



Catalog of FEMA Wind, Flood, and Wildfire Publications, Training Courses, and Workshops

FEMA P-787 / Third Edition / January 2012



FEMA

Federal Insurance and Mitigation Administration

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These publications, courses, and workshops have been developed by the Building Science Branch of FEMA's Federal Insurance and Mitigation Administration (FIMA).

Please visit <http://www.fema.gov/library> to view or download publications.

Ordering Information

To order publications from this catalog, please call 1-800-480-2520 or fax 240-699-0525 (Monday – Friday 8:00 a.m. – 5:00 p.m., EST) or email to FEMA-Publications-Warehouse@dhs.gov. Please provide the title, item number, and quantity of each publication, along with your name, address, zip code, and daytime telephone number.

ABOUT THIS CATALOG

The Federal Emergency Management Agency's (FEMA's) Building Science Branch has compiled this catalog of available FEMA wind, flood, and wildfire publications, training courses, and workshops. These materials are listed by FEMA publication number (see Table 1). The publications are also listed by subject areas (hurricanes, tornadoes, floods, wildfires) in order of publication date (the most recent first) in the text. See the inside cover of this document for ordering information.

FEMA BUILDING SCIENCE BRANCH

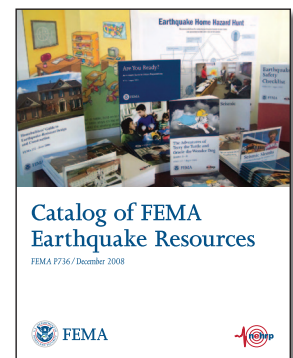
The FEMA Building Science Branch provides technical services for the Federal Insurance and Mitigation Administration (FIMA). The branch develops and produces multi-hazard mitigation guidance that focuses on creating disaster-resilient communities to reduce loss of life and property. Building Science Branch activities include deploying Mitigation Assessment Teams to conduct post-disaster engineering investigations for both man-made and natural hazard events. Building Science takes a lead role in developing publications, guidance materials, tools, technical bulletins, and recovery advisories that incorporate the most up-to-date building codes, floodproofing requirements, seismic design standards, and wind design requirements for new construction and the repair of existing buildings. In addition to providing technical support for the development and adoption of model building codes and standards, the Building Science Branch provides technical support for the National Flood Insurance Program (NFIP) for public and private sector stakeholders, the National Earthquake Hazards Reduction Program (NEHRP), and the National Windstorm Impact Reduction Program (NWIRP), and pursues outreach strategies for communicating Building Science issues.



Visit us at: <http://www.fema.gov/rebuild/buildingscience>.

For more information about any of the FEMA publications, please call the flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

The *Catalog of FEMA Earthquake Resources*, FEMA P-736A is available and contains publications pertaining to earthquakes. It is available online at <http://www.fema.gov/library/viewRecord.do?id=3538>.



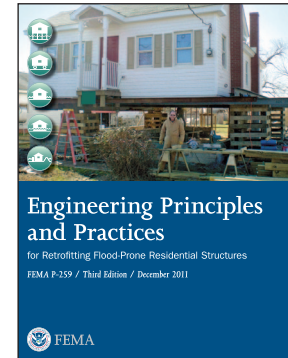
BUILDING SCIENCE PUBLICATIONS




Design and Construction Guidance Publications

FEMA P-259 – *Engineering Principles and Practices for Retrofitting Flood-Prone Residential Structures* (Third Edition, December 2011)   

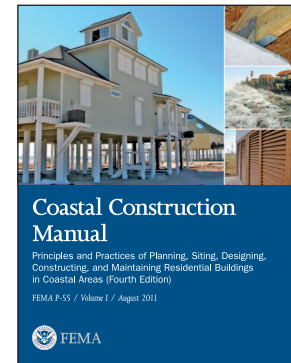
The third edition of this document is intended to further aid homeowners in selecting and successfully executing a flood retrofit on their home. Engineering design and economic guidance on what constitutes feasible and cost-effective retrofitting measures for flood-prone residential and non-residential structures are presented. Elevation, relocation, dry floodproofing, wet floodproofing, and the use of levees and floodwalls to mitigate flood hazards are discussed. This edition was updated to be more user-friendly and concise, the overall length of the publication has been shortened. New and updated graphics, as well as newly updated design calculation examples and case studies, are presented. Equations, example calculations, and the guidance in the text have been updated to reflect the most current editions of building codes and standards.

<http://www.fema.gov/library/viewRecord.do?id=1645>



FEMA P-55 – *Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas* (Fourth Edition, August 2011)   

The 2011 Coastal Construction Manual, Fourth Edition, is a two-volume publication that provides a comprehensive approach to planning, siting, designing, constructing, and maintaining homes in the coastal environment. Volume I provides information about hazard identification, siting decisions, regulatory requirements, economic implications, and risk management. The primary audience for Volume I is design professionals, officials, and those involved in the decision-making process.

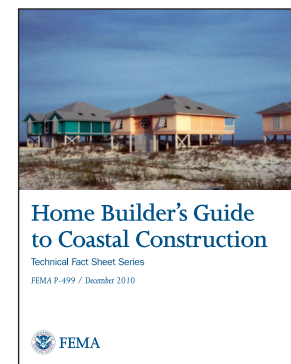


Volume II contains in-depth descriptions of design, construction, and maintenance practices that, when followed, will increase the durability of residential buildings in the harsh coastal environment and reduce economic losses associated with coastal natural disasters. The primary audience for Volume II is the design professional who is familiar with building codes and standards and has a basic understanding of engineering principles.

<http://www.fema.gov/library/viewRecord.do?id=1671>

FEMA P-499 – *Home Builder's Guide to Coastal Construction Technical Fact Sheet Series* (December 2010)   

This document contains a series of 37 fact sheets that provide technical guidance and recommendations concerning the construction of coastal residential buildings. The fact sheets present information aimed at improving the performance of buildings subject to flood and wind forces in coastal environments. The fact sheets make extensive use of



photographs and drawings to illustrate National Flood Insurance Program (NFIP) regulatory requirements, the proper siting of coastal buildings, and recommended design and construction practices for building components, including structural connections, the building envelope, utilities, and accessory structures. Many of the fact sheets also include lists of additional resources that provide more information about the topics discussed. Where appropriate, resources are accompanied by active web links. The fact sheets are divided into nine categories: General, Planning, Foundations, Load Paths, Wall Systems, Openings, Roofing, Attachments, and Repairs. A guide, including References and Resources, is also included.

<http://www.fema.gov/library/viewRecord.do?id=2138>

FEMA P-804 – *Wind Retrofit Guide for Residential Buildings*
(December 2010)   

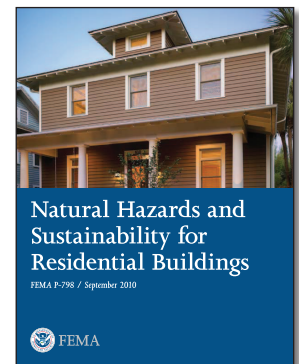
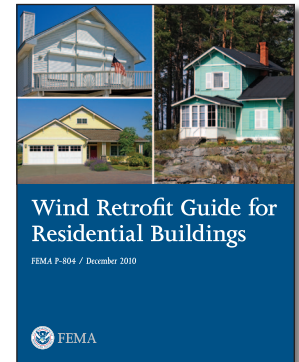
FEMA produced this document to provide guidance on how to improve the wind resistance of existing residential buildings in the hurricane-prone regions throughout the United States. Wind-related damages can be reduced or prevented by improving the performance of residential buildings in these areas. Retrofitting a home is most effective when building components are strengthened in groups, or packages, to achieve a more complete improvement to the performance of the building. This guide proposes three “Mitigation Packages” retrofits – Basic, Intermediate, and Advanced. Components of each mitigation package are presented in the guide. The improvements of each package build on the retrofits of the previous package to provide increasing levels of wind hazard resistance.

<http://www.fema.gov/library/viewRecord.do?id=4569>

FEMA P-798 – *Natural Hazards and Sustainability for Residential Buildings*
(September 2010)   

This document examines current green building rating systems in a broader context. It identifies green building practices – the tools of today’s green building rating systems – that are different from historical residential building practices and that, unless implemented with an understanding of their interactions with the rest of the structure, have the potential to compromise a building’s resistance to natural hazard events. This document also discusses how to retain or improve natural hazard resistance while incorporating these green building practices. While most common green building practices provide sustainability advantages with little or no effect on structural performance or durability, others require reevaluation of the building’s structural design or detailing to retain its integrity during natural hazard events. Often, only minimal design modifications are required to maintain natural hazard resistance.

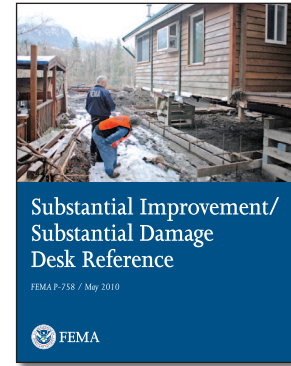
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FEMA P-758 – *Substantial Improvement/Substantial Damage Desk Reference* (May 2010)   

The Substantial Improvement/Substantial Damage (SI/SD) Desk Reference is designed as a comprehensive resource for local officials who are responsible for the administration of local codes and ordinances, including the SI/SD requirements. It also is intended for state officials who provide technical assistance to communities on the NFIP. Incorporating diagrams, decision charts, illustrations, and examples, the SI/SD Desk Reference is designed to clearly communicate responsibilities and strategies for administering this important NFIP requirement.

<http://www.fema.gov/library/viewRecord.do?id=4160>



FEMA B-797 – *Hazard Mitigation Field Book: Roadways* (May 2010)  

This document helps local government entities choose the best hazard mitigation solution(s) given their operational constraints and design considerations. By offering the user a quick selection tool, based on broad characteristics, the field book reduces a wide array of technical solutions to a few practical options. Although there are many causes of damage to roadways, this field book focuses primarily on flood-related causes of damage.

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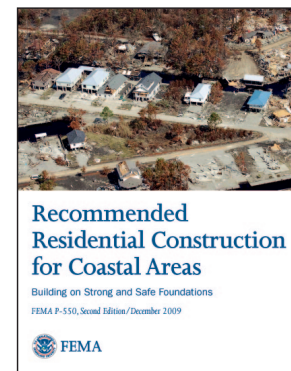


FEMA P-550 – *Recommended Residential Construction in Coastal Areas: Building on Strong and Safe Foundations* (Second Edition, December 2009)



Every storm has shown that, while good design and construction cannot completely eliminate risk, they can significantly reduce the risk to life and damage to property. This design manual provides recommended designs and guidance for rebuilding homes destroyed by hurricanes in coastal areas. The manual also provides guidance in designing and building less vulnerable new homes that reduce the risk to life and property. Construction plans and specifications in AutoCad format are also available.

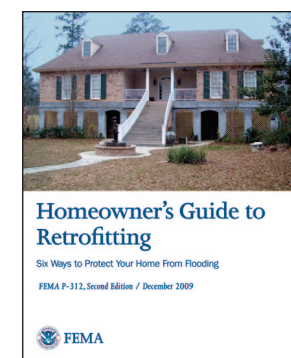
<http://www.fema.gov/library/viewRecord.do?id=1853>



FEMA P-312 – *Homeowner's Guide to Retrofitting: Six Ways to Protect Your Home From Flooding* (Second Edition – December 2009)   

This handbook is intended for non-technical readers who are interested in additional information on flood protection methods. Illustrated discussions of house elevation, wet and dry floodproofing, relocation, levees and floodwalls, and demolition are supplemented with cost estimates, checklists, and decision-making worksheets.

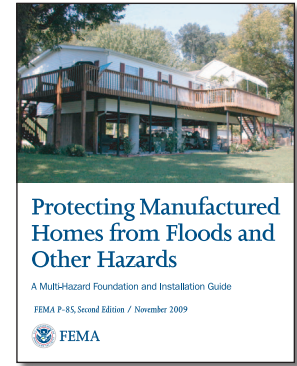
<http://www.fema.gov/library/viewRecord.do?id=1420>



FEMA P-85 – *Protecting Manufactured Homes from Floods and Other Hazards* (Second Edition, November 2009)   

This publication was designed to provide guidance for prospective homeowners, contractors, and local officials for the installation of manufactured homes in Special Flood Hazard Areas (SFHAs). Manufactured homes have unique challenges related to water intrusion into the structure. This publication addresses recommendations for foundation construction for this popular style of home.

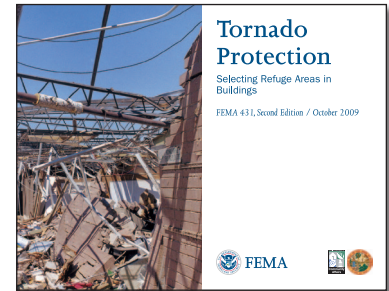
<http://www.fema.gov/library/viewRecord.do?id=1577>



FEMA P-431 – *Tornado Protection: Selecting Refuge Areas in Buildings* (Second Edition, October 2009)  

This booklet presents information (e.g., tornado profiles, effects of high winds, case studies, selection procedures, etc.) that will aid qualified architects and engineers in the identification of the best available refuge areas in existing buildings.

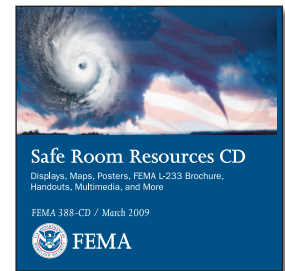
<http://www.fema.gov/library/viewRecord.do?&id=1563>



FEMA 388-CD – *Safe Room Resources CD* (March 2009) 

This CD contains displays, posters, handouts, multimedia, and other resources that provide information about mitigating for tornadoes or other high-wind events and the importance of safe rooms in saving lives during such events. Also included are: safe room display panels that contain artwork for reproducing the exhibit panels used in the National Emergency Training Center Safe Room Exhibit, maps on tornado activity in the U.S., posters, FEMA's *Taking Shelter From the Storm* brochure, various handouts, and a safe room PowerPoint presentation.

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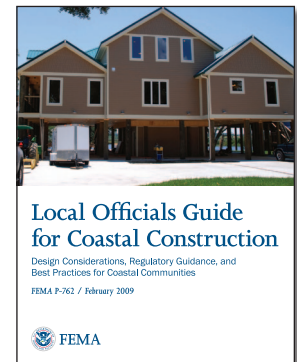


FEMA P-762 – *Local Officials Guide for Coastal Construction* (February 2009)



This guide was developed to assist building officials in understanding the connection between National Flood Insurance Program (NFIP) guidelines and applicable building codes and standards. It also explores evidence collected following recent storm events and recommends "best practices" where appropriate. The focus of this guide is on residential buildings, including detached single-family structures (three or fewer stories).

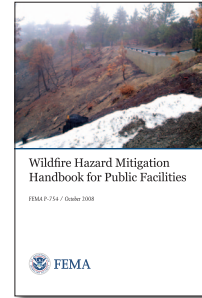
<http://www.fema.gov/library/viewRecord.do?id=3647>



FEMA P-754 – *Wildfire Hazard Mitigation Handbook for Public Facilities* (October 2008) 

This Wildfire Hazard Mitigation Handbook for Public Facilities (Handbook) is intended to assist facility owners affected by wildfire disasters by suggesting mitigation measures that can be taken to reduce the vulnerability of damaged facilities to future wildfire incidents.

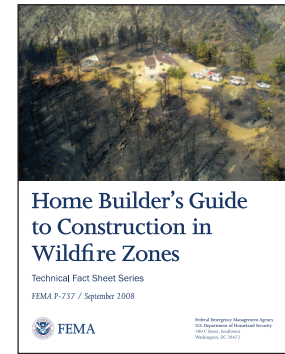
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FEMA P-737 – *Home Builder's Guide to Construction in Wildfire Zones* Technical Fact Sheet Series (September 2008)   

The purpose of this series of 17 Technical Fact Sheets is to provide information about wildfire behavior and recommendations for building design and construction methods in the wildland/urban interface. Implementation of the recommended design and construction methods can greatly increase the chances of a building's survival in a wildfire. In addition to the recommendations for building design and construction methods, other fact sheet subject areas include selecting the construction site; defensible space; roofs; eaves, overhangs, and soffits; exterior walls; vents; gutters and downspouts; windows and skylights; exterior doors; foundations; decks and other attached structures; landscape fences and walls; fire sprinklers; utilities and exterior equipment; and community infrastructure.

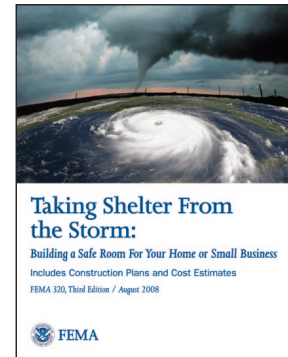
<http://www.fema.gov/library/viewRecord.do?id=3646>



FEMA 320 – *Taking Shelter From The Storm: Building a Safe Room For Your Home or Small Business* (Third Edition, August 2008)   

This document helps home and business owners decide how best to protect their families and employees from tornadoes and hurricanes. Designs for in-home, free-standing, and underground safe rooms to protect families and employees from the forces of wind and flying debris are provided. Construction plans and specifications in AutoCad format are also provided.

<http://www.fema.gov/library/viewRecord.do?id=1536>



FEMA 361 – *Design and Construction Guidance for Community Safe Rooms* (Second Edition, August 2008)   

This document presents important information about the design and construction of community safe rooms that will provide protection during tornado and hurricane events.

Community safe rooms are designed and constructed to protect a large number of people from a natural hazard event. The number of persons taking refuge in the safe rooms will typically be more than 12 and could be up to several hundred or more.

<http://www.fema.gov/library/viewRecord.do?id=1657>

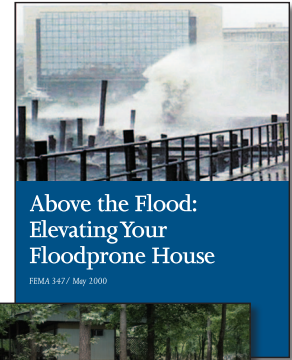


FEMA 347 – *Above the Flood: Elevating Your Floodprone House* (May 2000)



This publication shows how floodprone houses in south Florida were elevated above the 100-year flood level following Hurricane Andrew and also presents alternative elevation techniques.

<http://www.fema.gov/library/viewRecord.do?id=1424>



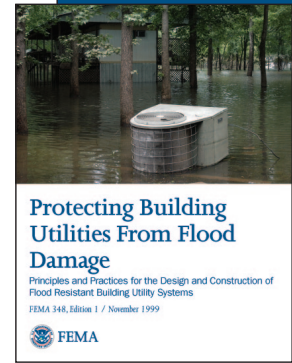
FEMA 348 – *Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems* (November 1999)



The overall objective of this document is to assist in the construction of buildings with building utility systems that are designed and built so that the buildings can be re-occupied and fully operational as soon as electricity, sewer, and water are restored to the neighborhood.

The intended users of this manual are developers, architects, engineers, builders, code officials, and homeowners who are involved in designing and constructing building utility systems for residential and non-residential structures. This manual discusses flood protective design and construction of utility systems for new buildings and modifications to utility systems in existing buildings

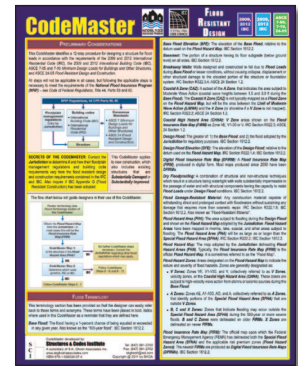
<http://www.fema.gov/library/viewRecord.do?id=1750>



CodeMaster for Flood Resistant Design (2011)

In cooperation with the International Code Council and S.K. Ghosh Associates, FEMA’s Risk Reduction Division, Building Science Branch, has produced an 8-page laminated guide to flood-resistant design. The CodeMaster provides designers with an easy-to-use desk reference that identifies the flood provisions in the 2009 and 2012 International Building Code® (IBC®) and International Residential Code® (IRC®), as well as the flood requirements of American Society of Civil Engineers (ASCE) standards 7-05, 7-10, and 24-05. The CodeMaster is a unique and useful tool for designers to make sure that they incorporate the flood-resistant provisions of these codes and standards. The 8-page guide provides sections on preliminary considerations and design process, key flood terminology, a 12-step process to incorporate flood resistance in the design of a building, an example showing the 12-step process being executed, and information on additional FEMA mitigation resources related to flood-resistant design. The document also uses illustrations to ensure a clear understanding for users in the professional community.

<http://www.iccsafe.org/Store/Pages/Product.aspx?id=9626S12>



Reducing Flood Losses Through the International Code Series
(Third Edition, December 2008)  

The third edition of this guide is intended to help community officials decide how to integrate the 2006 edition (and 2007 Supplement) of the International Codes (I-Codes) into their current floodplain development and regulatory processes in order to meet the requirements to participate in the National Flood Insurance Program (NFIP). Careful attention is required to ensure that all requirements of the NFIP are addressed by communities through both building codes and other ordinances or regulations. Adoption of one or more of the I-Codes, by themselves, does not necessarily meet those requirements. This guide is not intended as an endorsement of any specific approach for achieving effective management of flood hazards, nor does it explain the NFIP requirements and how to administer them. This publication is available in hard copy for a modest fee (<http://www.iccsafe.org>).

<http://www.fema.gov/library/viewRecord.do?id=2094>

Hurricane Mitigation: A Handbook for Public Facilities (May 2005) 

This handbook is intended to aid local jurisdictions in identifying a variety of feasible mitigation measures that can be implemented during the rebuilding process. It focuses on projects commonly eligible for hazard mitigation funding under the Public Assistance (PA) Program.

<http://www.fema.gov/library/viewRecord.do?id=3722>

Flood Hazard Mitigation Handbook for Public Facilities (June 2001) 

This handbook is intended to aid local jurisdictions in identifying a variety of feasible mitigation ideas that can be implemented during the rebuilding process. It focuses on projects commonly eligible for hazard mitigation funding under the Public Assistance (PA) Program.

<http://www.fema.gov/library/viewRecord.do?id=3724>

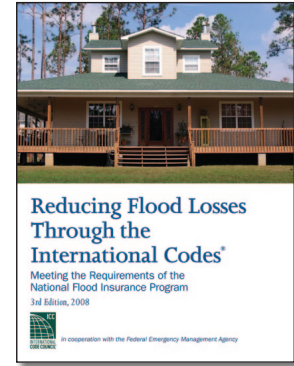
Flood Resistant Provisions of the 2012 International Code Series (January 2012) 

This document is a compilation of flood resistant provisions, prepared by FEMA, of the 2012 International Code Series (IBC, IRC, IEBC IMC, IPC, IFGC, IPSDC, IFC). Also included, as a separate document, is a summary of changes from the 2009 IBC. The 2012 edition of the I-Codes contains provisions that are consistent with the minimum flood-resistant design and construction requirements of the NFIP for buildings and structures.

<http://www.fema.gov/library/viewRecord.do?id=4990>

Flood Resistant Provisions of the 2009 International Code Series (January 2011) 

This document is a compilation of flood resistant provisions, prepared by FEMA, of the 2009 International Code Series (IBC, IRC, IEBC IMC, IPC, IFGC, IPSDC, IFC). Also included, as a separate document, is a summary of changes from the 2006 IBC. The 2009 edition of the



I-Codes contains provisions that are consistent with the minimum flood-resistant design and construction requirements of the NFIP for buildings and structures.

<http://www.fema.gov/library/viewRecord.do?id=4574>

Provisions of the 2009 I-Codes and ASCE 24 Compared to the NFIP (January 2011) 

This table is a comparison of the provisions of the 2009 I-Codes/ASCE 24-05 and the National Flood Insurance Program (NFIP) requirements.

<http://www.fema.gov/library/viewRecord.do?id=4575>

Highlights of ASCE 24-05 Flood Resistant Design and Construction (December 2010) 

The American Society of Civil Engineers (ASCE) 24-05 is a referenced standard in the International Building Code® and the International Residential Code®. Any building or structure that falls within the scope of the IBC that is proposed in a flood hazard area is to be designed in accordance with ASCE 24-05. The IRC requires that dwellings in floodways be designed in accordance with ASCE 24-05, and the 2009 edition of the International Residential Code (IRC) includes an alternative that allows communities to require homes in V Zones to be designed in accordance with ASCE 24-05. Highlights of ASCE 24-05 that complement the NFIP minimum requirements include: Building Performance; Flood-Damage Resistant Materials; Utilities and Service Equipment; and Siting Considerations.

<http://www.fema.gov/library/viewRecord.do?id=3515>

I-Codes Sample Checklists for Flood Hazards 

This document contains a Plan Review Checklist for Flood Hazard Area Application Review and an Inspection Checklist for Flood Hazard Area Inspections in both A Zones and V Zones. The checklists are from Reducing Flood Losses Through the International Code Series (3rd Edition) which can be ordered from the International Code Council, Inc. (www.iccsafe.org) or downloaded from the FEMA Library.

<http://www.fema.gov/library/viewRecord.do?id=4576>

Mitigation Assessment Team Reports

In response to disasters, FEMA assembles a team of national experts from the design and construction industry, as well as from FEMA Headquarters and Regional Offices. This group is known as a Mitigation Assessment Team (MAT; formerly known as a Building Performance Assessment Team [BPAT]) and comprises structural, wind, and civil engineers; architects; coastal scientists; building code experts; and flood preservation specialists, as well as representatives from other government agencies, laboratories, associations, and universities. The MAT evaluates and assesses damage from hurricanes and other natural disasters, and provides observations, conclusions, and recommendations on the performance of buildings and other structures impacted by wind and flood forces. The conclusions and recommendations of the MAT reports provide decision-makers with information and technical guidance that can be used to reduce future damage from natural disasters.

A compilation CD with all the MAT reports will be available in 2012.

HURRICANES

FEMA P-757 – Mitigation Assessment Team Report – *Hurricane Ike in Texas and Louisiana: Building Performance Observations, Recommendations, and Technical Guidance* (April 2009)   

Hurricane Ike was the ninth named storm during the 2008 hurricane season and the seventh of the season's storms to hit the U.S. mainland. Hurricane Ike is likely to be one of the costliest and most destructive hurricanes in U.S. history; the total damage was estimated to be \$21.3 billion dollars, making it the fourth costliest hurricane in history behind Hurricanes Katrina (2005), Andrew (1992), and Wilma (2005). The Mitigation Assessment Team (MAT) report focuses on damages to critical facilities and residential construction for both flood and wind. A special section focuses on damages to high-rise buildings in downtown Houston. Recommendations focus on actions that should be taken as part of the rebuilding efforts in Texas and Louisiana.

<http://www.fema.gov/library/viewRecord.do?id=3577>

Hurricane Ike (2008) Recovery Advisories 

The Mitigation Assessment Team (MAT) report for Hurricane Ike (FEMA P-737) contains eight hurricane recovery advisories on attachment of brick veneer in high-wind regions; design and construction in Coastal A Zones; designing for flood levels above the BFE; enclosures and breakaway walls; erosion, scour, and foundation design; metal roof systems in high-wind regions; minimizing water intrusion through roof vents in high-wind regions; and siding installation in high-wind regions.

<http://www.fema.gov/library/viewRecord.do?id=3539>

FEMA 549 – Mitigation Assessment Team Report – *Hurricane Katrina in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance* (July 2006)   

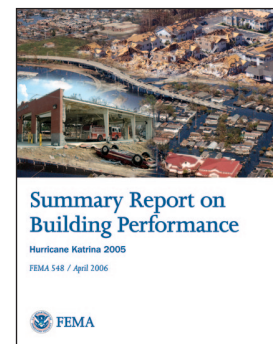
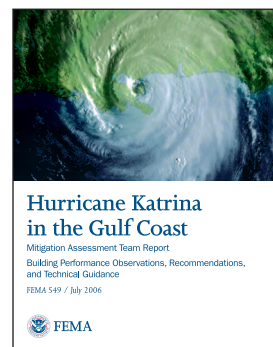
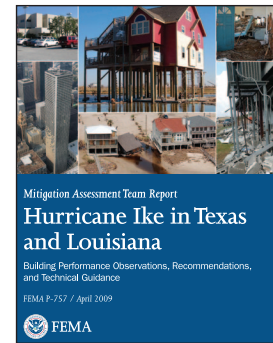
Hurricane Katrina was one of the strongest and most destructive storms to hit the Gulf Coast of the United States in the last 100 years. Katrina significantly exceeded the base flood elevations (BFEs) by as much as 15 feet along parts of the Louisiana and Mississippi coasts. Flooding extended well beyond the inland flood limits of the Special Flood Hazard Area (SHFA), and the highest storm surge in U.S. history was recorded along the Mississippi coast. The American Red Cross estimated that Katrina destroyed over 300,000 single-family homes in Louisiana and Mississippi.

<http://www.fema.gov/library/viewRecord.do?id=1857>

FEMA 548 – Mitigation Assessment Team Report – *Summary Report on Building Performance: Hurricane Katrina 2005* (April 2006)  

This is an 80-page summary of the almost 700-page FEMA 549 MAT report.

<http://www.fema.gov/library/viewRecord.do?id=1455>



Hurricane Katrina (2005) Recovery Advisories

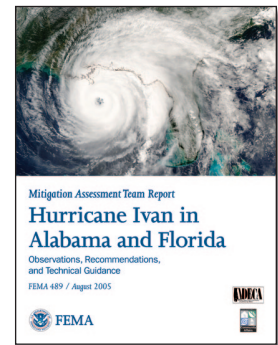
The Mitigation Assessment Team (MAT) report for Hurricane Katrina (FEMA 549) contains eight hurricane recovery advisories on reconstruction guidance using Hurricane Katrina surge inundation and Advisory BFEs; initial restoration for flooded buildings; design and construction in Coastal A Zones; the ABCs of returning to flooded buildings; attachment of brick veneer in high-wind regions; attachment of rooftop equipment in high-wind regions; rooftop attachment of lightning protection systems in high-wind regions; and designing for flood levels above the BFE.

<http://www.fema.gov/library/viewRecord.do?id=2633>

FEMA 489 – Mitigation Assessment Team Report – *Hurricane Ivan in Alabama and Florida: Observations, Recommendations, and Technical Guidance* (August 2005)

Hurricane Ivan approximated a design flood event on the barrier islands and exceeded design flood conditions in sound and back bay areas. This provided a good opportunity to assess the adequacy of National Flood Insurance Program (NFIP) floodplain management requirements as well as current construction practices in resisting storm surge and wave damage. FEMA was particularly interested in evaluating damages to buildings in Coastal A zones where V-zone construction methods are not required.

<http://www.fema.gov/library/viewRecord.do?id=1569>

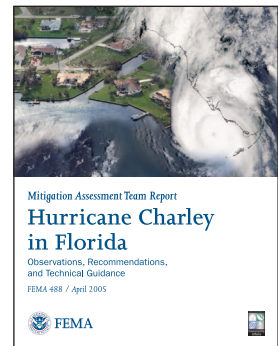


FEMA 488 – Mitigation Assessment Team Report – *Hurricane Charley in Florida: Observations, Recommendations, and Technical Guidance* (April 2005)



Hurricane Charley was the strongest hurricane to hit Florida since Hurricane Andrew. The storm made an unexpected eastward turn prior to landfall and the storm surge was not as high as originally predicted by the National Hurricane Center. Charley did not cause extensive flood damage to the built environment and the MAT's investigations revealed that the storm was a design-level wind event. For these reasons, the report primarily addresses the effects of high winds and the means to help mitigate them.

<http://www.fema.gov/library/viewRecord.do?id=1444>



Hurricane Charley (2004) Recovery Advisories



The Mitigation Assessment Team (MAT) report for Hurricane Charley (FEMA 488) contains three hurricane recovery advisories on roof underlayment for asphalt shingle roofs; asphalt shingle roofing for high-wind regions; and tile roofing for hurricane-prone areas.

<http://www.fema.gov/library/viewRecord.do?id=2632>

FEMA 490 – *Summary Report on Building Performance 2004 Hurricane Season* (March 2005)  



This is a 68-page summary of the observation, conclusions, and recommendations from FEMA 488 and FEMA 489.

<http://www.fema.gov/library/viewRecord.do?id=1445>

FEMA 338 – *Building Performance Assessment Team Report – Hurricane Georges in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance* (March 1999)  


Hurricane Georges made landfall in the Ocean Springs/Biloxi, Mississippi area. Over the next 30 hours, the storm moved slowly north and east, causing heavy damage along the Gulf Coast in Alabama, Florida, and Mississippi. Storm surges over the area ranged from more than 5 feet in Pensacola, Florida, to 9 feet in Pascagoula, Mississippi. According to the National Weather Service (NWS), the Town of Munson, Florida, in Santa Rosa County, received the highest recorded level of rainfall with more than 38 inches.

<http://www.fema.gov/library/viewRecord.do?id=1537>

FEMA 339 – *Building Performance Assessment Team Report – Hurricane Georges in Puerto Rico: Building Performance Observations, Recommendations, and Technical Guidance* (March 1999)  

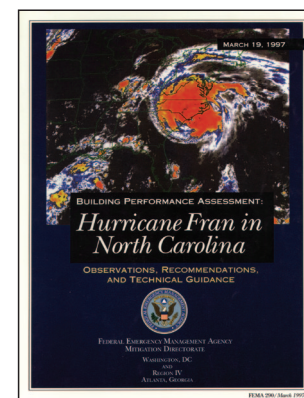
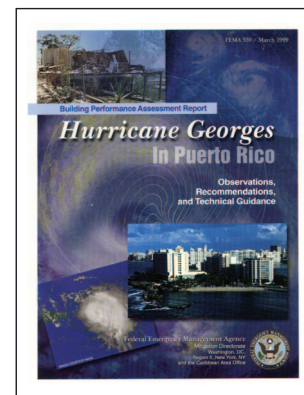
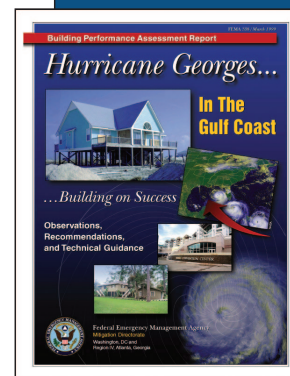
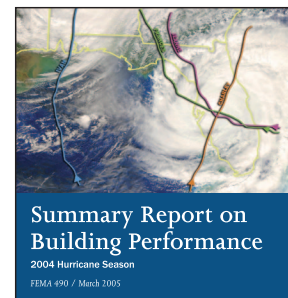
This report presents observations on the success and failure of buildings in Puerto Rico in withstanding the wind and flood forces generated by Hurricane Georges. Several examples of successful mitigation implementation were noted, but a significant amount of damage was incurred due to lack of compliance with and enforcement of existing building codes.

<http://www.fema.gov/library/viewRecord.do?id=1422>

FEMA 290 – *Building Performance Assessment Team Report – Hurricane Fran in North Carolina: Building Performance Observations, Recommendations, and Technical Guidance* (March 1997) 

Hurricane Fran made landfall near Cape Fear, North Carolina. Coastal areas experienced significant erosion and scour. Erosion caused by Hurricane Fran was exacerbated by the previous dune erosion caused by Hurricane Bertha, which made landfall in the same area only 2 months earlier. The erosion and scour added to the average erosion rate of 1 to 2 feet a year and left many oceanfront homes unable to withstand the loads experienced. The loss of supporting sand left many short pilings either completely exposed or embedded less than 2 feet.

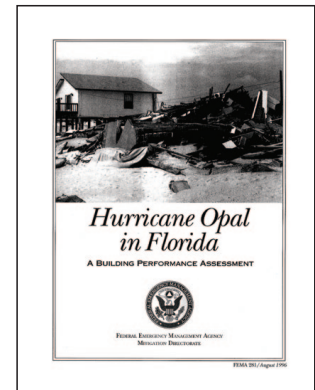
<http://www.fema.gov/library/viewRecord.do?id=2770>



FEMA 281 – Building Performance Assessment Team Report – *Hurricane Opal in Florida* (August 1996)

Hurricane Opal was classified as a Category 3 storm on the Saffir-Simpson scale. Fifteen counties in the Florida Panhandle were declared Federal disaster areas. Most of the structural damage associated with the storm was to slab foundations; pile, post, column, and pier foundations; and framing systems. The damage was caused by coastal flood forces – storm surge, wind-generated waves, storm-induced erosion, and floodborne debris.

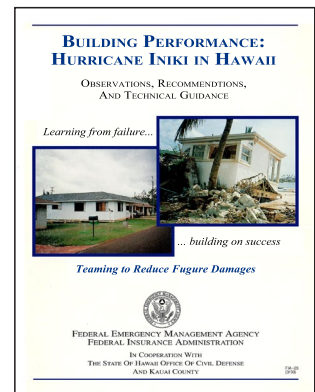
<http://www.fema.gov/library/viewRecord.do?id=2769>



FIA 23 – Building Performance Assessment Report – *Hurricane Iniki in Hawaii: Observations, Recommendations, and Technical Guidance* (March 1993)

Hurricane Iniki was the strongest and most destructive hurricane to strike the Hawaiian Islands in recent memory. The team investigated primary structural systems (i.e., systems in a building that resist lateral and vertical forces), and the effects of windborne and waterborne debris and the quality of construction and materials. The performance of exterior architectural systems (such as roofing, windows, and doors) was analyzed.

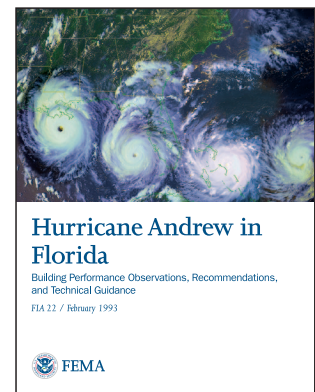
<http://www.fema.gov/library/viewRecord.do?id=2767>



FIA 22 – Building Performance Assessment Report – *Hurricane Andrew in Florida: Observations, Recommendations, and Technical Guidance* (February 1993)

The team's investigation was similar to that conducted for Hurricane Iniki (i.e., the performance of primary structural systems and exterior architectural systems) and also included the effects of debris and the quality of construction workmanship. The loss of roof material and roof sheathing and the failure of windows and doors exposed interiors of buildings to further damage from wind and rain, resulting in significant damage to building interiors and contents that rendered many buildings uninhabitable.

<http://www.fema.gov/library/viewRecord.do?id=2765>



TORNADOES

FEMA P-908 – Mitigation Assessment Team Report – *April and May 2011 Tornadoes in Alabama, Georgia, Mississippi, Tennessee, and Missouri*

In May and June 2011, Mitigation Assessment Teams (MATs) were deployed to Alabama, Georgia, Mississippi, and Tennessee, and Missouri, respectively, to assess the damage caused by outbreaks of tornadoes in those states. This report presents the MATs observations, conclusions, and recommendations in response to those field investigations. The mission of the MATs was to assess the performance of structures affected by the tornadoes, investigate safe room and shelter performance in the affected areas, and describe the lessons learned to help future efforts to more successfully mitigate tornado events. The objective of the report is to provide information to communities, businesses, and individuals so that they can rebuild safer, more robust structures and minimize loss of life, injuries, and property damage in future tornadoes and high-wind events. The MAT report will present the observations, conclusions, and recommendations for residential structures, as well as commercial and other non-residential and critical facilities (e.g., schools, hospitals and health care facilities, first responder facilities, and emergency operations centers and emergency management agencies).

This publication will be available in 2012.

FEMA 342 – Building Performance Assessment Team Report – *Midwest Tornadoes of May 3, 1999: Observations, Recommendations, and Technical Guidance* (October 1999)

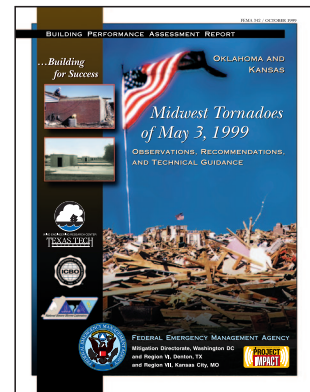
On the evening of May 3, 1999, tornadoes tore through parts of Oklahoma and Kansas, in areas that are considered part of “Tornado Alley,” leveling entire neighborhoods and killing 49 people. The storms that spawned the tornadoes moved slowly, contributing to the development and redevelopment of individual tornadoes over an extended period of time. The report presents observations, conclusions, and recommendations intended to help communities, businesses, and individuals reduce future injuries and the loss of life and property resulting from tornadoes and other high-wind events.

<http://www.fema.gov/library/viewRecord.do?id=1423>

2011 Tornadoes in Alabama, Georgia, Mississippi, Tennessee, and Missouri Recovery Advisories

These eight recovery advisories present guidance on tornado risks and hazards in the Southeastern United States; selecting design criteria for safe rooms; residential sheltering (in-residence and stand-alone safe rooms); safe rooms and refuge areas in a home; recommendations for owners of critical facilities located in tornado-prone regions; recommendations for architects and engineers for critical facilities located in tornado-prone regions; rebuilding and repairing a home after a tornado; and reconstructing non-residential buildings after a tornado.

<http://www.fema.gov/library/viewRecord.do?id=4723>



2007 Tornadoes in Kansas Recovery Advisories

These three recovery advisories present guidance on tornado risks and hazards in the Midwest United States; selecting design criteria for storm shelters; and residential sheltering (in-residence and stand-alone shelters).

<http://www.fema.gov/library/viewRecord.do?id=2972>

2007 Tornadoes in Florida Recovery Advisories

These five recovery advisories present guidance on tornado risks and hazards in the Southeastern United States; selecting design criteria for storm shelters; residential sheltering (in-residence and stand-alone shelters); understanding and improving performance of older manufactured homes during high-wind events; and understanding and improving performance of new manufactured homes during high-wind events.

<http://www.fema.gov/library/viewRecord.do?id=2631>

FLOODS

FEMA P-765 – Mitigation Assessment Team Report – *Midwest Floods of 2008 in Iowa and Wisconsin: Building Performance Observations, Recommendations, and Technical Guidance* (October 2009)

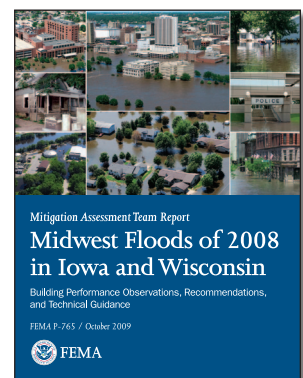
In August and September 2008, the Mitigation Assessment Team (MAT) deployed to the States of Iowa and Wisconsin to assess damage caused by riverine flooding from the 2008 Midwest floods. This report presents the MAT's observations on the success and failure of buildings impacted by these floods. Several examples of mitigation success stories were noted, as well lessons learned and recommendations resulting from field investigations. The report includes recovery advisories related to supporting homeowners making fundamental decisions relative to rebuilding as well as offering proactive methods to support the continuity of operations for critical facilities.

<http://www.fema.gov/library/viewRecord.do?id=3851>

2008 Midwest Floods Recovery Advisories

The Mitigation Assessment Team (MAT) report for the Midwest Floods in Iowa and Wisconsin (FEMA P-765) contains two flood recovery advisories on considerations for rebuilding a flood-damaged house and design considerations for improving critical facility functionality during flood events.

<http://www.fema.gov/library/viewRecord.do?id=3824>



MAN-MADE HAZARDS

FEMA 403 – *World Trade Center Building Performance Study: Data Collection, Preliminary Observations, and Recommendations* (September 2002)

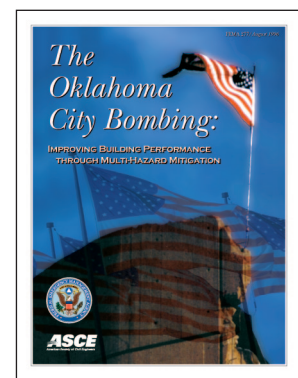
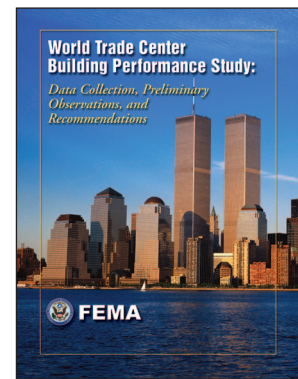
This report presents observations, findings, and recommendations regarding the performance of buildings affected by the September 11 attacks on the WTC towers in New York City. The report also describes the structural and fire protection features of the affected buildings and their performance in response to the terrorist attacks.

<http://www.fema.gov/library/viewRecord.do?id=1728>

FEMA 277 – *The Oklahoma City Bombing: Improving Building Performance Through Multi-Hazard Mitigation* (August 1996)

The purposes of the Mitigation Assessment Team investigation were to review damage caused by the blast, determine the failure mechanism for the building, and review engineering strategies for reducing such damage to new and existing buildings in the future. Specifically, mechanisms for multi-hazard mitigation, including mitigation of wind and earthquakes effects, were considered.

<http://www.fema.gov/library/viewRecord.do?id=1530>



Risk Management Series

The Risk Management Series (RMS) is directed at providing design guidance for mitigating multihazard events. The objective of the series is to reduce physical damage to structural and nonstructural components of buildings and related infrastructure, and to reduce resultant casualties during natural and manmade disasters.

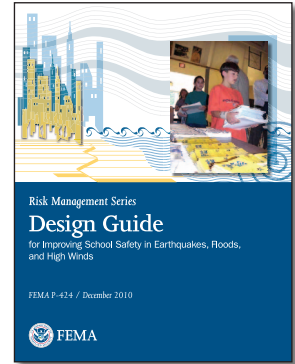
The RMS is intended to minimize conflicts that may arise from a multihazard design approach. A multihazard approach requires a complex series of tradeoffs. Security concerns need to be balanced with requirements in terms of earthquakes, floods, high-speed winds, accessibility, fire protection, and aesthetics, among others. Designing to mitigate natural hazards should avoid considering manmade hazards as an afterthought, but rather as a critical concern to be studied early during the project cycle. Natural hazards are the largest single contributor to catastrophic or repetitive damage to communities nationwide. Manmade hazards can be categorized as rare events with a potential high impact and very difficult to predict.

For additional RMS publications visit <http://www.fema.gov/plan/prevent/rms>.

FEMA P-424 – *Design Guide for School Safety in Earthquakes, Floods, and High Winds* (December 2010)  

This manual is the updated version of the original FEMA 424 published in January 2004. It is intended to provide guidance for the protection of school buildings from natural disasters. This volume concentrates on grade schools, K-12. FEMA P-424 covers earthquakes, floods, and high winds. Its intended audience is design professionals and school officials involved in the technical and financial decisions of school construction, repair, and renovations.

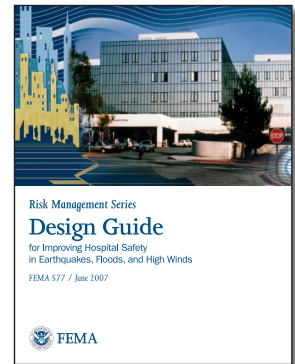
<http://www.fema.gov/library/viewRecord.do?id=1986>



FEMA 577 – *Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds* (June 2007)  

This publication provides design information for the construction of new hospitals and rehabilitation of existing ones with the purpose of improving their performance during the immediate aftermath of various hazard events. This manual is concerned with factors such as performance-based design and continuity of operations for this type of building. It provides a multihazard approach highlighting conflicts and benefits to consider when designing.

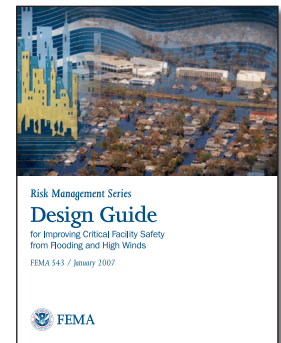
<http://www.fema.gov/library/viewRecord.do?id=2739>



FEMA 543 – *Design Guide for Improving Critical Facility Safety from Flooding and High Winds* (January 2007)  

This manual concentrates on critical facilities (hospitals, schools, fire and police stations, and emergency operations centers). It is based on the behavior of critical facilities during Hurricane Katrina and makes recommendations on the performance of these types of buildings. It includes extensive information on the impact of storm surges to the Gulf area.

<http://www.fema.gov/library/viewRecord.do?id=2441>



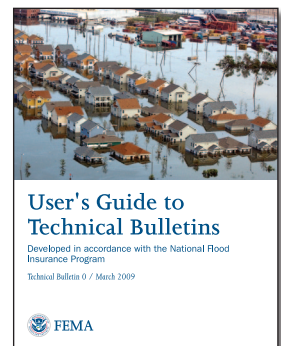
Technical Bulletins

TB-0 – *Technical Bulletin 0 – User's Guide to Technical Bulletins* (March 2009)



This Technical Bulletin provides a list of available technical bulletins, a key word/subject reference index for all of the bulletins, and information about how to obtain copies of the bulletins.

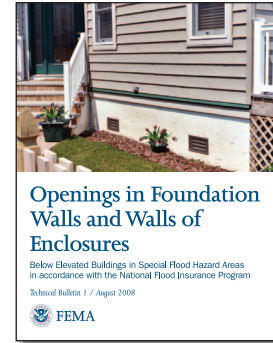
<http://www.fema.gov/library/viewRecord.do?id=1484>



TB-1 – Technical Bulletin 1 – Openings in Foundation Walls of Enclosures (August 2008)  

This Technical Bulletin provides guidance on the NFIP regulations concerning the requirements for openings in foundation walls for buildings with enclosures below the base flood elevation (BFE) and located in Special Flood Hazard Areas (SFHAs) shown on Flood Insurance Rate Maps (FIRMs) as Zones A, AE, A1-A30, AR, AO, and AH.

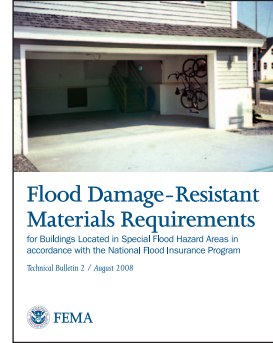
<http://www.fema.gov/library/viewRecord.do?id=1579>



TB-2 – Technical Bulletin 2 – Flood Damage-Resistant Materials Requirements (August 2008)  

This Technical Bulletin provides guidance on the NFIP regulations concerning the required use of flood damage-resistant construction materials for building components located below the BFE in Special Flood Hazard Areas (SFHAs) in both A and V zones.

<http://www.fema.gov/library/viewRecord.do?id=1580>



FIA-TB-3 – Non-Residential Floodproofing – Requirements and Certification (April 1993)  

This Technical Bulletin provides guidance on the NFIP regulations concerning watertight construction and the required certification for floodproofed non-residential buildings in Zones A, AE, A1-A30, AR, AO, and AH whose lowest floors are below the BFE.

<http://www.fema.gov/library/viewRecord.do?id=1716>

TB-4 – Technical Bulletin 4 – Elevator Installation (November 2010)  

This Technical Bulletin provides guidance on the NFIP regulations concerning the installation of elevators below the BFE in Special Flood Hazard Areas (both A and V zones).

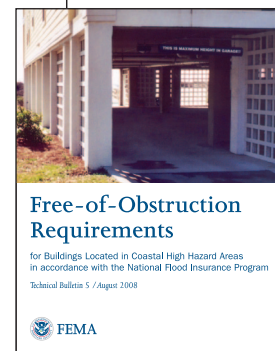
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TB-5 – Technical Bulletin 5 – Free-of-Obstruction Requirements (August 2008)  

This Technical Bulletin provides guidance on the NFIP regulations concerning obstructions to floodwaters below elevated buildings and on building sites in Coastal High Hazard Areas (Zones V, VE, and V1-V30).

<http://www.fema.gov/library/viewRecord.do?id=1718>



FIA-TB-6 – *Below-Grade Parking Requirements (April 1993)*  

This Technical Bulletin provides guidance on the NFIP regulations concerning the design of below-grade parking garages beneath buildings located in Zones A, AE, A1-A30, AR, AO, and AH.

<http://www.fema.gov/library/viewRecord.do?id=1719>

FIA-TB-7 – *Wet Floodproofing Requirements (December 1993)*  

This Technical Bulletin provides guidance on the NFIP regulations concerning wet floodproofing of certain types of structures located in Zones A, AE, A1-A30, AR, AO, and AH.

<http://www.fema.gov/library/viewRecord.do?id=1720>

FIA-TB-8 – *Corrosion Protection for Metal Connectors in Coastal Areas (August 1996)*  

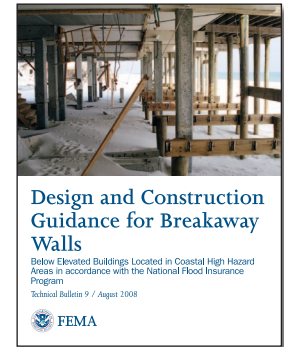
This Technical Bulletin provides guidance on the need for, selection of, and use of corrosion-resistant metal connectors for the construction of buildings in coastal areas.

<http://www.fema.gov/library/viewRecord.do?id=1721>

TB-9 – *Technical Bulletin 9 – Design and Construction Guidance for Breakaway Walls (August 2008)*  

This Technical Bulletin provides prescriptive criteria for the design and construction of wood-frame and masonry breakaway walls beneath elevated buildings in Coastal High Hazard Areas compliant with NFIP regulatory requirements.

<http://www.fema.gov/library/viewRecord.do?id=1722>

**FIA-TB-10 – *Ensuring That Structures Built on Fill In or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding (May 2001)***  

This Technical Bulletin discusses building techniques, including the use of fill, that can be used to ensure structures are reasonably safe from flooding.

<http://www.fema.gov/library/viewRecord.do?id=1723>

FIA-TB-11 – *Technical Bulletin 11 – Crawlspace Construction for Buildings Located in Special Flood Hazard Areas (November 2001)*  

This Technical Bulletin provides interim guidance on minimum NFIP requirements as well as best practices for crawlspace construction in Special Flood Hazard Areas.

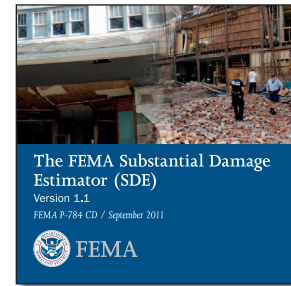
<http://www.fema.gov/library/viewRecord.do?id=1724>

Tools

FEMA P-784 CD – *The FEMA Substantial Damage Estimator (SDE)* (Version 1.1, September 2011; Version 2.0, Spring/Summer 2012)

The FEMA P-784 CD includes the Substantial Damage Estimator (SDE) software, the *SDE User's Manual and Workbook*, the video titled *SDE and Your Community*, and the *Substantial Improvement/Substantial Damage Desk Reference* (FEMA P-758). The SDE was developed to assist State and local officials in estimating building value and costs to repair for residential and non-residential buildings. The SDE software is based on the concept of using damage estimates for individual building elements to determine whether the structure as a whole is substantially damaged. The SDE software and *User's Manual and Workbook* are provided here for online access. Version 2.0 will be available in spring/summer 2012.

<http://www.fema.gov/library/viewRecord.do?id=4166>



FEMA 497 – *National Flood Mitigation Data Collection Tool and RLP Viewer* (April 2011)

The *National Flood Mitigation Data Collection Tool* (abbreviated as NFMDCT and referred to as the National Tool or NT) was developed for nationwide use to gather information about flood-prone structures in order to determine potentially appropriate long-term mitigation measures. The ultimate goal of the NT is to provide a standardized, systematic approach to collecting and interpreting property data and mitigation project development.

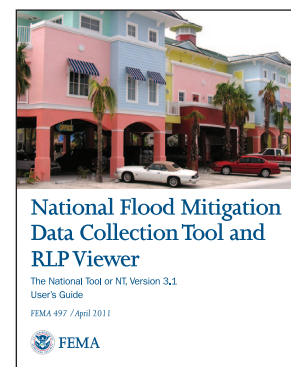
While the focus of the NT is on data collection for repetitive loss (RL) properties, it can be used to gather information related to flood risk, building construction, and building value for any structure. The NT is designed to encourage a comprehensive sweep for information pertinent to each structure. Data fields within the NT require information from a variety of sources, including NFIP policy information; community building, tax, and historical flood records; and field reconnaissance. Having detailed data helps create a clearer picture of the property and its flooding issues, which is important in determining the most appropriate and cost-effective mitigation method. However, the NT can also be used for more cursory or limited data collection efforts as appropriate.

<http://www.fema.gov/library/viewRecord.do?id=3413>

FEMA 497 – *Repetitive Loss Property (RLP) Viewer 2.0* (April 2011)

The *Repetitive Loss Property (RLP) Viewer 2.0* is a standalone application capable of connecting to any standard NT database in Access format (.MDB) that uses GIS to display point features representing flood-prone properties. The *NT User's Guide* provides assistance in using both tools. The *National Flood Mitigation Data Collection Tool*, FEMA 497, was developed for nationwide use to gather information about flood-prone structures in order to evaluate appropriate long-term mitigation measures.

<http://www.fema.gov/library/viewRecord.do?id=1447>



Brochures

FEMA L-780 – *Building Science for Disaster-Resistant Communities: Wind Hazard Publications* (November 2011)

This brochure provides readers with a quick summary of publications that will help them prepare for and mitigate against wind hazards. It describes how severe wind storms often directly damage roofs, windows, and exterior finishes. The impact that wind has on the envelope of a building can also impact the superstructure of the building, and breaches in a building envelope frequently contribute to additional damages. Debris such as signs, roofing material, and other small items can also become flying missiles during wind events, which can pose a danger to a home or the safety of its occupants.

Proper design and construction provides resilient buildings that resist damages from hurricane-force winds and other high-wind events.

<http://www.fema.gov/library/viewRecord.do?id=4579>

FEMA L-781 – *Building Science for Disaster-Resistant Communities: Hurricane Hazard Publications* (November 2011)

This brochure provides readers with a quick summary of publications that will help them prepare for and mitigate against hurricane wind hazards. During a hurricane, homes, businesses, public buildings, and infrastructure may be damaged or destroyed by many different storm hazards. Debris can break windows and doors, allowing high winds and rain inside the home. In extreme storms (such as Hurricanes Hugo, Andrew, and Katrina), the force of the wind alone can cause tremendous devastation, as trees and power lines topple and weak elements of homes and buildings fail. Roads and bridges can be washed away and homes saturated by flooding.

Hurricanes pose a particular hazard to buildings, and proper design and construction are essential to help buildings withstand the impact of these storms.

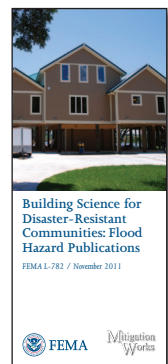
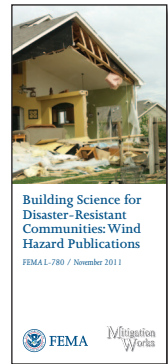
<http://www.fema.gov/library/viewRecord.do?id=4578>

FEMA L-782 – *Building Science for Disaster-Resistant Communities: Flood Hazard Publications* (November 2011)

This brochure provides readers with a quick summary of publications that will help them prepare for and mitigate against flood hazards.

Buildings located in flood hazard areas are at risk from forces generated by floodwaters. These forces can include hydrostatic forces from slow moving floodwaters, hydrodynamic forces from waves and quickly moving water, as well as scour around building elements, erosion, and flood-borne debris.

<http://www.fema.gov/library/viewRecord.do?id=4580>



FEMA L-235 – *Homeowner's Guide to Retrofitting* (December 2009)

This brochure presents a brief overview of the information in FEMA P-312, *Homeowner's Guide to Retrofitting: Six Ways to Protect Your Home From Flooding*. It also provides information that will help you decide whether your home is a candidate for retrofitting.

<http://www.fema.gov/library/viewRecord.do?id=1681>

FEMA L-233 – *Taking Shelter From the Storm: Building a Safe Room For Your Home or Small Business* (December 2008)

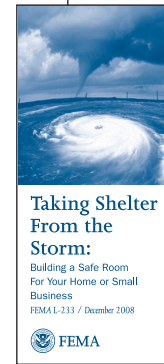
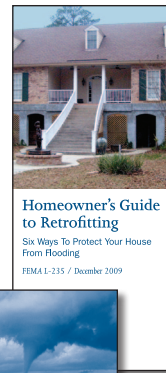
This brochure is about FEMA 320, *Taking Shelter From the Storm: Building a Safe Room For Your Home or Small Business*, which is now in its third edition. It briefly describes how having a safe room built for your home or small business can help provide “near-absolute protection” for you and your family or employees from injury or death caused by the dangerous forces of extreme winds such as tornadoes and hurricanes. This brochure is also available in Spanish.

<http://www.fema.gov/library/viewRecord.do?id=3510>

Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program (December 2009)

The primary purpose of this brochure is to help communities decide how to coordinate the I-Codes with their floodplain management programs and land development procedures. It discusses the benefits of disaster-resistant codes, community responsibilities under the NFIP, and the benefits of adopting standards that exceed the minimum requirements.

<http://www.fema.gov/library/viewRecord.do?id=3563>



Protect Your Property or Business From Disaster Series

In this series of publications you can find information on how to protect yourself, your home, business, and property from various hazards. The publications are divided into three categories: natural hazards, flooding, and high winds.

<http://www.fema.gov/plan/prevent/howto/index.shtm>

Protect Your Business From All Natural Hazards

These two publications describe how protecting your business from disasters caused by natural hazards can involve a variety of actions, from inspecting and maintaining your buildings to installing protective devices. Most of these actions, especially those that affect the structure of your buildings or their utility systems, should be carried out by qualified maintenance staff or professional contractors licensed to work in your state, county, or city. One example of disaster protection is safely storing the important documents, electronic files, raw materials, and inventory required for the operation of your business.

1. *Install a Generator for Emergency Power*
2. *Protect Business Records and Inventory*

<http://www.fema.gov/library/viewRecord.do?id=3259>

Protect Your Property From Flooding

These four publications offer information on how protecting your property from flooding can involve a variety of actions, from inspecting and maintaining the building to installing protective devices. Most of these actions, especially those that affect the structure of your building or its utility systems, should be carried out by qualified maintenance staff or professional contractors licensed to work in your state, county, or city.

1. *Install Sewer Backflow Valves*
2. *Anchor Fuel Tanks*
3. *Raise Electrical System Components*
4. *Build With Flood Damage Resistant Materials*

<http://www.fema.gov/library/viewRecord.do?id=3262>

Protect Your Property From High Winds

These eight publications offer information on how protecting your property from high winds can involve a variety of actions, from inspecting and maintaining your building to installing protective devices. Most of these actions, especially those that affect the exterior shell of your building, should be carried out by qualified maintenance staff or professional contractors licensed to work in your state, county, or city. For buildings with Exterior Insulation Finishing System (EIFS) walls, a type of wall often used for commercial buildings, one example of wind protection is inspecting and maintaining the walls.

1. *Protect Windows and Doors with Covers*
2. *Reinforce or Replace Garage Doors*
3. *Brace Gable End Roof Framing*
4. *Secure Composition Shingle Roofs*
5. *Secure Built-Up and Single-Ply Roofs*
6. *Secure Metal Siding and Metal Roofs*
7. *Remove Trees and Potential Windborne Missiles*
8. *Maintain EIFS Walls*

<http://www.fema.gov/library/viewRecord.do?id=3263>

TRAINING COURSES AND WORKSHOPS

Numerous training courses/workshops have been developed by FEMA Building Science. These courses/workshops are typically offered either in the field or in conferences. They can also be offered at FEMA's Emergency Management Institute (EMI) in Emmitsburg, Maryland.

WIND

Retrofitting Residential Buildings for Wind Hazards (FEMA P-804)

This ½ day course is to provide guidance on how to improve the wind resistance of existing residential buildings in the U.S. coastal regions where design wind speeds exceed 90 mph. This improved resistance can be achieved through the Basic, Intermediate, or Advanced “Mitigation Packages,” which offer incrementally resistant retrofit options for the homeowner. This course teaches how to select and implement effective wind retrofit projects for one- and two family dwellings. It does not apply to manufactured housing. This course follows the content of FEMA P-804, *Wind Retrofit Guide for Residential Buildings*.

There are multiple intended audiences for this course. Homeowners should be involved in the process of the wind retrofit project; they must understand who must understand the benefits and costs of each potential decisions. In turn, homeowners will work with their evaluator, design professional (if necessary), and contractor to determine which wind retrofit project is most appropriate. State and local governments and entities that have mitigation programs in hurricane-prone regions will also benefit from this course by using the information to deliver technical assistance to the public.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

COASTAL

Coastal Construction Workshop for Home Builders (FEMA P-499)

FEMA developed a series of 37 technical fact sheets that provide guidance and recommendations concerning the construction of coastal residential buildings. The fact sheets present information aimed at improving the performance of buildings subject to flood and wind forces in coastal environments. This introductory-level 3-hour training is made available to construction professionals in coastal areas to facilitate their understanding and use of these technical fact sheets and the design and construction practices they promote.

The goal of the workshop is to provide a practical learning experience that enables participants, upon completion of the workshop, to cite best practices that result in reduced damages to homes affected by coastal storms, locate information as needed in the *Home Builder's Guide to Coastal Construction* fact sheets, and implement building practices that will improve the performance of buildings subject to flood and wind forces in coastal environments.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

Introduction to Coastal Foundation Design and Construction for Design Professionals (FEMA P-550)

This 1-day course is the second of two courses on FEMA P-550, *Recommended Residential Construction for Coastal Areas*, developed by FEMA and is geared to design professionals. The course focuses on the guidance contained in the manual. It discusses the unique loads foundations must resist in coastal and near coastal areas (flood, debris, breaking waves, etc.); addresses NFIP requirements; and discusses designing for high-wind events and for erosion and scour. The course describes the assumptions used in developing the FEMA P-550 foundation designs and how the designs can be customized by professionals to develop foundations for specific homes. Copies of FEMA P-550 and a Student Manual will be provided.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

Residential Coastal Construction (EMI 386)

FEMA designed this 4½-day course to train participants on FEMA's *Coastal Construction Manual* (FEMA P-55), which is the primary, state-of-the-art reference for planning, designing, and constructing residential structures in various coastal environments. The target audience is engineers, architects, and building code officials. Floodplain management, hazard mitigation, planning, and building officials with building science knowledge may also apply. The course is taught at EMI. An Independent Study Course is also available.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

FLOOD

Retrofitting Flood-Prone Residential Buildings (EMI 279)

FEMA developed a technical training course on proper methods of retrofitting residential buildings. This course is designed to provide engineering and economic guidance to architects, engineers, and local code enforcement officials on retrofitting existing one- to four-family residential structures situated in flood-prone areas. The retrofitting measures presented are creative, practical, compliant with applicable floodplain regulations, and satisfactory to most homeowners. The course is available as a 1-week course offered several times a year at EMI or as a 2-day field-deployed version. For technical assistance in offering the field course, contact your NFIP State Coordinator, FEMA Regional Offices, or Disaster Field Office. To register for the EMI course, all applications must be submitted through your State Emergency Management Training Office.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

The Flood Provisions of the International Code Series and ASCE 24

This 4-hour workshop presents basic information needed to understand the flood provisions of the International Code Series and ASCE 24, *Flood Resistant Design and Construction* and the importance of coordinating local floodplain management ordinances with building codes. The 2009, 2006, and 2003 editions of the International Codes (I-Codes) contain flood-resistant provisions that FEMA has determined to be consistent with the NFIP. Reading materials will be distributed in advance. Participants will learn how the I-Code provisions are consistent with the

NFIP regulations; understand the relationship between the I-Codes and ASCE 24: learn about distinctions between the I-Codes and ASCE 24, and the NFIP regulations; learn the importance of coordinating the I-Codes with local floodplain management ordinances; and review a sample “companion” ordinance designed specifically to coordinate with the I-Codes.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

MULTI-HAZARD

Multi-Hazard Mitigation Design Considerations (EMI 312)

This 2½-day course is designed to introduce potential natural hazard impacts on the performance of the constructed environment. The target audience is Federal, State, and local emergency response staff; local building officials; and other building professionals responsible for the design and/or operation of buildings or other infrastructure facilities. Hazards discussed include floods, winds, earthquakes, and wildfires. The behavior of each hazard is reviewed, followed by a discussion of their potential impacts on or threats to buildings and infrastructure. The threats are evaluated qualitatively and quantitatively. The introduction to each hazard is followed by a discussion of mitigation strategies and techniques proven to be effective in mitigating the effects of that hazard. After discussions of the individual hazards are complete, the mitigation measures are represented for further evaluation relative to hazards other than the specific hazard for which it was originally intended. The focus is to not only identify mitigation strategies that may reduce the risks from more than one hazard, but also to consider the potential unintended increased risks from another hazard.

If you are interested in this workshop please call the flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings (FEMA 543)

This 2-day course on FEMA 543 was developed to help improve the design, construction, reconstruction, and rehabilitation of critical facilities in areas exposed to flooding and high winds. The target audience is architects and engineers with existing knowledge of building science.

The performance of critical facilities (e.g., hospitals, fire and police stations, schools, and emergency operations centers) during recent natural disasters has been impaired by storm-related damages, as documented by post-disaster reports. Critical facilities provide critical life-safety services to citizens of affected areas. The course is intended to enable participants to support and implement design techniques and construction practices that will improve building performance and result in critical facilities remaining fully operational during and after flooding and high-wind events.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

SAFE ROOMS

Design and Construction of Safe Rooms for Architects and Engineers (FEMA 361/320)

This 2-day training course discusses design and construction of community and residential safe rooms. The target audience is architects, engineers, and emergency managers. The course uses as its base text the two popular publications FEMA 361, *Design and Construction Guidance for Community Safe Rooms*, Second Edition (2008), and FEMA 320, *Taking Shelter from the Storm: Building a Safe Room for Your Home or Small Business*, Third Edition (2008). The training discusses how both hazard identification, and design and construction criteria (specific to tornado, hurricane, and combined hazards) have changed over the years. In addition, how the FEMA publications are in alignment with the minimum requirements of the International Code Council/National Storm Shelter Association (ICC/NSSA) 500 *Standard for the Design and Construction of Storm Shelters* (ICC 500-2008) is discussed. Specific guidance and design criteria for operational or emergency management issues, which are not addressed in the ICC 500, are also described. The presentation also covers the elements of wind and flood design criteria in FEMA 361 that remain more restrictive than those of the ICC 500 standard. The latter is important because FEMA 361 is the basis of the technical design criteria used for FEMA grant programs that fund the design and construction of hurricane and tornado safe rooms.

If you are interested in this workshop please call the FEMA safe room helpline at (866) 222-3580 (toll free) or email: Saferoom@dhs.gov.

Evaluating Buildings for Extreme-Wind Refuge Areas

This 1-day training course focuses on the evaluation of proposed areas or buildings for use as community safe rooms or, if they do not meet the FEMA 361, *Design and Construction Guidance for Community Safe Rooms*, Second Edition (2008) criteria, areas of last resort. The target audience is architects, engineers, school officials, and emergency managers. The course provides background on safe room design and construction issues in FEMA 361 and FEMA P-431, *Tornado Protection Selecting Refuge Areas in Buildings*, Second Edition (2009) and reviews the use of the Extreme-Wind Refuge Area Evaluation Checklists provided in Appendix B of FEMA 361. After a review of tornado and hurricane wind hazards, the instructors discuss FEMA 361 design criteria and present checklists and tools for building evaluations. Students will have the opportunity to complete a case study by evaluating a structure while using the FEMA 361 Appendix B checklists. This workshop also includes a field exercise where participants use the evaluation checklists from FEMA 361 to walk through a facility and score and select refuge areas.

If you are interested in this workshop please call the FEMA safe room helpline at (866) 222-3580 (toll free) or email: Saferoom@dhs.gov.

Preparing a Successful Safe Room Grant Application

This training course focuses on the requirements to develop a successful safe room grant application. The target audience is state and local officials as well as engineers and architects. The course covers all of the requirements of FEMA Hazard Mitigation Grant Program (HMGP) and Pre-Disaster Mitigation (PDM) program safe room grant applications. After a brief review of tornado and hurricane wind hazards, the instructors discuss FEMA 361, *Design and Construction Guidance for Community Safe Rooms*, Second Edition (2008) design criteria, essential documentation that must be included in the grant application, and tools such as checklists,

sample documents, and reference materials that are useful in the design and construction of safe rooms. The course demonstrates the more difficult aspects of information gathering by having participants complete a grant subapplication as a case study exercise.

If you are interested in this workshop please call the FEMA safe room helpline at (866) 222-3580 (toll free) or email: Saferoom@dhs.gov.

TOOLS

SI/SD – Using FEMA Guidance to Administer the NFIP Substantial Improvement/Substantial Damage Requirements

This workshop will focus on using the SI/SD Desk Reference (FEMA P-758) to administer the NFIP requirements in local floodplain management regulations and building codes. The workshop covers the basics of making SI/SD determinations while illustrating how the Desk Reference is organized and the level of detail that it has on all aspects of the SI/SD requirements. There are many factors that local officials need to consider and several scenarios they may encounter while administering the SI/SD requirements, which are required by the International Codes Series. Emphasis is placed on all aspects of buildings that must be brought into compliance, which depend on flood zone and building occupancy. Some of the more common examples are discussed, including interior-only improvements, lateral and vertical additions, and historic structures. Following this workshop, the learner will understand and be able to effectively administer SI/SD requirements. Learners already familiar with SI/SD requirements will further their understanding of how administering SI/SD responsibilities fits into the overall picture of floodplain management through day-to-day and post-disaster activities. The target audience for this workshop includes State and local floodplain managers, building officials, and plan reviewers.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

FEMA P-784 Substantial Damage Estimator

The Substantial Damage Estimator (SDE) Train-the-Trainer Course is a 2-day course designed to teach students about the SDE software and explain how the property-specific results are used to ensure compliance with the National Flood Insurance Program (NFIP). It can also be used to secure Increased Cost of Compliance (ICC) funding for property owners following flood events. The SDE software was developed to assist State and local officials in estimating both residential and non-residential building value and damage costs using FEMA-accepted approaches. The SDE software is based on the concept of using damage estimates for individual building elements to determine whether the structure as a whole is substantially damaged. This computer application was created to support enforcement of the NFIP's regulatory requirements and is intended to be used in conjunction with an industry-accepted construction cost-estimating guide.

Using the SDE-calculated building values, the user can apply a “Percent Damaged” or “Improved” value to establish a substantial damage/improvement determination for each structure. The SDE application is designed to accommodate residential and non-residential buildings such as, single-family residences, manufactured homes, schools, office buildings, police stations, hospitals, courthouses, department stores, grocery and convenience stores, and strip malls.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

The SDE Substantial Damage Estimator (SDE) Web-Based Course (late 2012)

FEMA is developing a 4- to 6-hour web-based technical presentation on Substantial Damage estimating and use of the SDE Tool, and technical guidance on the Substantial Improvement/Substantial Damage (SI/SD) Desk Reference. The technical presentation will be designed for end users of the SDE Tool and will cover all aspects of the SDE, including field inspections and assessments, data collection and entry, evaluation and determination of the percent damage for each structure element, quality control, and data assessment, as well as use of the SDE results at the local level in new construction or repair processes. This new guidance will coincide with the enhancements to the SDE Tool and is scheduled for release by the end of 2012.

If you are interested in this workshop please call the FEMA flood/wind helpline at (866) 927-2104 (toll free) or email: FEMA-Buildingsciencehelp@dhs.gov.

Table 1. Publications Included in This Catalog

Publication No.	Title	Page No.	Flood Damage	Wind Damage	Wildfire Damage	Accessibility
FIA 22	<i>Hurricane Andrew in Florida: Observations, Recommendations, and Technical Guidance</i>	13		✓		
FIA 23	<i>Hurricane Iniki in Hawaii: Observations, Recommendations, and Technical Guidance</i>	13	✓	✓		
FEMA P-55	<i>Coastal Construction Manual (Fourth Edition)</i>	2	✓	✓		
FEMA P-85	<i>Protecting Manufactured Homes from Floods and Other Hazards (Second Edition)</i>	5	✓	✓		
FEMA P-259	<i>Engineering Principles and Practices for Retrofitting Flood-Prone Residential Structures (Third Edition)</i>	2	✓			
FEMA 277	<i>The Oklahoma City Bombing: Improving Building Performance Through Multi-Hazard Mitigation</i>	16				
FEMA 281	<i>Hurricane Opal in Florida</i>	13	✓			
FEMA 290	<i>Mitigation Assessment Team Report: Hurricane Fran in North Carolina: Building Performance Observations, Recommendations, and Technical Guidance</i>	12	✓	✓		
FEMA P-312	<i>Homeowner's Guide to Retrofitting (Second Edition)</i>	4	✓			
FEMA 320	<i>Taking Shelter From the Storm: Building a Safe Room For Your Home or Small Business (Third Edition)</i>	6		✓		
FEMA 338	<i>Hurricane Georges in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance</i>	12	✓	✓		
FEMA 339	<i>Hurricane Georges in Puerto Rico: Building Performance Observations, Recommendations, and Technical Guidance</i>	12	✓	✓		
FEMA 342	<i>Midwest Tornadoes of May 3, 1999: Observations, Recommendations, and Technical Guidance</i>	14		✓		
FEMA 347	<i>Above the Flood: Elevating Your Floodprone House</i>	7	✓			
FEMA 348	<i>Protecting Building Utilities From Flood Damage: Principles and Practices for the Design and Construction of Flood Resistant Building Utility Systems</i>	7	✓			

Table 1. Publications Included in This Catalog (continued)

Publication No.	Title	Page No.	Flood Damage	Wind Damage	Wildfire Damage	Accessibility
FEMA 361	<i>Design and Construction Guidance for Community Safe Rooms (Second Edition)</i>	6		✓		  
FEMA 388 CD	<i>Safe Room Resources CD</i>	5		✓		
FEMA 403	<i>World Trade Center Building Performance Study: Data Collection, Preliminary Observations, and Recommendations</i>	16				
FEMA P-424	<i>Design Guide for School Safety in Earthquakes, Floods, and High Winds</i>	17	✓	✓		 
FEMA P-431	<i>Tornado Protection: Selecting Refuge Areas in Buildings (Second Edition)</i>	5		✓		 
FEMA 488	<i>Hurricane Charley in Florida: Observations, Recommendations, and Technical Guidance</i>	11	✓	✓		 
FEMA 489	<i>Hurricane Ivan in Alabama and Florida: Observations, Recommendations, and Technical Guidance</i>	11	✓	✓		  
FEMA 490	<i>Summary Report on Building Performance 2004 Hurricane Season</i>	12	✓	✓		 
FEMA 497	<i>National Flood Mitigation Data Collection Tool and RLP Viewer - User's Guide (FEMA 497)</i>	20	✓			
FEMA 497	<i>Repetitive Loss Property (RLP) Viewer 2.0</i>	20	✓			
FEMA P-499	<i>Home Builder's Guide to Coastal Construction, Technical Fact Sheet Series (37 Fact Sheets)</i>	2	✓	✓		  
FEMA 543	<i>Design Guide for Improving Critical Facility Safety from Flooding and High Winds</i>	17	✓	✓		
FEMA 548	<i>Summary Report on Building Performance: Hurricane Katrina 2005</i>	10	✓	✓		 
FEMA 549	<i>Hurricane Katrina in the Gulf Coast: Building Performance Observations, Recommendations, and Technical Guidance</i>	10	✓	✓		  
FEMA P-550	<i>Recommended Residential Construction in Coastal Areas: Building on Strong and Safe Foundations (Second Edition)</i>	4	✓	✓		  
FEMA 577	<i>Design Guide for Improving Hospital Safety in Earthquakes, Floods, and High Winds</i>	17	✓	✓		
FEMA P-737	<i>Home Builder's Guide to Construction in Wildfire Zones Technical Fact Sheet Series (17 Fact Sheets)</i>	6			✓	  
FEMA P-754	<i>Wildfire Hazard Mitigation Handbook for Public Facilities</i>	6			✓	
FEMA P-757	<i>Hurricane Ike in Texas and Louisiana: Building Performance Observations, Recommendations, and Technical Guidance</i>	10	✓	✓		  
FEMA P-758	<i>Substantial Improvement/Substantial Damage Desk Reference</i>	4	✓			  
FEMA P-762	<i>Local Officials Guide for Coastal Construction</i>	5	✓	✓		  
FEMA P-765	<i>Midwest Floods of 2008 in Iowa and Wisconsin: Building Performance Observations, Recommendations, and Technical Guidance</i>	15	✓			  
FEMA P-784 CD	<i>The FEMA Substantial Damage Estimator (SDE) (Version 1.1, September 2011)</i>	20	✓			 

Table 1. Publications Included in This Catalog (continued)

Publication No.	Title	Page No.	Flood Damage	Wind Damage	Wildfire Damage	Accessibility
FEMA B-797	<i>Hazard Mitigation Field Book: Roadways</i>	4	✓			
FEMA P-798	<i>Natural Hazards and Sustainability for Residential Buildings</i>	3	✓	✓		
FEMA P-804	<i>Wind Retrofit Guide for Residential Buildings</i>	3		✓		
FEMA P-908	<i>Mitigation Assessment Team Report – April and May 2011 Tornadoes in Alabama, Georgia, Mississippi, Tennessee, and Missouri</i>	14		✓		
Recovery Advisories						
	Hurricane Charley (2004) Recovery Advisories	11		✓		
	Hurricane Katrina (2005) Recovery Advisories	11	✓	✓		
	Hurricane Ike (2008) Recovery Advisories	10	✓	✓		
	2007 Tornadoes in Florida Recovery Advisories	15		✓		
	2007 Tornadoes in Kansas Recovery Advisories	15		✓		
	2011 Tornado Recovery Advisories in Alabama, Georgia, Mississippi, Tennessee, and Missouri	14		✓		
	Midwest Floods (2008) Recovery Advisories	15	✓			
Technical Bulletins						
FEMA TB-0	<i>User's Guide to NFIP Technical Bulletins</i>	17	✓			
FEMA TB-1	<i>Openings in Foundation Walls and Walls of Enclosures</i>	18	✓			
FEMA TB-2	<i>Flood Damage-Resistant Materials Requirements</i>	18	✓			
FIA TB-3	<i>Non-Residential Floodproofing – Requirements and Certification</i>	18	✓			
FEMA TB-4	<i>Elevator Installation</i>	18	✓			
FEMA TB-5	<i>Free-of-Obstruction Requirements</i>	18	✓			
FIA TB-6	<i>Below-Grade Parking Requirements</i>	19	✓			
FIA TB-7	<i>Wet Floodproofing Requirements</i>	19	✓			
FIA TB-8	<i>Corrosion Protection for Metal Connectors in Coastal Areas</i>	19	✓			
FEMA TB-9	<i>Design and Construction Guidance for Breakaway Walls Below Elevated Coastal Buildings</i>	19	✓			
FIA TB-10	<i>Ensuring That Structures Built on Fill In or Near Special Flood Hazard Areas Are Reasonably Safe From Flooding</i>	19	✓			
FIA TB-11	<i>Crawlspace Construction for Buildings Located in Special Flood Hazard Areas</i>	19	✓			
Brochures						
FEMA L-233	<i>Taking Shelter From the Storm: Building a Safe Room For Your Home or Small Business</i>	22		✓		
FEMA L-235	<i>Homeowner's Guide to Retrofitting</i>	22		✓		
FEMA L-780	<i>Building Science for Disaster-Resistant Communities: Wind Hazard Publications</i>	21		✓		
FEMA L-781	<i>Building Science for Disaster-Resistant Communities: Hurricane Hazard Publications</i>	21		✓		

Table 1. Publications Included in This Catalog (continued)







Publication No.	Title	Page No.	Flood Damage	Wind Damage	Wildfire Damage	Accessibility
FEMA L-782	<i>Building Science for Disaster-Resistant Communities: Flood Hazard Publications</i>	21	✓			
	<i>Reducing Flood Losses Through the International Codes: Meeting the Requirements of the National Flood Insurance Program</i>	22	✓			
Protect Your Property or Business From Disaster Series						
	Protect Your Business From All Natural Hazards	22	✓	✓	✓	
	Protect Your Property From Flooding	23	✓			
	Protect Your Property From High Winds	23		✓		
Other						
	<i>CodeMaster for Flood Resistant Design (2011)</i>	7	✓			
	<i>Flood Hazard Mitigation Handbook for Public Facilities</i>	8	✓			
	<i>Flood Resistant Provisions of the 2012 International Code Series</i>	8	✓			
	<i>Flood Resistant Provisions of the 2009 International Code Series</i>	8	✓			
	<i>Highlights of ASCE 24-05 Flood Resistant Design and Construction</i>	9	✓			
	<i>Hurricane Mitigation: A Handbook for Public Facilities</i>	8		✓		
	<i>I-Codes Sample Checklists for Flood Hazards</i>	9	✓			
	<i>Provisions of the 2009 I-Codes and ASCE 24 Compared to the NFIP</i>	9	✓			
	<i>Reducing Flood Losses Through the International Code Series (Third Edition)</i>	8	✓			 
Training Courses And Workshops					Contact Information	
WIND						
	Retrofitting Residential Buildings for Wind Hazards (FEMA P-804)	24	✓			FEMA-Buildingsciencehelp@dhs.gov
COASTAL						
	Coastal Construction Workshop for Home Builders (FEMA P-499)	24	✓	✓		FEMA-Buildingsciencehelp@dhs.gov
	Introduction to Coastal Foundation Design and Construction for Design Professionals (FEMA P-550)	25	✓	✓		FEMA-Buildingsciencehelp@dhs.gov
	Residential Coastal Construction (EMI 386)	25	✓	✓		FEMA-Buildingsciencehelp@dhs.gov
FLOOD						
	Retrofitting Flood-Prone Residential Buildings (EMI 279)	25	✓			FEMA-Buildingsciencehelp@dhs.gov
	The Flood Provisions of the International Code Series and ASCE 24	25	✓			FEMA-Buildingsciencehelp@dhs.gov
MULTI-HAZARD						
	Multi-Hazard Mitigation Design Considerations (EMI 312)	26	✓	✓		FEMA-Buildingsciencehelp@dhs.gov
	Design Guide for Improving Critical Facility Safety from Flooding and High Winds: Providing Protection to People and Buildings (FEMA 543)	26	✓	✓		FEMA-Buildingsciencehelp@dhs.gov

Table 1. Publications Included in This Catalog (continued)

Publication No.	Title	Page No.	Flood Damage	Wind Damage	Wildfire Damage	Accessibility
Training Courses And Workshops (continued)					Contact Information	
SAFE ROOMS						
	Design and Construction of Safe Rooms for Architects and Engineers (FEMA 361/320)	27		✓		Saferoom@dhs.gov
	Evaluating Buildings for Extreme-Wind Refuge Areas	27		✓		Saferoom@dhs.gov
	Preparing a Successful Safe Room Grant Application	27		✓		Saferoom@dhs.gov
TOOLS						
	SI/SD Using FEMA Guidance to Administer the NFIP Substantial Improvement/Substantial Damage Requirements	28	✓			FEMA-Buildingsciencehelp@dhs.gov
	Substantial Damage Estimator (FEMA P-784)	28	✓			FEMA-Buildingsciencehelp@dhs.gov
	The SDE Substantial Damage Estimator (SDE) Web-Based Course (late 2012)	29	✓			



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