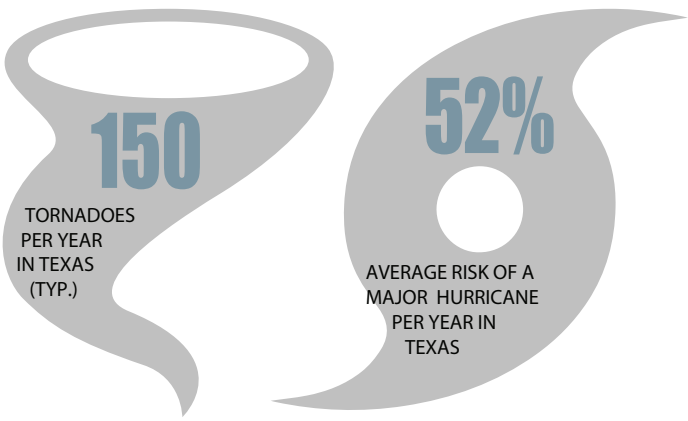


WIND RISK



FREQUENCY RISK



Design

The siting, size, configuration, access points, support areas, and other aspects must solve location specific issues.



Duration of Occupancy

FEMA considers 2 hours for tornadoes and approximately 24 hours for hurricanes.



Intended occupants

Will your safe room be open to the general public? Or will it only be for specific occupants?



Staffing and Personnel

Who will be your primary and backup personnel? Are they trained to respond to a tornado/hurricane watch or warning?



Community Outreach

Identify your potential safe room occupants should understand the distinct warning signal that calls for them to proceed to a safe room



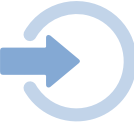
Alert Signals and Drills

Potential safe room occupants should understand the district warning signal that calls for them to proceed to a safe room.



Emergency Provisions

Food and water (for 24 hr hurricane protection), communications equipment, and emergency supplies such as, first aid kit, radios and flashlights.



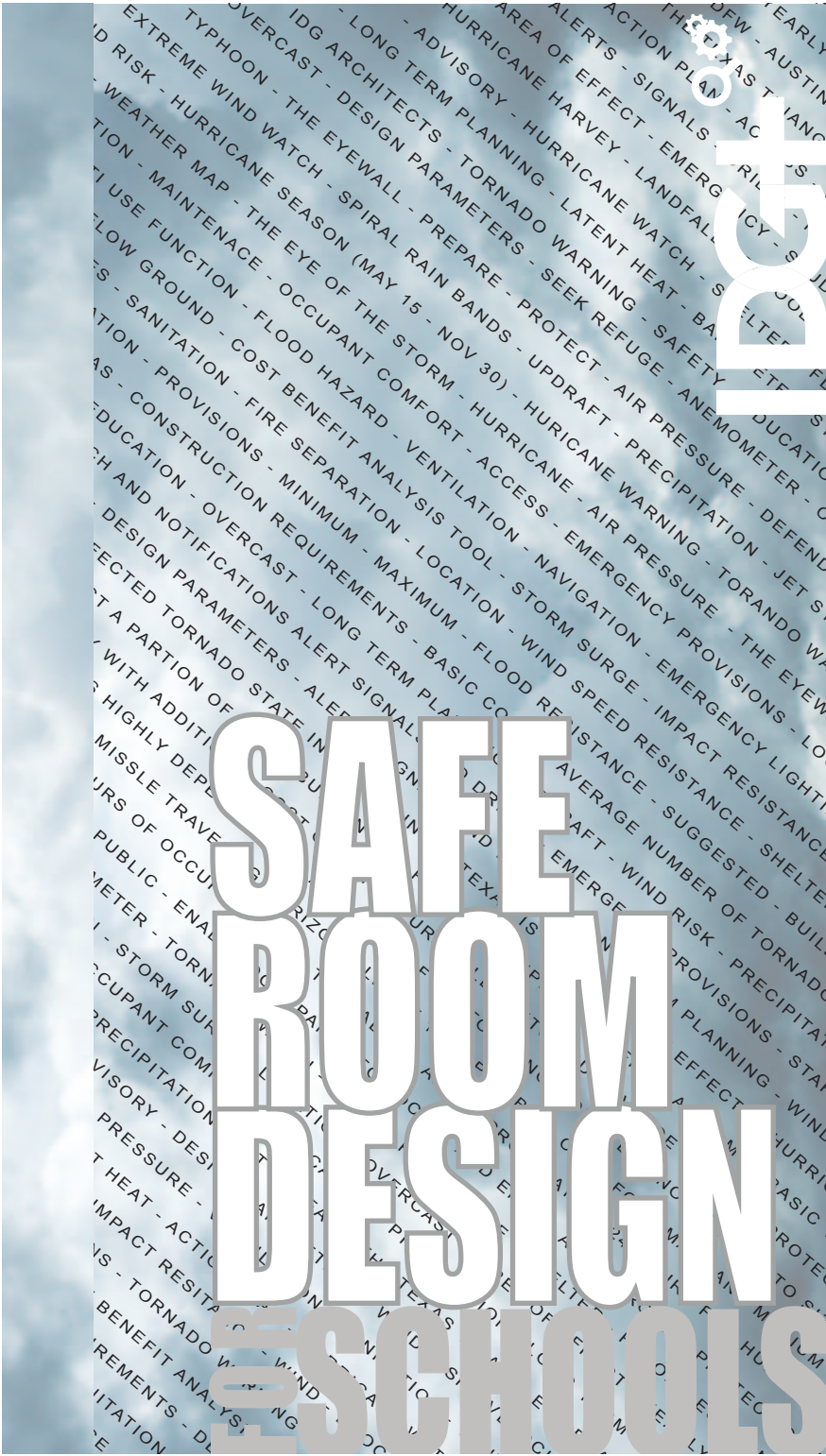
Access

When a safe room is designed for specific occupants, there must be a contingency for visitors present during an event.



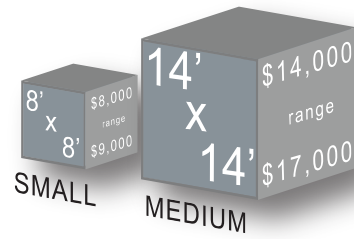
Maintenance

The operator of the safe room must address these maintenance schedule items: update schedules, inventory checklist and schedule, redundant power, and perishables schedule.



# COST

BENEFIT COST ANALYSIS TOOL  
[www.fema.gov/benefit-cost-analysis](http://www.fema.gov/benefit-cost-analysis)



LARGER SAFE ROOM cost vary dependent upon size, use type, duration of use and construction.

## WIND RESISTANCE

to resist 250 mph winds from a 140 mph basic wind speed (ASCE 7-05)

5% - 7%

to resist 250 mph winds from a 90 mph basic wind speed (ASCE 7-05)

15% - 20%

## DEBRIS IMPACT PROTECTION

to resist impact from a 15 pound 2x4 board missile traveling 100mph for walls, and 67 mph for roofs

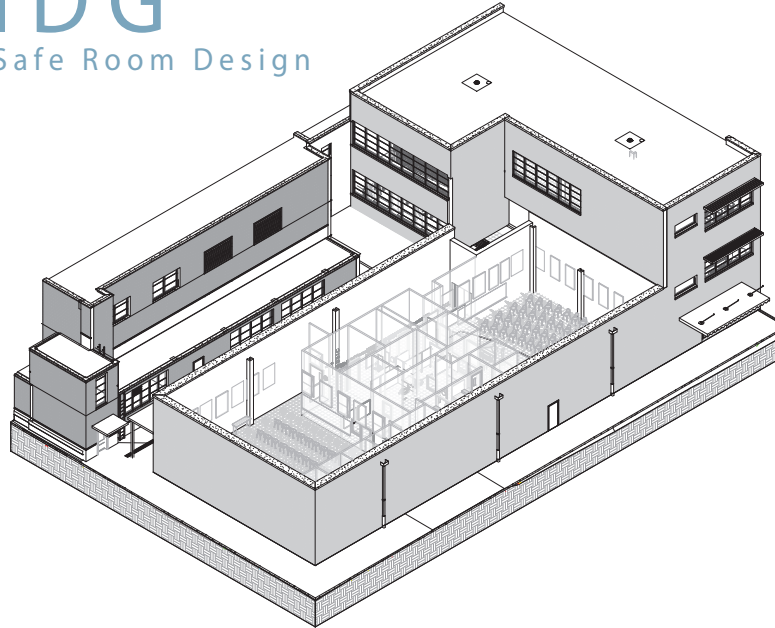
5% - 27%

to resist 250 mph winds from a 90 mph basic wind speed (ASCE 7-05)

20% - 32%

# IDG

## Safe Room Design



XXXX SQFT  
Expansion to existing facility  
Music Room / Band Hall Function  
Travis Tag Elementary School

## REQUIREMENTS

### LIGHTING

Emergency interior lighting provisions that can remain operational for two hours.

### MEP

All MEP openings greater than 3 1/2 sq. in. must be covered with an impact protection system.

### VENTILATION

A stand-alone system adequately sized to serve the space at full occupancy.

### ENGINEERING

Structure must be peer-reviewed by an independent registered engineer.

### SANITATION

Sanitation facilities adequately sized to serve the space at full occupancy.

### FIRE SEPARATION

Perimeter of safe room must have at least 2hr fire protection rating.

### AIR PRESSURE

Safe room must have the ability to internally equalize pressure.

### EGRESS

Via an emergency escape opening.

### EARTHQUAKES

Minimize seismic risk.

### WALL CONSTRUCTION

Must withstand a 15 pound 2x4 wood stud shot at 100 mph.

### ROOF CONSTRUCTION

Must withstand a 15 pound 2x4 wood stud shot at 67 mph.

### MULTI-USE FUNCTION

Cafeterias, classrooms, hallways, music rooms, gymnasiums are good examples of functions for a safe room, having more than one function for a space save cost by increasing utilization and efficiency.

### INCOMPATIBLE FUNCTIONS

libraries, auditoriums and laboratories are not good examples for functions for a safe room.

### FOUNDATION

A lifted slab with crawlspace is suggested in storm surge and flood hazard areas.

### ABOVE-GROUND BENEFITS

- Good for building in a flood hazard area
- Good for a location with a high water table
- Can provide long term safe room occupancy comfort
- Easily accessible to those with limited mobility.

### ABOVE GROUND NEGATIVES

- More expensive than basement solutions.
- More likely to be hit by wind force and debris.

## SAFE ROOM FUNDING

HAZARD MITIGATION GRANT PROGRAM (HMGP)  
Via HMA Unified Guidance  
[www.fema.gov/hazard-mitigation-assistance](http://www.fema.gov/hazard-mitigation-assistance)

COMMUNITY DEVELOPMENT BLOCK GRANT FUNDS (CDBG)  
Via Tornado Shelters Act (Public Law 108-146)  
[www.hud.gov/program\\_offices/comm\\_planning/communitydevelopment/programs](http://www.hud.gov/program_offices/comm_planning/communitydevelopment/programs)

PRE-DISASTER MITIGATION PROGRAM FUNDS  
Via Pre-disaster Mitigation (PDM) Data  
[www.fema.gov/media-library/assets/documents/103341](http://www.fema.gov/media-library/assets/documents/103341)

## LONG TERM PLANNING

District administrators must consider safe room design for the development of new buildings. A district must also develop a strategic plan to expand or retrofit existing building through the options outlined in FEMA P-361.

## SAFE ROOM RECOMMENDATIONS

(EXAMPLE: SOUTHEAST REGION OF TEXAS)

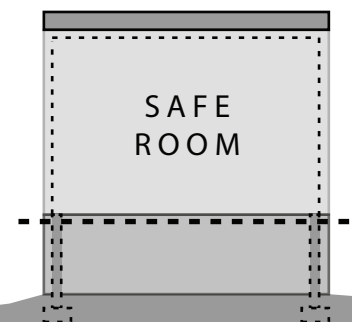
ABOVE GROUND STRUCTURE

WIND RESISTANCE

DEBRIS IMPACT RESISTANCE

ELEVATED FOUNDATION

HIGHEST RECORDED FLOOD ELEVATION



## CONTACT

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## SOURCES

Federal Emergency Management Agency (FEMA P-361) (2015)  
"Safe Rooms for Tornadoes and Hurricanes," Federal Emergency Management Agency, USA.

International Code Council, ICC 500-2014 (2014), "ICC/NSSA Standard for the Design and Construction of Storm Shelters," American National Standards Institute, Washington, DC.

[www.fema.gov/safe-room-funding](http://www.fema.gov/safe-room-funding)