

# Uniform Mitigation Verification Inspection Form: Issues and Recommendations

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**APPLIED  
RESEARCH  
ASSOCIATES, INC.**

An Employee-Owned Company

# Key Points

- Many moving parts
  - Building codes (constantly changing)
  - Loss mitigation studies (relativities/credits)
  - Legislation, rules and informational memoranda
  - Insurance filings (implementation of credits)
  - UMVI Form (collection of data)
- Keeping all these moving parts synchronized is challenging and requires an understanding of the science behind the credits

# Key Points

- Interpretation and judgment are large problems and lead to errors and significant variances from inspector to inspector
- General recommendations
  - Simplify the form and provide separate, detailed instructions
  - Collect objective information (nail size, % non-hip features, etc.) instead of simply checking a box

# Key Points

- Professional qualifications are worth something, but are a distant second to significantly improved training and quality assurance procedures
- A deliberate schedule is needed to allow for regular updates of the form to reflect new science and address interpretation issues or other problems

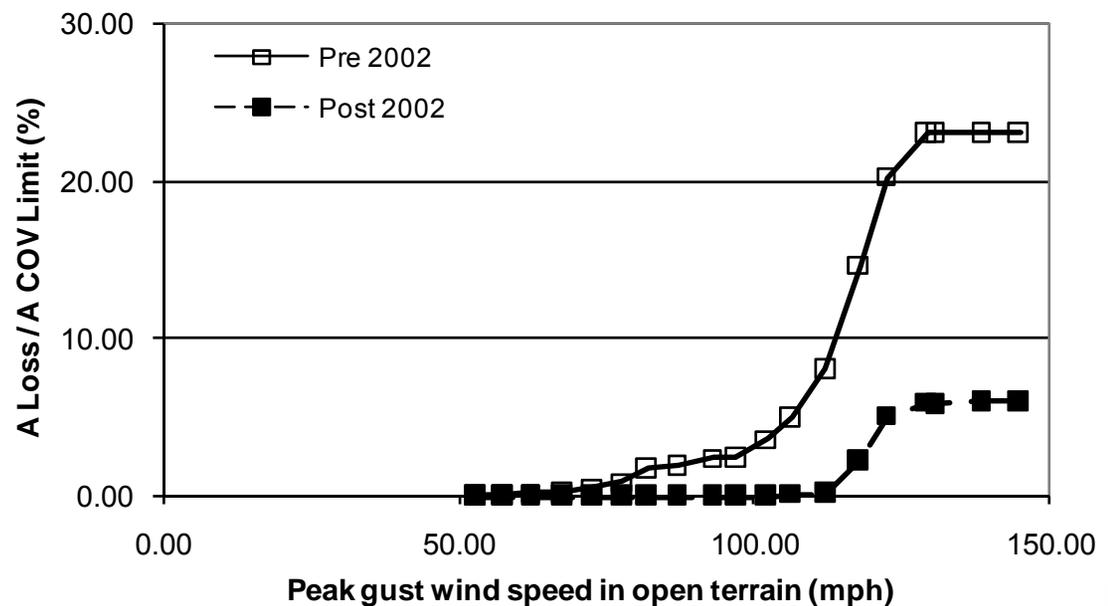
# 1. Building Code

## 1. Building Code: What building code was used to design and build the structure?

- A. 1994 South Florida Building Code (building permit application date of 9/1/1994 or later in Miami-Dade and Broward Counties (also known as the High Velocity Hurricane Zone (HVHZ))).
- B. Building code prior to the 1994 South Florida Building Code (building permit application date of 8/31/1994 or earlier in Miami-Dade and Broward Counties (HVHZ)).
- C. 2001 Florida Building Code (building permit application date of 3/1/2002 or later outside the HVHZ).
- D. Building code prior to the 2001 Florida Building Code (building permit application date of 2/28/2002 or earlier outside the HVHZ).
- E. Unknown or undetermined.

### Insurance Co. Data: Loss vs. Wind Speed

(Company A, 1 story)



# 1. Building Code: Issues

- The purpose of this question is to determine which credit table to use (new vs. existing construction)
- Neither the 2002 study nor the OIR-B1-1699 indicate that homes built to the 1994 SFBC automatically qualified for the FBC differentials
  - Post 1994 SFBC homes should be fully inspected
  - Existing construction credits should be used
  - Resulting credits are slightly less than the new construction FBC table, assuming the roof cover is in good condition

# 1. Building Code: Issues

- HVHZ vs. non-HVHZ is redundant
  - County is already known to the insurer
  - County is also a field in the header section of the UMFIF

# 1. Building Code: Immediate Change

## 1. Original permit date and/or year-built information\*

- a) Building permit appl. date (MM/DD/YYYY) \_\_\_\_\_, or
  - Not available
- b) Year built (YYYY) \_\_\_\_\_, or
  - Not available
- c) Source of year built information (complete only if year built provided in (b))
  - Tax Records  Insurer  Other \_\_\_\_\_

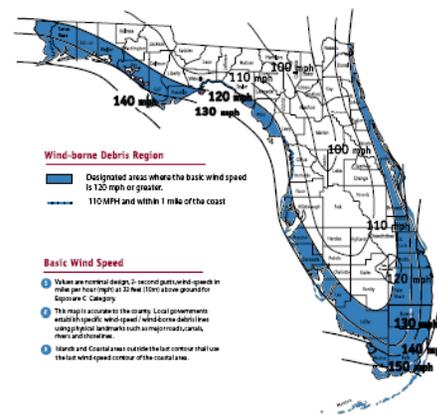
\* Permit application date required for New Construction credits if year built is 2002 or 2003.



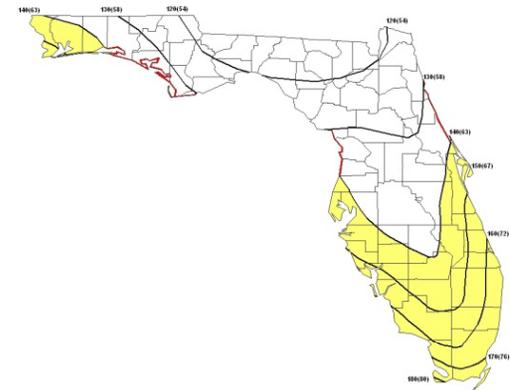
# 1. Building Code: 2011

- Address “2006 FBC” changes examined in 2008 study
- Planned adoption of ASCE 7-10 by the FBC on 12/31/2011 will mean significant changes for Florida
  - Basic wind speeds
  - Windborne debris region
  - Exposure D

State of Florida  
Wind-Borne Debris Region



ASCE 7-10



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# 2. Roof Cover

## 2. Predominant Roof Covering:

Permit Application Date: \_\_\_\_\_ or Date of Installation: \_\_\_\_\_

- A. At a minimum meets the 2001 Florida Building Code or the 1994 South Florida Building Code and has a Miami-Dade NOA or FBC 2001 Product Approval listing demonstrating compliance with ASTM D 3161 (enhanced for 110MPH) OR ASTM D 7158 (F, G or H), OR FBC TAS 100-95 and TAS 107-95, OR FMRC 4470 and/or 4471 (for metal roofs).
- B. Does not meet the above minimum requirements.
- C. Unknown or undetermined.



## 2. Roof Cover: Issues

- Roof cover type not recorded
  - Insurance losses are significantly higher for houses with tile roofs
  - Current credits are not limited to shingles
- Current wording is ambiguous
  - meets FBC or SFBC and has NOA or FBC PA compliant w/ 3161 or 7158, or 100-95 and 107-95, OR 4470 and/or 4471

## 2. Roof Cover: Issues

### ■ Possible interpretations

- {meets FBC or SFBC} and {has (NOA) or (FBC PA compliant w/ [3161 or 7158, or 100-95 and 107-95, or 4470 and/or 4471])}.
- {meets (FBC or SFBC) and has NOA} or {FBC PA compliant w/ (3161 or 7158, or 100-95 and 107-95, or 4470 and/or 4471)}.
- meets {FBC} or {SFBC and has NOA} or {FBC PA compliant w/ (3161 or 7158, or 100-95 and 107-95, or 4470 and/or 4471)}.

= meets FBC or SFBC

## 2. Roof Cover: Immediate Changes

- Was roof cover permitted under ...
  - FBC
  - SFBC
  - Neither
  - Unknown
- Year of installation
- Permit application date required for all re-roofs and for any original roofs installed during a transition year
  - FBC: 2002 or 2003
  - SFBC: 1994 or 1995



## 2. Roof Cover: 2011

- Develop separate discount factors for commonly used roof coverings
  - Tiles
  - Shingles
  - Metal
  - ...
- Implement roof age interpolation to phase out FBC roof credit as roof ages
  - Start at FBC equivalent and end at non-FBC equivalent



# 3. Roof Deck

## 3. Roof Deck Attachment: What is the weakest form of roof deck attachment?

- A. Plywood/Oriented strand board (OSB) roof sheathing attached to the roof truss/rafter (spaced a maximum of 24" o.c.) by staples or 6d nails spaced at 6" along the edge and 12" in the field. -OR- Batten decking supporting wood shakes or wood shingles.-OR- Any system of screws, nails, adhesives, other deck fastening system or truss/rafter spacing that has an equivalent mean uplift resistance of 55 psf.
- B. Plywood/OSB roof sheathing with a minimum thickness of 7/16" attached to the roof truss/rafter (spaced a maximum of 24" o.c.) by 8d common nails spaced 6" along the edge and 12" in the field.-OR- Any system of screws, nails, adhesives, other deck fastening system or truss/rafter spacing that has an equivalent mean uplift resistance of 103 psf.
- C. Plywood/OSB roof sheathing with a minimum thickness of 7/16" attached to the roof truss/rafter (spaced a maximum of 24" o.c.) by 8d common nails spaced 6" along the edge and 6" in the field. -OR- Dimensional lumber/Tongue & Groove decking with a minimum of 2 nails per board. -OR- Any system of screws, nails, adhesives, other deck fastening system or truss/rafter spacing that has an equivalent mean uplift resistance of 182 psf.
- D. Reinforced Concrete Roof Deck.
- E. Other: \_\_\_\_\_
- F. Unknown or unidentified.
- G. No attic access.



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# 3. Roof Deck: Issues

- Maximum allowable spacing not specified for nail types other than common nails
  - Box or sinker (nail gun)
  - Ring shank
  - Twist shank
- Deck thickness was not considered in 2002 or 2008 studies
  - Nonetheless needed for nail length verification

# 3. Roof Deck: Immediate Changes

- Record number of nails per 48" in two field locations
- Record number of missed nails in the two field samples
- Record nail penetration length (to nearest 1/8")
- Record deck thickness (round up to nearest 1/16")
- Record fastener type
  - Common, box, sinker, ring shank, twist shank, staple, screw, other
- Record other deck attachment type
  - Adhesives or closed cell foam

# 3. Roof Deck: 2011

- Consider redefining break points between decks A, B and C or interpolation between A, B and C for nail gun fastener types



# 4. Roof-Wall

## 4. Roof to Wall Attachment: What is the weakest roof to wall connection?

- A. Toe Nails Rafter/truss anchored to top plate of wall using nails driven at an angle through the rafter/truss and attached to the top plate of the wall.
- B. Clips Metal attachments on every rafter/truss that are nailed to one side (or both sides in the case of a diamond type clip) of the rafter/truss and attached to the top plate of the wall frame or embedded in the bond beam.
- C. Single Wraps Metal Straps must be secured to every rafter/truss with a minimum of 3 nails, wrapping over and securing to the opposite side of the rafter/truss with a minimum of 1 nail. The Strap must be attached to the top plate of the wall frame or embedded in the bond beam in at least one place.
- D. Double Wraps Both Metal Straps must be secured to every rafter/truss with a minimum of 3 nails, wrapping over and securing to the opposite side of the rafter/truss with a minimum of 1 nail. Each Strap must be attached to the top plate of the wall frame or embedded in the bond beam in at least one place.
- E. Structural Anchor bolts structurally connected or reinforced concrete roof.
- F. Other: \_\_\_\_\_
- G. Unknown or Unidentified
- H. No attic access



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# 4. Roof-Wall: Issues

- Big issue is “Toe-nail” vs. “Clips, Straps or Wraps”
- Difference between credits on OIR-B1-1699 for clips, single wraps, and double wraps is small
- Proper connection type depends on:
  - Design wind speed
  - Design exposure
  - Roof shape, mean roof height, roof pitch
  - Truss/rafter span and spacing

# 4. Roof-Wall: Immediate Changes

- Leave essentially as is
- For single wraps (C) or double wraps (D), change “minimum of 3 nails” to “minimum of 2 nails on the front side”



# 4. Roof-Wall: 2011

- Toe-nail
- Clips, straps or wraps meeting objective criteria
  - Every truss or rafter
  - At least 2 fasteners
  - Proper placement
  - No evidence of severe corrosion
- Other
- Unknown



# 5. Roof Shape

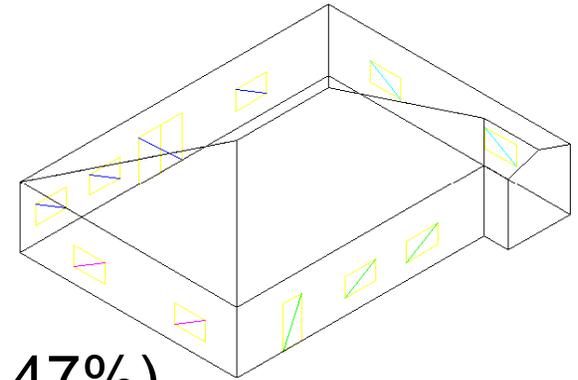
5. **Roof Geometry:** What is the roof shape(s)? (Porches or carports that are attached only to the fascia or wall of the host structure and not structurally connected to the main roof system are not considered in the roof geometry determination.)
- A. Hip Roof                      Hip roof with no other roof shapes greater than 10% of the total building perimeter.
  - B. Non-Hip Roof                Any other roof shape or combination of roof shapes including hip, gable, gambrel, mansard and other roof shapes not including flat roofs.
  - C. Flat Roof                      Flat roof shape greater than 100 square feet or 10% of the entire roof, whichever is greater.



# 5. Roof Shape: Issues

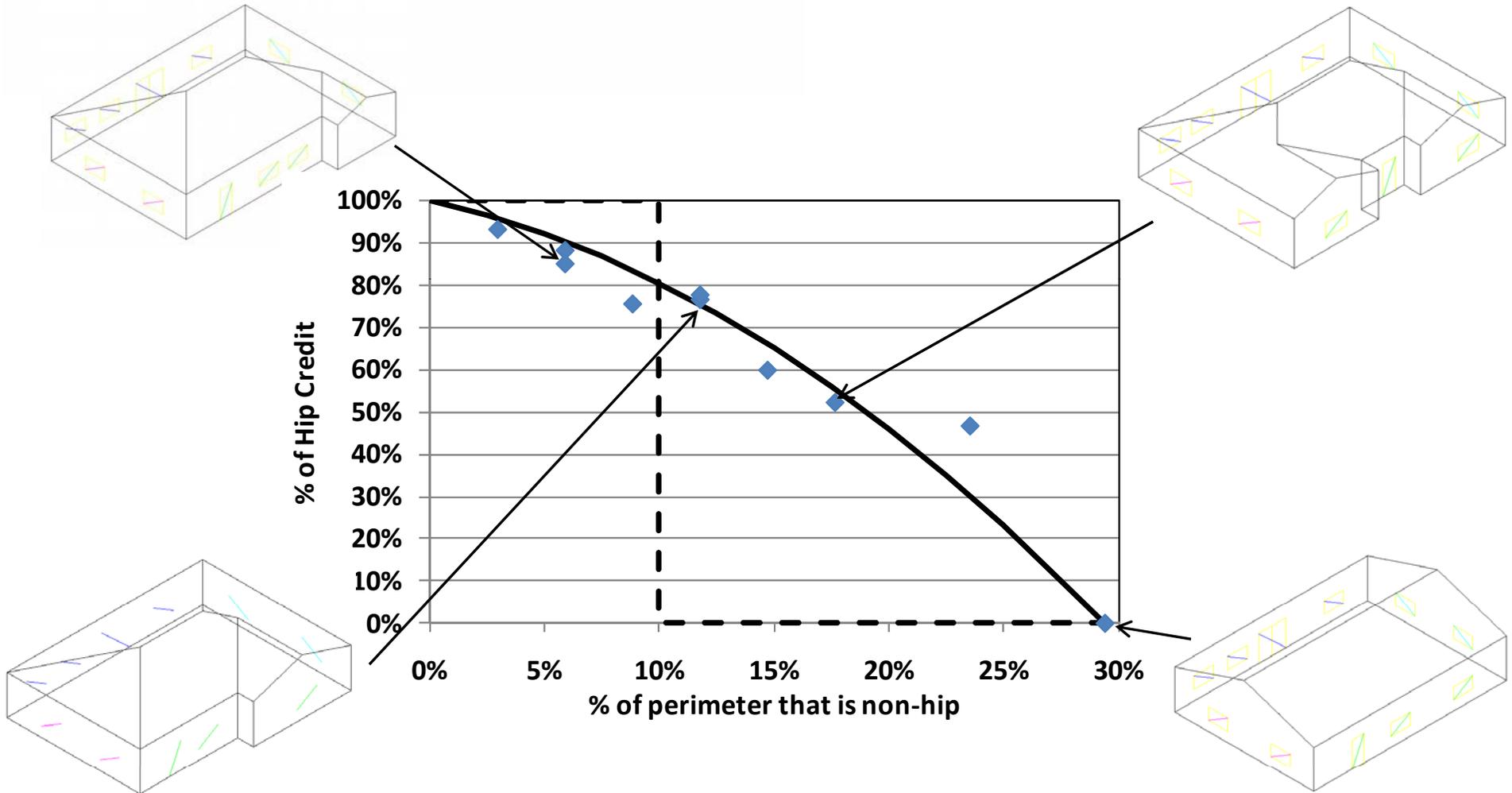
- A lot riding on this answer (big discounts)
- Clarification needed
  - Perimeter
  - Dormers
  - Dutch hips
  - Structurally connected

# Roof Shape



- Hip roof credit is very significant (up to 47%)
- Typical hip roof credit is 15% to 20%
- Hip and gable definitions vary with insurers
  - 2007 UMVIF
    - ✦ Hip roof if “there are no other roof shapes greater than 50% of any major wall length”
  - 2010 UMVIF
    - ✦ Hip roof if “there are no other roof shapes greater than 10% of the total building perimeter”

# Increase in Loss: Hip vs. % Gable

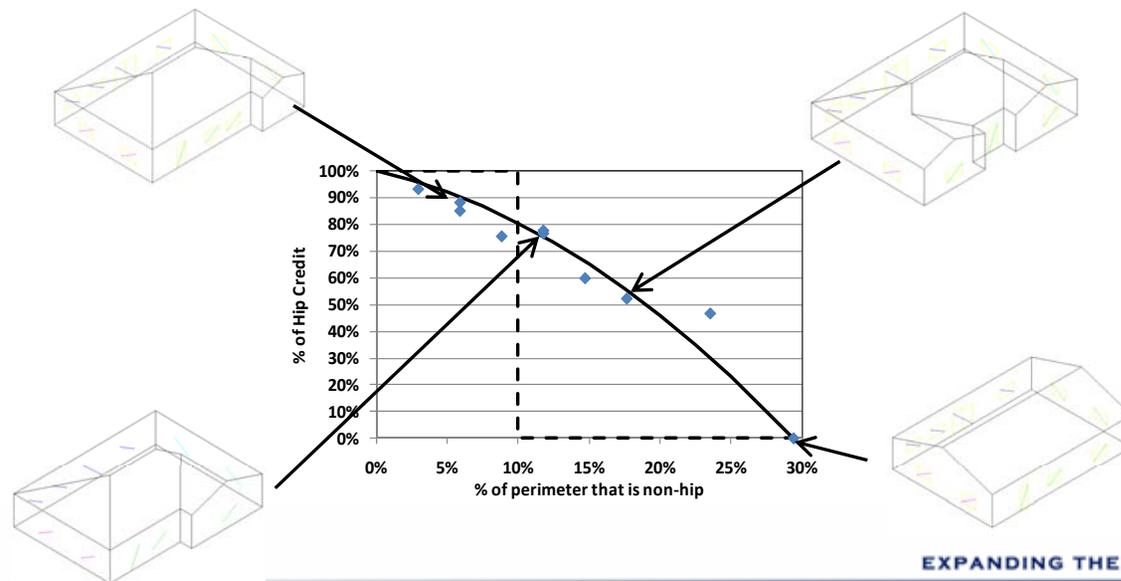


# 5. Roof Shape: Immediate Changes

- Record total length of non-hip features as a % of the total perimeter
  - Define perimeter as roof edge to facilitate verification through use of aerial photography
- Remove “C. Flat Roof”
  - Not on OIR-B1-1699
  - Hip and non-hip are already mutually exclusive and collectively exhaustive
  - Create separate form for buildings with 5 or more units

# 5. Roof Shape: 2011 Form

- Perform additional sensitivity studies on a wide variety of realistic roof shape configurations
- Record percent non-hip
- Interpolate credit between pure hip and pure gable



# 6. Gable End Bracing

6. **Gable End Bracing**: For roof structures that contain gables, please check the weakest that apply:
- A. Gable End(s) are braced at a minimum in accordance with the 2001 Florida Building Code.
  - B. Does not meet the above minimum requirements.
  - C. Not applicable, unknown or unidentified.

# 6. Gable End Bracing: Issues

- Not on OIR-B1-1699

# 6. Gable End Bracing: Immediate Changes

- Remove from UMVIF

## 6. Gable End Bracing: 2011

- Establish a criterion for determining which features are to be included on UMVIF
  - Example: Retain those features that can increase or decrease the relative loss costs of a house by 5% or more for at least one set of building features (e.g., 1.00 to 1.05, 0.20 to 0.19, etc.)
- Add gable end bracing back as a factor if modeling and claims data analysis show that it meets the established criterion

# 7. Wall Construction

7. **Wall Construction Type:** Check all wall construction types for exterior walls of the structure and percentages for each:

- A. Wood Frame \_\_\_\_\_%
- B. Un-Reinforced Masonry \_\_\_\_\_%
- C. Reinforced Masonry \_\_\_\_\_%
- D. Poured Concrete \_\_\_\_\_%
- E. Other: \_\_\_\_\_%



# 7. Wall Construction: Issues

- Not on OIR-B1-1699

# 7. Wall Construction: Immediate Change

- Remove from UMVIF

# 7. Wall Construction: 2011

- Re-visit relativities for un-reinforced masonry vs. wood vs. reinforced masonry with respect to 5% criterion
- If wall construction is determined to be significant then provide clear guidance on how percentages are determined
  - e.g. wood frame dormers, etc. on an otherwise 100% reinforced masonry house

# 8. SWR

## 8. Secondary Water Resistance (SWR): (standard underlayments or hot mopped felts are not SWR)

- A. SWR      Self adhering polymer modified bitumen roofing underlayment applied directly to the sheathing or foam adhesive SWR barrier (not foamed on insulation) applied as a secondary means to protect the dwelling from water intrusion.
- B. No SWR
- C. Unknown or undetermined.



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## 8. SWR: Issues

- Difficult to document
- Cannot be visually verified, unless
  - Observed before primary roof cover is in place, or
  - Closed-cell foam adhesive applied underneath roof deck

# 8. SWR: Immediate Changes

- Leave as is

# 8. SWR: 2011

- Leave as is

# 9. Opening Protection

9. **Opening Protection:** What is the weakest form of wind borne debris protection installed on the structure? (Exterior openings include, but are not limited to: windows, doors, garage doors, skylights, etc. Product approval may be required for opening protection devices without proper rating identification.)
- A. **All Exterior Openings (Glazed and Unglazed)** All exterior openings are fully protected at a minimum with impact resistant coverings, impact resistant doors and/or impact resistant window units that are listed as wind borne debris protection devices in the product approval system of the State of Florida or Miami-Dade County and meet the requirements of one of the following for “Cyclic Pressure and Large Missile Impact”. For the HVHZ, systems must have either a Miami-Dade NOA or FBC Approval marked “*For Use in the HVHZ*”:
    - Miami-Dade County Notice of Acceptance (NOA) 201, 202 **and** 203. (Large Missile - 9 lb.)
    - Florida Building Code Testing Application Standard (TAS) 201, 202 **and** 203. (Large Missile – 9 lb.)
    - American Society for Testing and Materials (ASTM) E 1886 **and** ASTM E 1996. (Large Missile – 9 lb.)
    - Southern Standards Technical Document (SSTD) 12. (Large Missile – 9 lb.)
    - For Skylights Only: ASTM E 1886/E 1996. (Large Missile - 4.5 lb.)
    - For Garage Doors Only: ANSI/DASMA 115. (Large Missile – 9 lb.)
  - B. **All exterior openings** are fully protected at a minimum with impact resistant coverings, impact resistant doors and/or impact resistant window units that are listed as windborne debris protection devices in the product approval system of the State of Florida or Miami-Dade County and meet the requirements of one of the following for “Cyclic Pressure and Large Missile Impact”:
    - ASTM E 1886 and ASTM E 1996. (Large Missile – 4.5 lb.)
    - SSTD 12. (Large Missile – 4 lb. to 8 lb.)
    - For Skylights Only: ASTM E 1886/E 1996. (Large Missile - 2 to 4.5 lb.)
  - C. **All exterior openings** are fully protected at a minimum with impact resistant coverings, impact resistant doors and/or impact resistant window units that are listed as windborne debris protection devices in the product approval system of the State of Florida or Miami-Dade County and meet the requirements of one of the following for “Cyclic Pressure and Small Missile Impact”:
    - Miami-Dade County NOA 201, 202 **and** 203. (Small Missile – 2grams)
    - Florida Building Code TAS 201, 202 **and** 203. (Small Missile – 2 grams)
    - ASTM E 1886 **and** ASTM E 1996. (Small Missile – 2 grams)
    - SSTD 12. (Small Missile – 2 grams)



# 9. Opening Protection

- D. All exterior openings are fully protected with windborne debris protection devices that cannot be indentified as Miami-Dade or Florida Building Code (FBC) product approved. This does not include plywood/OSB or plywood alternatives (see Answer "H").

## All Glazed Exterior Openings

- E. All glazed exterior openings are fully protected at a minimum with impact resistant coverings and/or impact resistant window units that meet the requirements of one of the standards listed in Answer "A" of this question. (Large Missile – 9 lb.)
- F. All glazed exterior openings are fully protected at a minimum with impact resistant coverings and/or impact resistant window units that meet the requirements of one of the standards listed in Answer "B" of this question. (Large Missile – 2 lb. - 8 lb.)
- G. All glazed exterior openings are fully protected at a minimum with impact resistant coverings and/or impact resistant window units that meet the requirements of one of the standards listed in Answer "C" of this question. (Small Missile – 2 grams)
- H. All glazed exterior openings are covered with plywood/OSB meeting the requirements of Section 1609 and Table 1609.1.4 of the 2004 FBC (with 2006 supplements).
- I. All glazed exterior openings are fully protected with wind-borne debris protection devices that cannot be identified as Miami-Dade or FBC product approved. This does not include plywood/OSB or other plywood alternatives that do not meet Answer H (see Answer "K").

## None or Some Glazed Openings

- J. At least one glazed exterior opening does not have wind-borne debris protection.
- K. No glazed exterior openings have wind-borne debris protection. This includes plywood/OSB or plywood alternative systems that do not meet Answer "H".
- L. Unknown or undetermined.



# 9. Opening Protection: Issues

- 2010 updates to UMFIF were a significant improvement, but really need, separately, weakest:
  - Glazed opening, excluding skylights & garage doors
  - Non-glazed opening, excluding skylights & garage doors
  - Skylights
  - Garage doors
- OIR-B1-1699 and ARA 2002 study give opening protection credit for “Windows or All”
  - Both 2002 and 2008 studies give additional 2% credit for all openings protected (vs. all glazed openings)

# 9. Opening Protection: Immediate Changes

- Record, separately, the protection level of the weakest:
  - Glazed opening, excluding skylights, garage doors, and glass block openings
  - Non-glazed opening, excluding skylights & garage doors
  - Skylights
  - Garage doors with glazing
  - Garage doors without glazing
  - Glass block openings



# 9. Opening Protection: Immediate Changes

- Proposed format for recording weakest level of protection:

Opening Protection Level		Glazed Openings				Non-Glazed Openings	
		Windows or Entry Doors	Garage Doors	Skylights	Glass Block	Entry Doors	Garage Doors
A	Miami-Dade NOA 201, 202, and 203 (Large Missile - 9 lb)	✓				✓	
B	FBC TAS 201, 202, and 203 (Large Missile - 9 lb)						
C	ATSM E 1886 and E 1996 (Large Missile - 9 lb)						
D	SSTD 12 (Large Missile - 9 lb)						
E	SSTD 12 (Large Missile - 4 lb to 8 lb)						
F	ATSM E 1886 and E 1996 (Large Missile - 4.5 lb)			✓			
G	ATSM E 1886 and E 1996 (Large Missile - 2 lb)						
H	Miami-Dade NOA 201, 202, and 203 (Small Missile - 2 gram)						
I	FBC TAS 201, 202, and 203 (Small Missile - 2 gram)						
J	ATSM E 1886 and E 1996 (Small Missile - 2 gram)						
K	SSTD 12 (Small Missile - 2 gram)						
L	Wood structural panels meeting 2004 FBC with 2006 supplements						
M	Any other windborne debris protection device that cannot be identified as meeting A-L						
P	Non-glazed door meeting FBC wind pressure requirements						✓
X	No windborne debris protection						
N/A	Not applicable -- there are no openings of this type on the structure		✓		✓		

# 9. Opening Protection: 2011

- Ensure all filings give credit for all glazed openings protected to the 9 lb, 50 ft-sec missile criterion (as per the 2002 and 2008 studies and the OIR-B1-1699 Form)
- Credit should also be given for opening protection that meets the FBC requirements (e.g. 4 ½ lb 2-by-4 impacting at 40 ft/sec in wind speed zones less than 130 mph and > 1 mile from coast)
- Additional credit for ALL openings protected
- Determine appropriate reduction in credit for unprotected skylights

# Summary of Immediate Suggested Changes

SECTION	FEATURE	IMMEDIATE CHANGES
1	Building code	Eliminate SFBC and FBC HVHZ choices
2	Roof cover	Eliminate all references to a standard (Use FBC, SFBC, neither or unknown)
3	Roof deck	Eliminate edge spacing measurement, focus on nail length, type and field spacing
4	Roof wall	No changes now, simplify in 2011
5	Roof shape	Record % non-hip, remove flat roof
6	Gable end bracing	Remove section (not on OIR-B1-1699)
7	Wall construction	Remove section (not on OIR-B1-1699)
8	SWR	No changes
9	Opening protection	Record weakest level of protection for each of up to six categories of openings

# Suggested Major Changes to 2011 OIR-B1-1699

- Interpolation between hip and non-hip for roof shape credit
- Interpolation between FBC and non-FBC roof credits as a function of rover cover type and age
- Interpolation and/or revisit breakpoints for roof deck attachment credit to address nail gun fasteners
- Simplify roof-wall connections credits
  - toe-nail or clip/strap/wrap/structural
- Consider additional features on next slide

# Issues Not Addressed in UMRI Sections 1-9 or OIR-B1-1699

- Terrain (B→C: +50% on average )
  - Losses are much higher and credits differ in Terrain C
- Number of stories (1→2: +50% on average )
- Roof cover type (shingle→tile: +30% on average )
- Roof slope (7:12→4:12: +15% on average )
- Structural wood panels (panel→none: +8% on average)
- Soffit construction (wood→vinyl: +7% on average )

Need to establish criterion for adding or deleting factors

# Summary

- Many moving parts
  - Building codes
  - Loss mitigation studies
  - Legislation, rules and informational memoranda
  - Insurance filings
  - UMVI Form

# Summary

- We have recommended several immediate changes to the UMVI that:
  - Simplify the form
  - Collect objective information (nail size, % non-hip features, etc.) instead of simply checking a box
  - Eliminate two sections (consistent with OIR-B1-1699)
    - ✦ Gable end bracing
    - ✦ Wall construction
- Separate, detailed instructions and training programs for completing the form are needed

# Summary

- Professional certification/licensure may or may not be beneficial, but it is a distant second to
  - training and testing by knowledgeable and experienced instructors
  - an independent quality assurance process
- A scheduled update cycle is needed to allow for regular revisions and improvements to the form to reflect new science and address interpretation issues or other problems
  - Recommend a two year cycle for major updates to allow time for comments and new rate filings

# Questions?

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