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Resilient Design Guide – High Wind Wood Frame Construction

3rd Biennial Residential Design & Construction Conference

March 2-3, 2016

@FederalAlliance
@trsmail

Agenda

- FLASH Background
- Resilient Design Guide – High-Wind Wood Frame Residential Construction
- Resilient Design Guide - Residential Concrete Construction

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Mission: *Strengthening Homes & Safeguarding Families*

- We *partner* with leading public, private and nonprofit academic, consumer, entertainment, financial services, product, research, service and technical organizations to deliver the latest advances in disaster safety information to the public
- *Create* a public value for resilience
- *Develop and deliver* initiatives focused on:
  - Storytelling for the public (Consumer Awareness)
  - Curriculum for students & professionals (Education & Training)
  - Policy leadership for influencers (Leadership)
- *Mainstream* the science of safe, strong and sustainable buildings

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Legacy Partners

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Resilient Design Guide

- The story behind the Resilient Design Guide

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Resilient Communities

- Resilient Communities start one house at a time.
- There is no community without homes, businesses, schools, places of worship, and infrastructure.
- Resilient communities bend but don’t break when disaster strikes.
- By reducing damage a community can minimize economic and social disruptions and bounce back more quickly after a disaster strikes.

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Consequences of Non-resilience

Initial construction is non-resilient

High wind event occurs

Building is damaged, produces debris

Neighboring buildings damaged by debris

Neighborhood is rendered uninhabitable

Community is slow to or doesn't recover

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The goal of the project was to utilize the architectural charette process to develop a document that would “communicate house construction technology that is built stronger and more weather resistant than required by the building code.”

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Resilient Design Guide – High Wind Wood Frame Construction

- Vision: To communicate “Why,” “How,” and What”
- Promotes enhanced awareness & understanding of high wind resistant wood-frame building design and construction practices
- Developed through a dialogue among: architects, engineers, homebuilders, academics, construction experts, insurers, and volunteer disaster responders / rebuilders

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High Wind Damage

Hurricane Katrina Damage
Photo by Rose Grant, AIA, CPCU

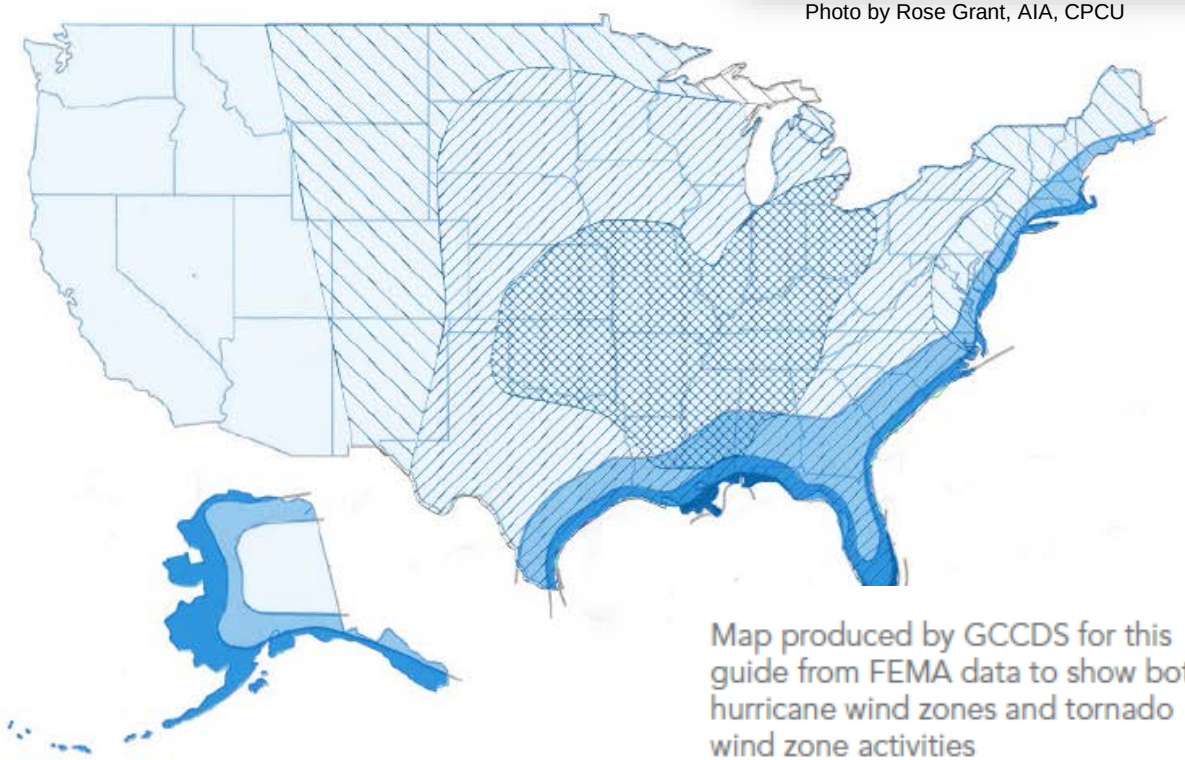
WIND ZONE MAP

- Zone 1 / 0–90 mph
- Zone 2 / 90–120 mph
- Zone 3 / 120–140 mph
- Zone 4/ 140–150 mph

- Special Zone 1
- Special Zone 2
- Special Zone 3

Zones are based on values that are nominal design 3-second gust wind speeds in miles per hour (mph) at 33 feet above grade for Exposure Category C. Special zones indicate level of risk for tornado and other straight-line wind events.

Map produced by GCCDS for this guide from FEMA data to show both hurricane wind zones and tornado wind zone activities



Map produced by GCCDS for this guide from FEMA data to show both hurricane wind zones and tornado wind zone activities

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The Why

~ 39 Million U.S. homes are at risk from winds that can exceed 110 mph

Wind Damage Photos by Rose Grant, AIA, CPCU

Building Codes vary by location and do not provide for resilience. Past wind events provide evidence of avoidable building failures.

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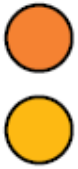
The How

- Ordinary, High Wind, or Resilient Techniques
- Guide broken down by Components:
  - Roof system,
  - Wall system,
  - Foundation / Floor system, and
  - Site (landscaping)
- Easy to understand graphics and color coding



These markers are used throughout the guide to indicate whether a building material is considered typical in high wind construction or represents an "increased resilience" construction upgrade.

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Cost and Complexity

Clearly spells out the important areas of concern for most people; can they do it, can they afford it?

This icon indicates the cost implication of different components from 1 to 5 with 1 representative of baseline construction costs.

This icon indicates the construction implication and/or difficulty level from 1 to 5 scale with 1 representative of baseline for ease of construction need for specialized installation and ability for skilled labor to complete the work.

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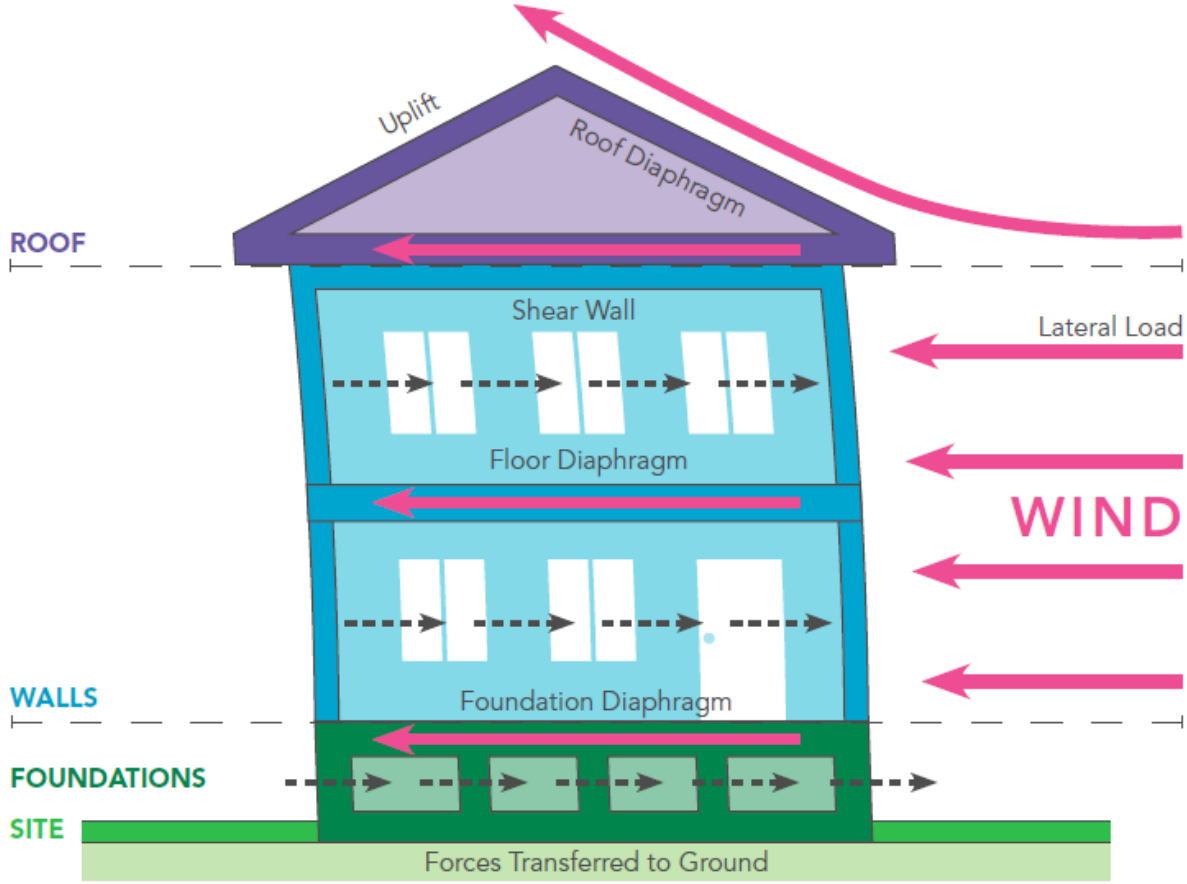
The What



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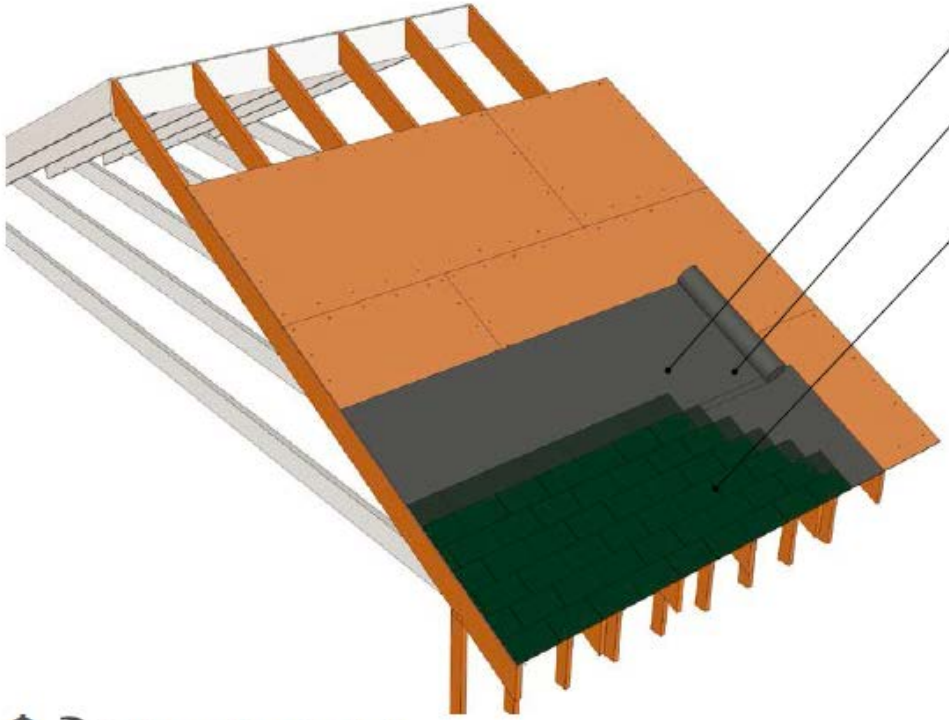
The What: Ordinary



Underlayment
30# felt tar paper

Staple fastener

Coverings
Three tab shingle –
4 corrosion resistant
nails per shingle

$ Covering Detail

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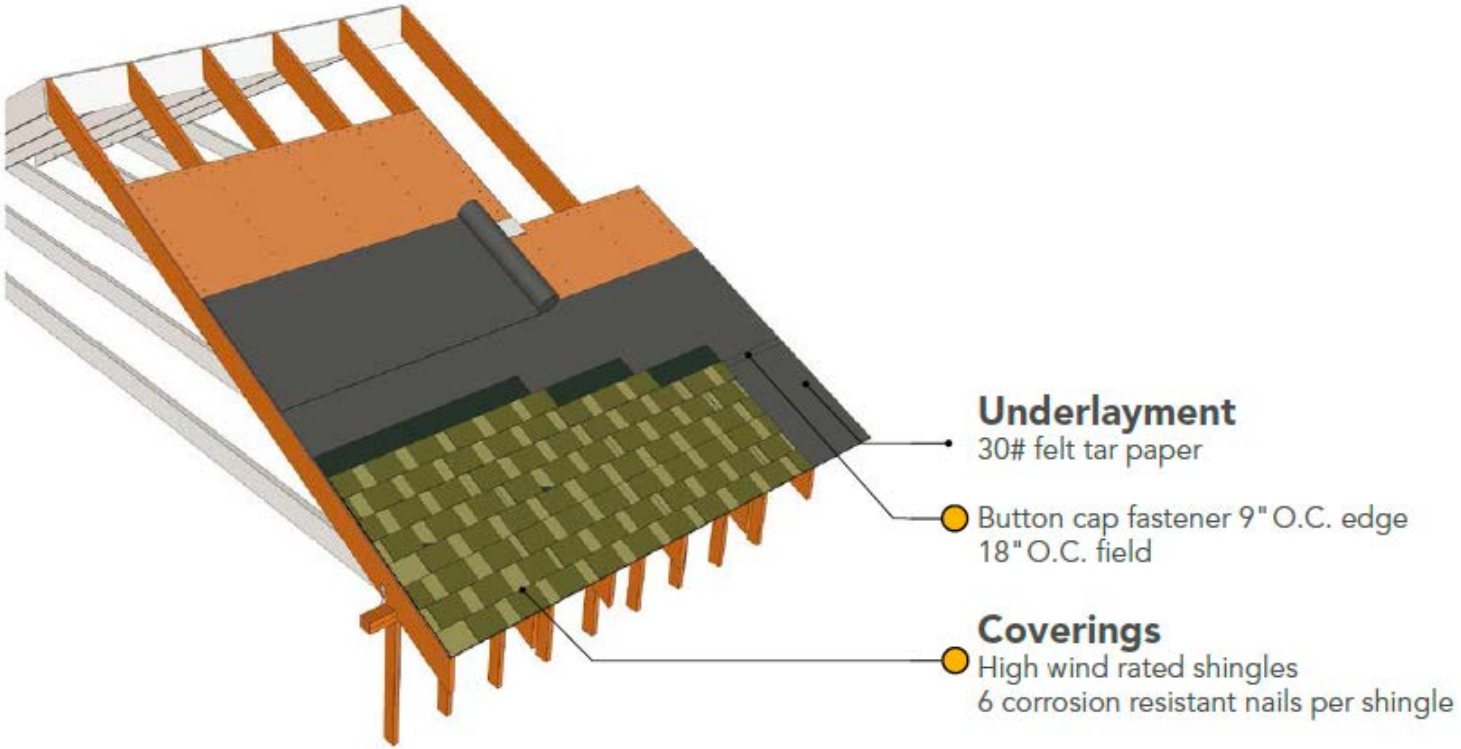
The What: High Wind



$$ Covering Detail

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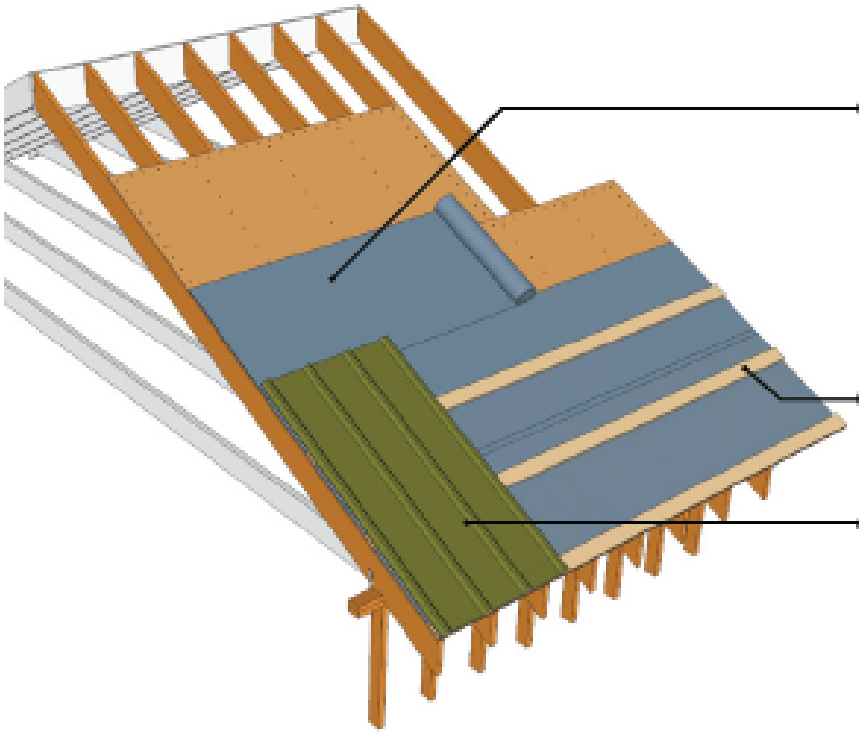
The What: Resilient



$$$ Covering Detail

Underlayment
Self-adhering polymer modified bitumen membrane over entire roof deck
or
Self-adhering polymer modified bitumen flashing tape on all decking panel joints.
30# felt tar paper. Button cap fastener
9" O.C. edge 12" O.C. field

Coverings
On 1x4 wood (untreated) purlins fastened by 2 10d ring shank nails 12" O.C. into framing every other set

Metal Roof – screw down panel
Per manufacturers' specification for increased wind load
or
Metal Panel / Standing Seam Metal Roof System
Per manufacturers' specification for increased wind load
Concrete & Clay Tile Systems
Per manufacturers' specification for increased wind load
or
High Wind Rated Shingles
Per manufacturers' specification for increased wind load

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The What: Bringing it Together

The Guide provides a side by side comparison tool – by building element

ROOF COMPONENTS	Ordinary Construction	High Wind Construction	Resilient Construction
Decking – Thickness	1/2" plywood or OSB	5/8" plywood or OSB, full sheet at eaves, ridges; no sheet narrower than 24" anywhere on the roof and no sheet shorter than 48" at rake edge	5/8" plywood or OSB, no sheet narrower than 24" anywhere on the roof and no sheet shorter than 48" at rake edge
Decking – Fasteners	6d common nails	8d ring shank nails	8d ring shank nails
Decking – Nailing Schedule	6"O.C. at edge, 8"O.C. field	4"O.C. at edge, 6"O.C. field, panel edge "H" clip spaced between framing member attachment	4"O.C. at edge, 6"O.C. field
Sealed Roof Deck		Closed-cell spray polyurethane foam adhesive at underside of decking at all framing and joint attachments	Closed-cell spray polyurethane foam adhesive at underside of decking at all framing and joint attachments
Framing – Spacing	24"O.C.	24"O.C.	16"O.C.
Framing – Eave Blocking		2x eave blocking *(see structural detail, page 12)*	2x eave blocking *(see structural detail, page 13)*
Framing – Connection		Metal strap at every truss, Metal strap tie at ridge	Metal strap at every truss, Metal strap tie at ridge
Underlayment	30# felt paper	30# felt/tar paper, button cap fastener, 9"O.C. edge, 12"O.C. field or self-adhering polymer modified bitumen flashing membrane over entire deck or self-adhering polymer modified bitumen flashing tape on all decking panel joints	30# felt/tar paper, button cap fastener, 9"O.C. edge, 12"O.C. field or self-adhering polymer modified bitumen flashing membrane over entire deck or self-adhering polymer modified bitumen flashing tape on all decking panel joints
Covering – Type	Three tab shingle	High wind rated shingles or metal roof or metal panel/ standing seam metal roof system or concrete & clay tile	High wind rated shingles or metal roof or metal panel/ standing seam metal roof system or concrete & clay tile
Covering – Connection	4 corrosion resistant nails per shingle	6 corrosion resistant nails per shingle	Per manufacturer's instructions for increased wind loads

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Supplemental Information Provided

For Roofing the Guide provides the following additional information:

- Hazards
- Ridges, Valleys and Accessories
- Underlayment and Coverings
- Nail Patterns
- Gable End Wall
- Roof Connections

Design Guide Participants & Reviewers

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The Concrete Demonstration Project

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The Concrete Demonstration Project

Log Concept

Southwest Perspective

+lab

114 Oceanside Ave.
Exterior 3D Model 021215

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The RDG – Concrete Edition

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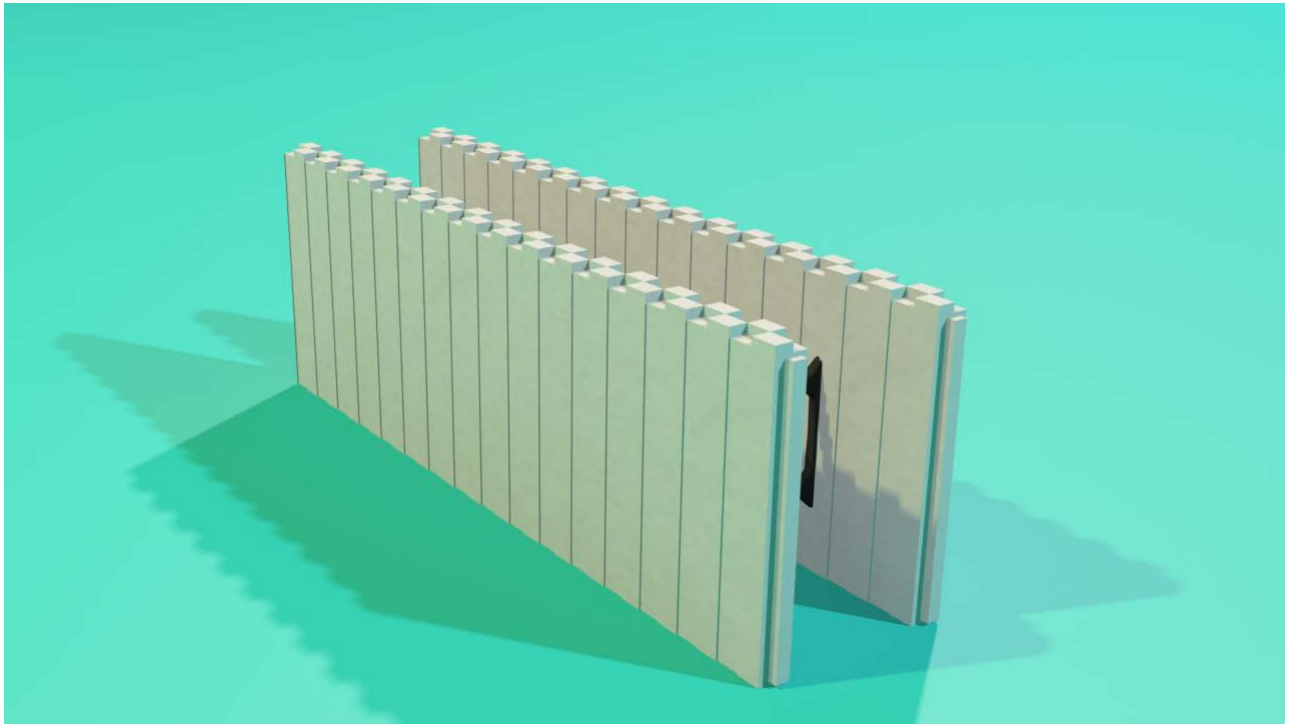
The Concrete Demonstration Project



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A Model for the Future?

- Will be useful in creating risk awareness
- Looking forward to user feedback, by user type
- Model for other hazards, other guides
- Model for collaboration by a diverse groups of construction experts

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Download the Guide

- www.flash.org/resilientdesignguide.pdf
- Mitigation Movement
  - Search on Resilient Design Guide

Disaster Safety: One Movement, Many Voices

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