

FEMA Building Science Resources to Assist with Reconstruction after an Extreme-Wind Event

FEMA has produced numerous publications detailing best practices for natural hazard mitigation associated with extreme-wind impacts. This Fact Sheet summarizes a few of the readily available publications and resources that can be used by homeowners, as well as design and construction professionals, during reconstruction following extreme-wind events.

Though many of the publications are developed for hurricane prone regions, they provide useful information that can be adopted for any area that has experienced an extreme-wind event. One such event is the Derecho which occurred in Iowa where some impacted areas sustained wind record with 140 mph gusts.

Recovery Advisories

These publications are released after major disasters, when FEMA's Mitigation Assessment Teams (MATs) have conducted forensic investigations of building performance and publish the results in various publications. Recovery Advisories (RAs) present guidance on design, construction, and restoration of buildings in areas subject to disaster effects. The most recent high-wind recovery guidance was developed after Hurricane Michael and includes RA1, "Successfully Retrofitting Buildings for Wind Resistance" and RA 2, "Best Practices for Minimizing Wind and Water Infiltration Damage." All Recovery Advisories are available on FEMA's website at <https://www.fema.gov/emergency-managers/risk-management/building-science/mitigation-assessment-team>.

FEMA P-361, "Safe Rooms for Tornadoes and Hurricanes"

This publication provides the criteria for the design and construction of a FEMA safe room. A FEMA safe room is a hardened structure specifically designed to meet FEMA criteria and provide life-safety protection in extreme-wind events, including tornadoes and hurricanes. FEMA P-361 is available online at <https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>.

FEMA P-320, "Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business"

This publication provides safe room guidance geared towards homeowners. It also includes prescriptive solutions (design drawings) for site-built safe rooms that were developed using the design criteria provided in FEMA P-361. FEMA P-320 is available online at <https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>.



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FEMA P-499, “Home Builder’s Guide to Coastal Construction Fact Sheets”

These 37 Fact Sheets provide technical guidance on constructing residential buildings in coastal environments and improving building performance in these areas subject to flood and wind forces. Many of the same recommendations for coastal environments for wind can be applied to other areas to mitigate damage from wind events. The Fact Sheets include information on planning, foundations, load path, wall systems, openings, roofing, attachments, and repaints. FEAM P-499 is available online at <https://www.fema.gov/emergency-managers/risk-management/building-science/hurricanes>.

FEMA P-804, “Wind Retrofit Guide for Residential Buildings”

This guide explains how to improve the wind resistance of existing one-and two-family dwellings for enhanced performance during high-wind events in coastal regions. Many of the same recommendations for coastal environments for wind can be applied to other areas to mitigate damage from wind events. FEMA P-804 is available online at <https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>.

FEMA P-1000, “Safer, Stronger, Smarter: A Guide to Improving School Natural Hazard Safety”

This guide provides up-to-date, authoritative information and guidance that schools can use to develop a comprehensive strategy for addressing natural hazards. Information within this guidance can be adopted to non-residential buildings that follow similar construction practices as schools. FEMA P-1000 is available online at <https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>.

FEMA P-2062, “Guidelines for Wind Vulnerability Assessments of Existing Critical Facilities”

This manual provides design professionals with guidelines for assessing the vulnerability of critical facilities to wind pressure, wind-borne debris, and wind-driven rain. The manual incorporates observations and lessons learned from recent hurricanes, current building code requirements, past hurricanes, and other historic high-wind events.

The guidelines apply to critical facilities both within and outside hurricane-prone regions and to critical facilities in tornado-prone regions. FEMA P-2062 is available online at <https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>.

Other Resources

FEMA’s Building Science Branch has produced numerous publications on the impacts of extreme-wind events. In the case of wind mitigation, much of the guidance for coastal regions may be applied to inland regions. The list of publications is available in FEMA P-787, “Catalog of FEMA Building Science Branch Publications and Training Courses” (<https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>). The

Building Science Branch website (<https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>) has links to additional resources for homeowners, business owners, local and government officials, engineers, and designers.

Notable resources include:

- FEMA P-55, “Coastal Construction Manual” (<https://www.fema.gov/emergency-managers/risk-management/building-science/hurricanes>)
- FEMA P-85, “Protecting Manufactured Homes from Floods and Other Hazards” (<https://www.fema.gov/emergency-managers/risk-management/building-science/hurricanes>)
- FEMA P-431, “Tornado Protection: Selecting Refuge Area in Buildings,” Second Edition (<https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>)
- FEMA 424, “Design Guide for Improving School Safety in Earthquakes, Floods, and High Winds” (<https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>)
- FEMA 543, “Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings” (<https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>)
- FEMA 577, “Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds: Providing Protection to People and Buildings” (<https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>)
- Wind provisions of the International Code Series (<https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>)
- Frequently asked questions (<https://www.fema.gov/emergency-managers/risk-management/building-science/faq>)
- Additional FEMA Safe Room Fact Sheets are available at <https://www.fema.gov/emergency-managers/risk-management/building-science/high-winds>

In addition to the high-wind guidance provided in the FEMA publications described above, 2018 “International Residential Code” (IRC) Section R301.2.1.1 provides the following prescriptive methods for one- and two-family dwellings where wind speeds exceed code limitations:

- “ICC Standard for Residential Construction in High Wind Regions” (ICC 600). A copy of ICC 600 can be purchased and subsequently downloaded at <https://shop.iccsafe.org/standards/icc-standards/icc-600-2014-standard-for-residential-construction-in-high-wind-regions-42984.html>. A free plain text version of ICC 600 can be viewed at <https://codes.iccsafe.org/content/ICC6002014>.
- “AISI Standard for Cold-Formed Steel Framing – Prescriptive Method For One- and Two Family Dwellings” (AISI S230). A copy of AISI S230 may be downloaded at <https://shop.steel.org/products/aisi-s230-07w-s3-12-2012->

[aisi-north-american-standard-for-cold-formed-steel-framing-prescriptive-method-for-one-and-two-family-dwellings-2007-edition-with-supplement-3-reaffirmed-2012.](#)

- WFCM Wood Frame Construction Manual for One- and Two-Family Dwellings (AWC, 2018) may be downloaded or viewed at <https://awc.org/codes-standards/publications/wfcm-2018>.

For more information, see the FEMA Building Science Frequently Asked Questions website at <https://www.fema.gov/emergency-managers/risk-management/building-science/multi-hazard>.

If you have any additional questions on FEMA Building Science Publications, contact the helpline at FEMA-Buildingsciencehelp@fema.dhs.gov or 866-927-2104.

You may also subscribe to the FEMA Building Science e-mail list serve, which is updated with publication releases and FEMA Building Science activities. Subscribe at <https://public.govdelivery.com/accounts/USDHSFEMA/subscriber/new?preferences=true>.

Visit the Building Science Branch of the Risk Management Directorate at FEMA's Federal Insurance and Mitigation Administration at <http://www.fema.gov/building-science>.

To order publications, contact the FEMA Distribution Center:

Call: 1-800-480-2520

Fax: 1-719-948-9724

E-mail: FEMApubs@gpo.gov.

Additional FEMA documents can be found in the FEMA Library at <https://www.fema.gov/multimedia-library>.

Please scan this QR code to visit the FEMA Building Science web page.

