Property Damage – Wind, Water, Flood, Defect & Resulting Mold

Prevention, Restoration & Remediation Techniques

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Lorman Faculty

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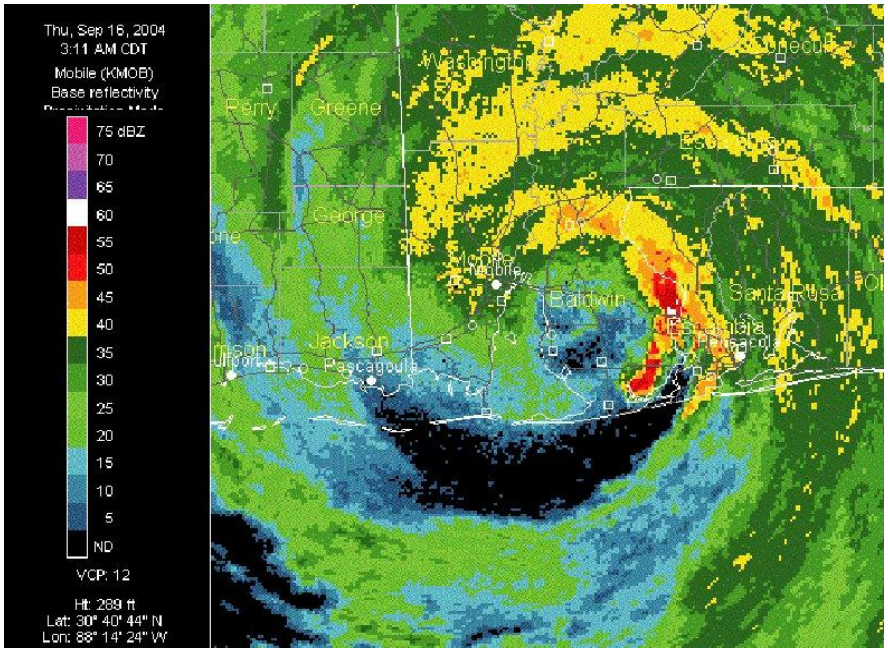
Career High Lights

- General Contractor - N.C., Fl. & S.C. for more than 15 yrs
- Appraiser / Umpire/ Expert - $250,000,000 + in property claims
- Trained Thermographer – Building Diagnostician
- Flood Plain Manager - FEMA L273
- UF, FSU Stromrisk.org, SERRI, National Hurricane Conference
- DIY – “Last House Standing” - mitigation industry expert

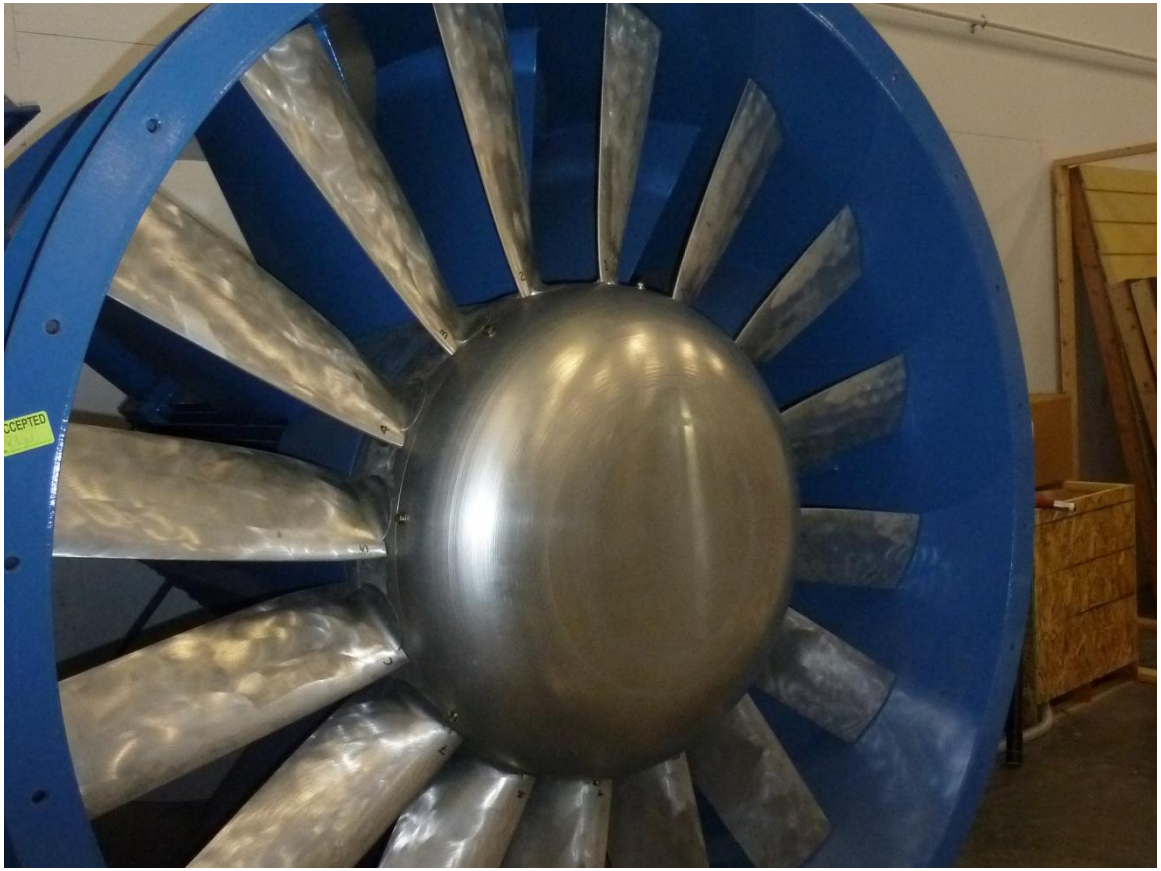


This portion of the conference will discuss the science behind & the preparation of a property so as to be hardened against wind damage

WIND DAMAGE – PREVENTION - SCIENCE

Wind Damage – Science - IIBHS – Test Facility

This facility is located in South Carolina just south of Charlotte, N.C. The wind “tunnel” has 105 – 310 hp fans with water entrained to replicate rain on a roundtable exposing all faces of the building.

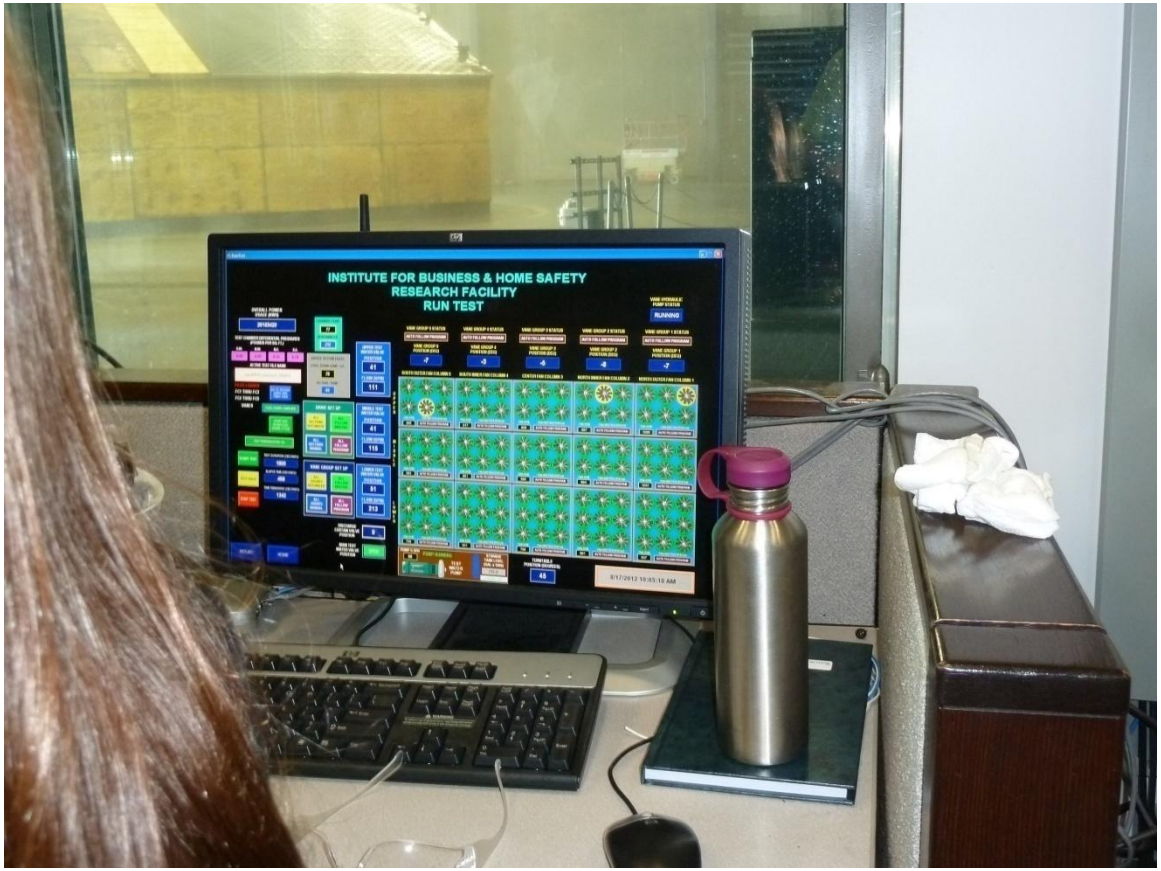


Wind Damage – Science - IIBHS – Test Facility

One of 105 fans

Wind Damage –Science - IIBHS – Test Facility

Baffles to replicate the ebb and flow of a windstorm



Wind Damage – Prevention - IIBHS – Test Facility

Computers monitor every fan, baffle and the rotation of the replica single family home

Wind Damage –Science - IIBHS – Test Facility

Careful documentation of conditions, before during and after each test. The 2010 International building codes is based on the ASCE 07 not the 05 and many changes in the formulas to determine loads have been made

Wind Damage – Prevention - IIBHS – Test Facility

Careful study goes into damages that result from windstorm

Wind Characteristics - angle of attack, run up speed
Thermal aging of shingles, advent of “lifetime “shingles

Wind Damage – Science - UF @ IIBHS – Test Facility

The University of Florida Coastal Engineering program is working with SERRI the DHS and others at the IIBHS facility. UF is one of the leaders in the field of the study of extreme weather and its effect on structures.

Wind Damage – Science - UF @ IIBHS – Test Facility

2010 International Building Code is nolonger based on the ASCE 05.

Wind Damage – Science - UF @ IIBHS – Test Facility

Wind Damage – Prevention

SERRI test roofs– 3 manufacturers 150 mph rated shingles, 25 yr comps and dimensional “lifetime” shingles. Different damage profiles

Wind Damage – Science - UF

UF Hurricane Research Team – Hurricane Isaac

Wind Damage – Science

This the facility often referred to as “The Ultimate Hurricane Simulator”

Wind Damage – Prevention

Wind Damage – Science

Hurricanes can drop as much as 2.4 trillion gallons of water per day

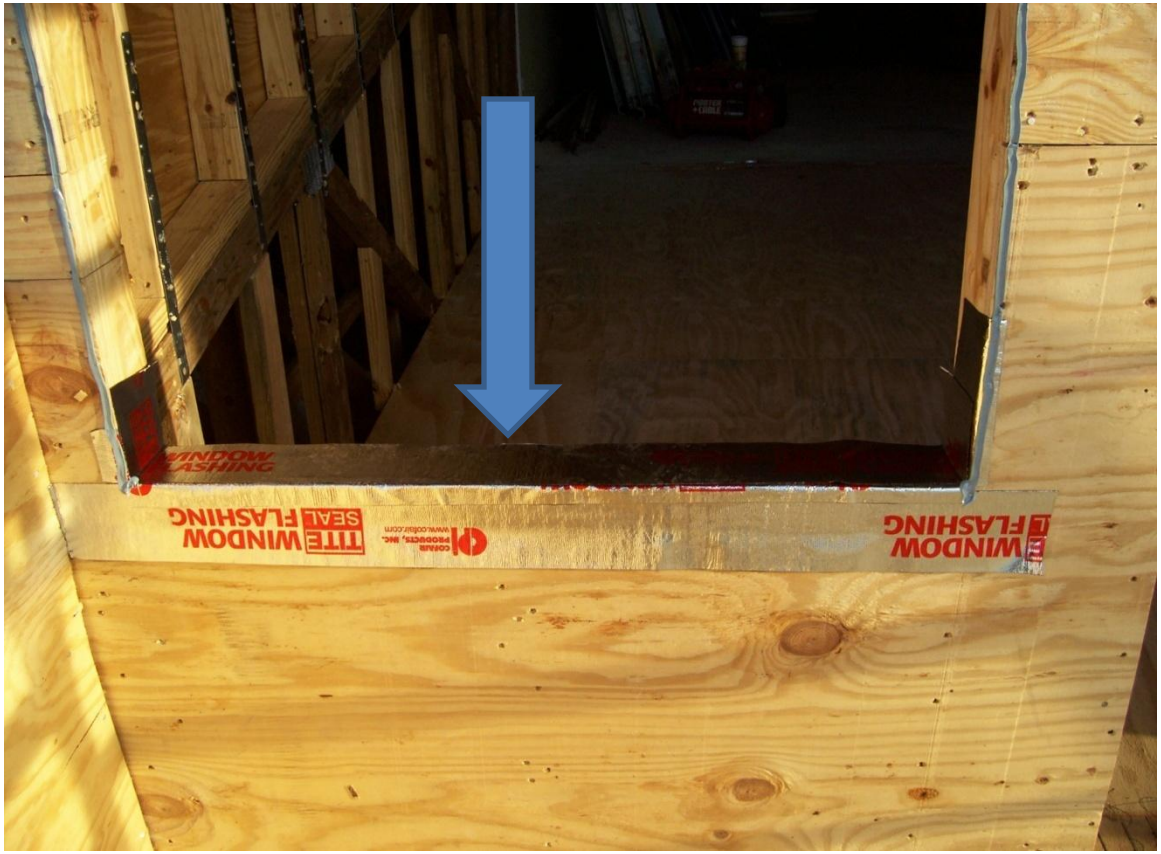
Wind Damage – Prevention

Prevention of Wind Damage thru careful construction

WATER INTRUSION – PREVENTION

Prevention of Water Intrusion - Window Install

Prepare your rough openings before installation of windows or doors

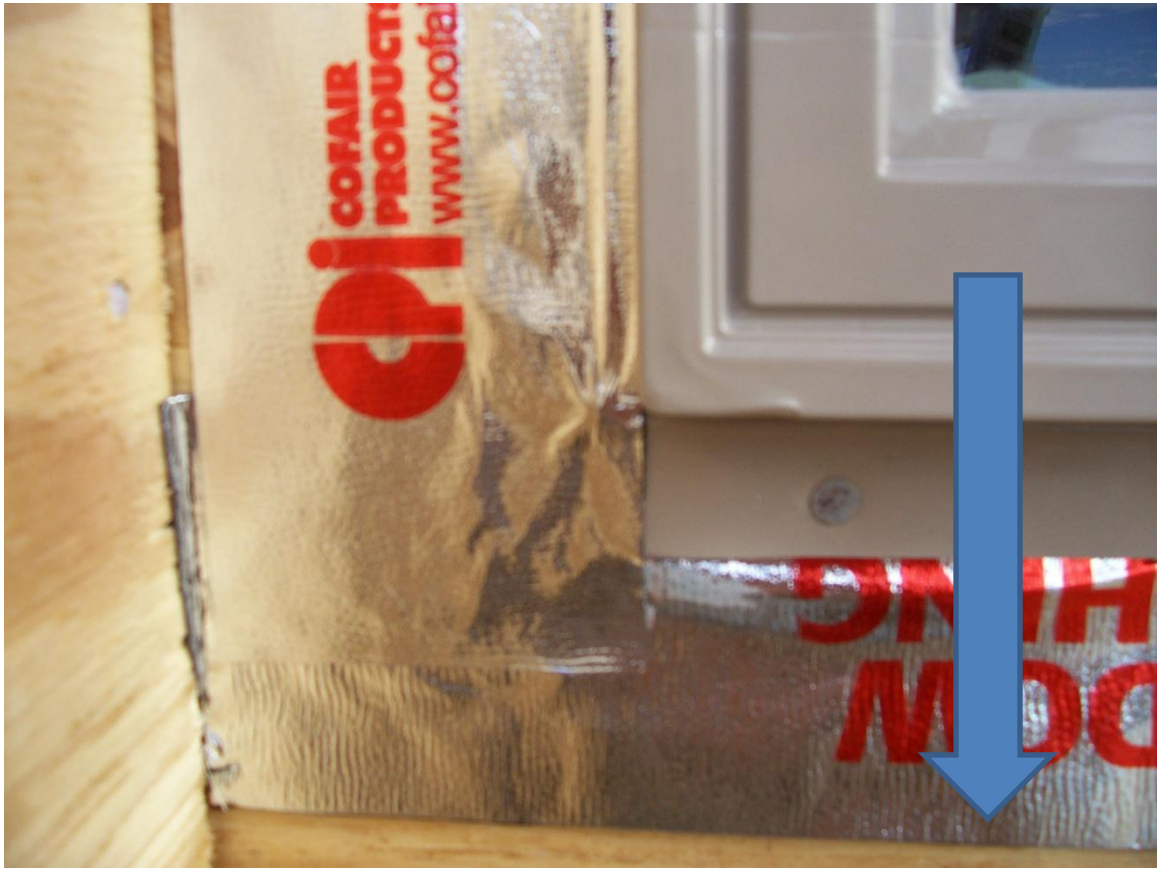


Prevention of Water Intrusion - Window Install

Steps to the proper Installation of flanged window system in framing –

Wrap the bottom portion of the rough opening

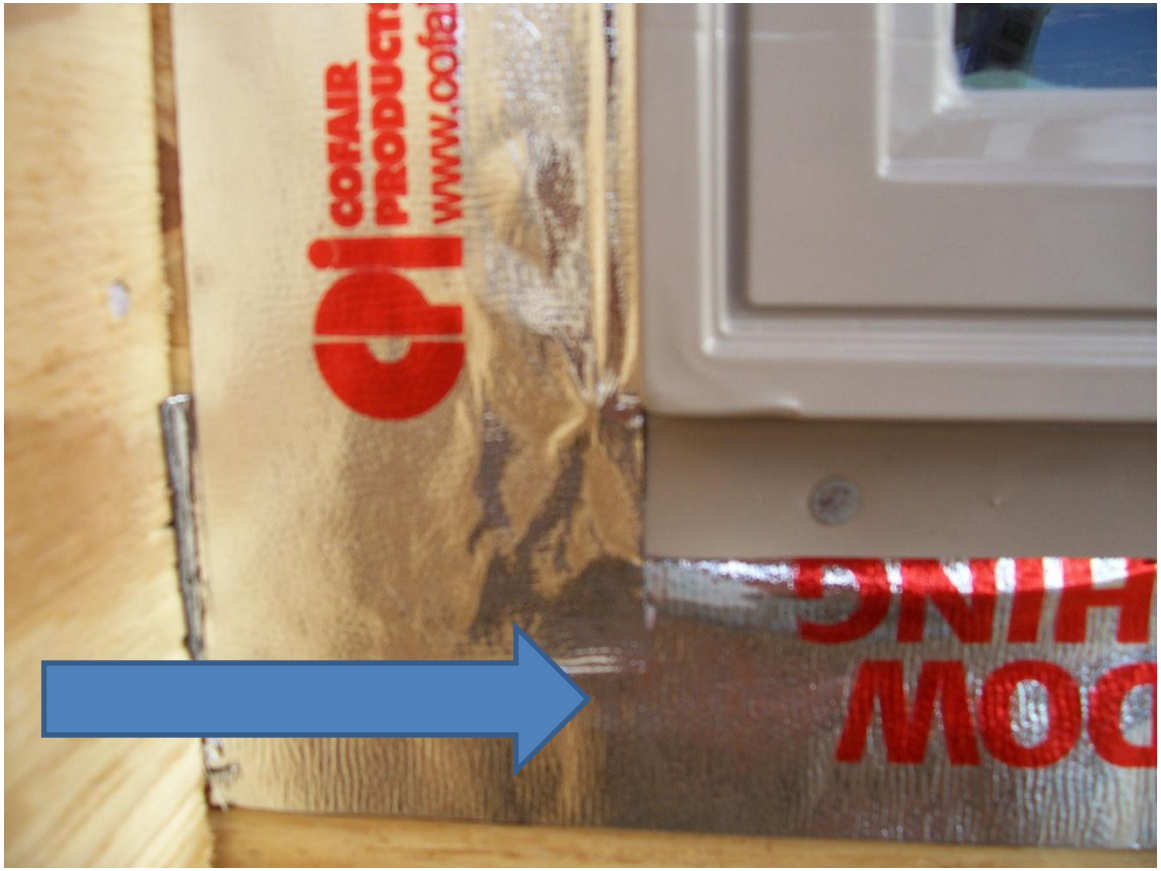
Theory - Build the rough assuming failure of the window to drain water out and imagine that one must rely on a drain under the window of peel and seal accepting that water and making the path of least resistance for the incidental water out of the wall system at an installed drain.



Prevention of Water Intrusion - Window Install

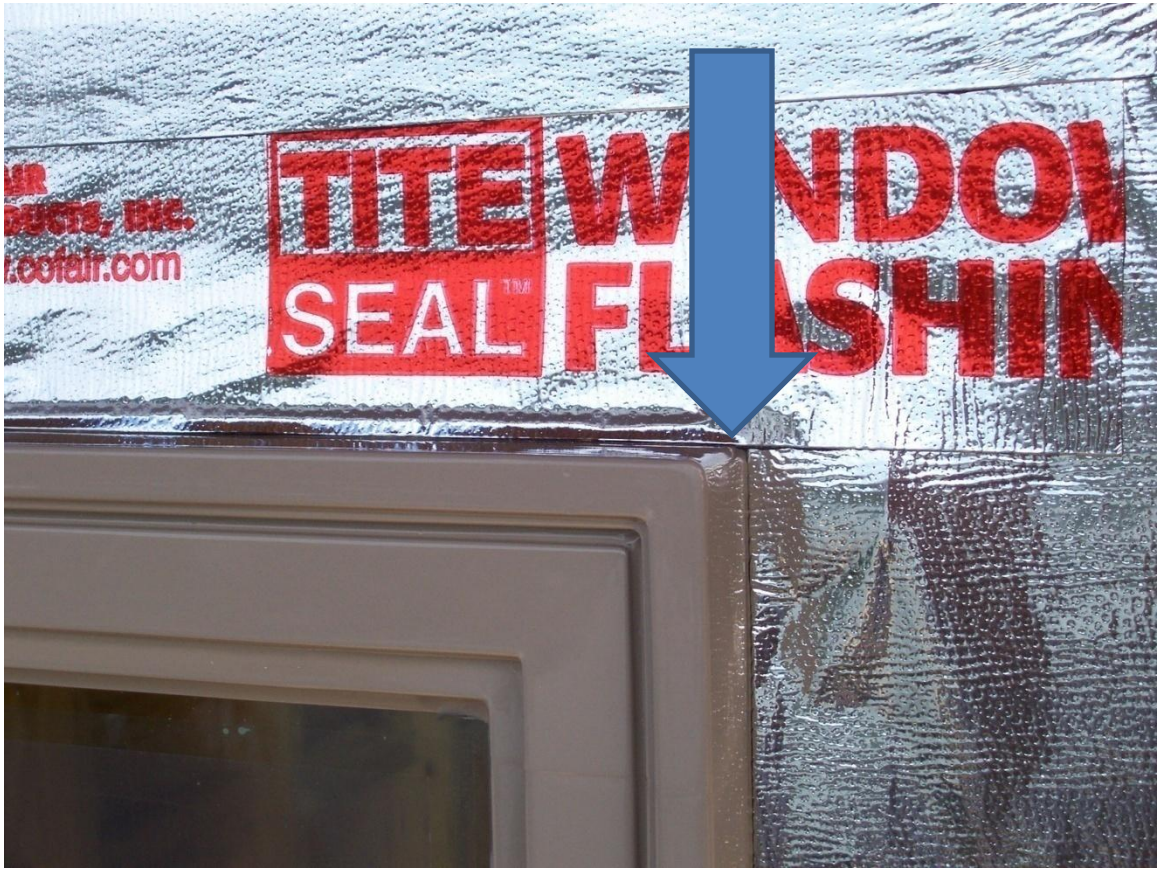
Install window with continuous sealant joint around rear of flange, appropriate wind clips and fasteners, spot apply sealant on bottom so as not to impede the flow of incidental water

Allow bottom portion of tape to float for installation of weather resistant barrier @ a later time as noted by arrow



Prevention of Water Intrusion - Window Install

Install peel and seal down the right and left flanges shingle style at the intersection of the tape protecting the bottom of the rough in



Prevention of Water Intrusion - Window Install

Apply peel and seal to the outside of the top flange

Prevention of Water Intrusion – Door Installation

Pan Flashings - meant to protect interiors by gathering incidental water that may escape the drain system in the door, collects same and drains to the exterior

Prevention of Water Intrusion – Head Flashing

Head Flashings - open to sun shine and collects any incidental water collected in the weather resistant barrier or (wrb) above that location. Protects the door or window as well as the interior from wood rot, poor indoor air quality and potentially a structural problem

Prevention of Water Intrusion – Head Flashing

Properly installed head flashings allow incidental water to drain to the outside

Prevention of Water Intrusion – Band Flashing

Band Flashing collects incidental water with flashing extending to daylight

Prevention of Water Intrusion – Bad Details

Reverse lapped weather resistant barrier. This is one of the most common and costly mistakes in the construction industry.

Prevention of Water Intrusion

Prepare any opening in a structure keeping in mind two things –
Water runs downhill, unless it doesn't or Building Redundancy

Wind Damage – Prevention – Roof Underlayment

Use of a double underlayment barrier specifically at the seams of modern plywood provides good protection from water leaks due to roof damage, resulting in less claims an lower premiums thru wind mitigation credits

Wind Damage – Prevention - IIBHS – Test Facility

Gable End Bracing – installed to protect an area susceptible to wind damage potentially resulting in building failure

Wind Damage – Prevention – DIY Network

Installation of hurricane protection @ window openings

Wind Damage – Prevention – DIY Network

Kayleen Mcabe – Host

Proper Air Circulation and site selection are key to prevention of mold

WATER DAMAGE & RESULTING MOLD - SURFACE WATER

Water Intrusion – Storm Water

Grade is important in eliminating chances for water intrusion, in addition the building should be sealed from hydrostatic pressures

Water Intrusion – Storm Water

Poorly designed and installed waterproofing membrane

Water Intrusion – Storm Water

Water Intrusion – Storm Water

Interior Damage – Air Quality issues along with the cost of replacing finishes

Water Intrusion – Storm Water

Mold Damage – Indicators

Surface mold

Crawl Space – Mold Issues

Result of lack of planning, improper grading, unfortunate placement of HVAC

Crawl Space – Prevention of Mold

Be especially aware of the health concerns of the individuals including the children, the elderly or other people that may be immune compromised

See the New York City Guidelines or EPA.gov

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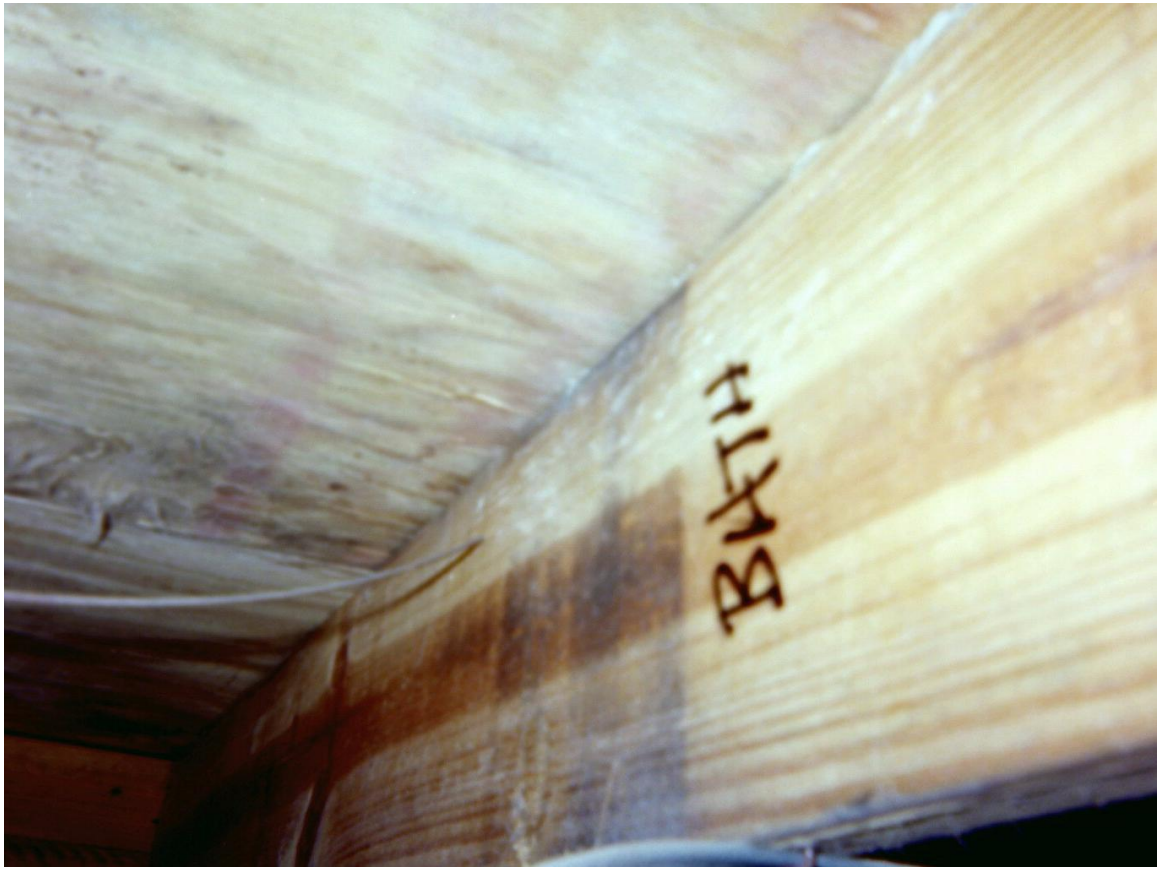
Mold Damage

Requires only water and cellulose to grow



Mold Remediation

Removal of the epidermal layer of wood

Mold Prevention – Crawl space ventilation

Part of the solution for damp basements/ crawl spaces, climate controlled crawl space ventilators

The items to look for in good design & the proper methods of restoration

CONSTRUCTION DEFECT – STUCCO WINDOWS & DOORS

Liability Concerns

Architects

Engineers

General Contractor

Sub Contractors

Liability Insurance -

"Own Work Exclusions"

"Completed Operations"is a very important coverage for a builder

Building Code Violations

Contract Documents

Construction Defect

Adherence with contract documents or passed building inspections does not release an entity from liability associated with construction defect.

Construction Defect

This is not a sufficient kick out flashing. In addition the stucco is in contact with the shingles, and the design did not allow for the full exterior opening trims.

Construction Defect – Inspection

Removal of the stucco in suspect areas reveals serious structural damage & resulting water intrusion & mold

Construction Defect

Water damaged sheathing behind hard coat stucco

Water Intrusion

Hire a professional to document the conditions, including code violations and resulting damage these experts are typically professional engineers, general contractor, architects, and the specialties using standardized testing

Water Intrusion – Documentation

Take off on interiors for purposes of preparing a repair cost appraisal

Moisture Meters/Protimiter – Accurately show the moisture content of different building materials based on either electrical resistance of an electrical current between points either intrusive or non-intrusive

Defect

Lack of expansion joints, improper stucco repairs, poor flashings, delayed dwell time due to retrograde of slope

Construction Defect

Construction Defect

Prevention of Water Intrusion

Solutions by selection of different building materials with different characteristics. In this case tile was a poor selection due to thermal loading on the balcony. Pavers are free to expand and contract.

Water Intrusion – Mold Remediation

Mold & water damage

Water Intrusion – Mold Remediation

Selective Demolition & Containment of water damaged areas

Gauge the risk to the occupants in your decision to allow occupancy until water intrusion can be stopped, and water damaged building components removed

Almost always remove occupants during the actual demolition activities

Water Intrusion – Mold Remediation

•The purpose of containment and or negative air is to exhaust particulate matter stirred up by demolition to locations where people are not including high traffic areas outside

•HVAC Off for duration of tear out and remediation with ducts sealed possible temp AC cooler air holds less moisture

•Containment barriers installed where area being remediated meets clean parts of building

Water Intrusion – Mold Remediation

•Plastic sheeting 8-12 mill with flaps for access

•Fans either sealed into exhausts at windows, doors or created openings blowing out or air hogs set up to pull the air to them then blown thru tubing to the exterior

Water Intrusion – Mold Remediation - Containment

Air cleaning or negative air fan. This fan is capable pulling 5000 cfm thru a three stage hepa filter

The prevention of water intrusion starts in the design.

CONSTRUCTION DEFECT – DESIGN

Prevention – Resulting Damage

Design issues carry a much longer statute of limitations than the actual construction

Prevention – Resulting Damage

Bad Design = Bad Results – Arrow identifies problem area

Prevention – Resulting Damage

Poorly Placed chimney increases dwell time on roof restricts run off and guarantees a poor result

Prevention – Resulting Damage

Intrusive Inspection

Prevention – Resulting Damage

Mold requires two things to grow cellulose and water

Prevention – Resulting Damage

Completed operations is an endorsement on cgl policies that may provide coverage

Prevention – Resulting Damage

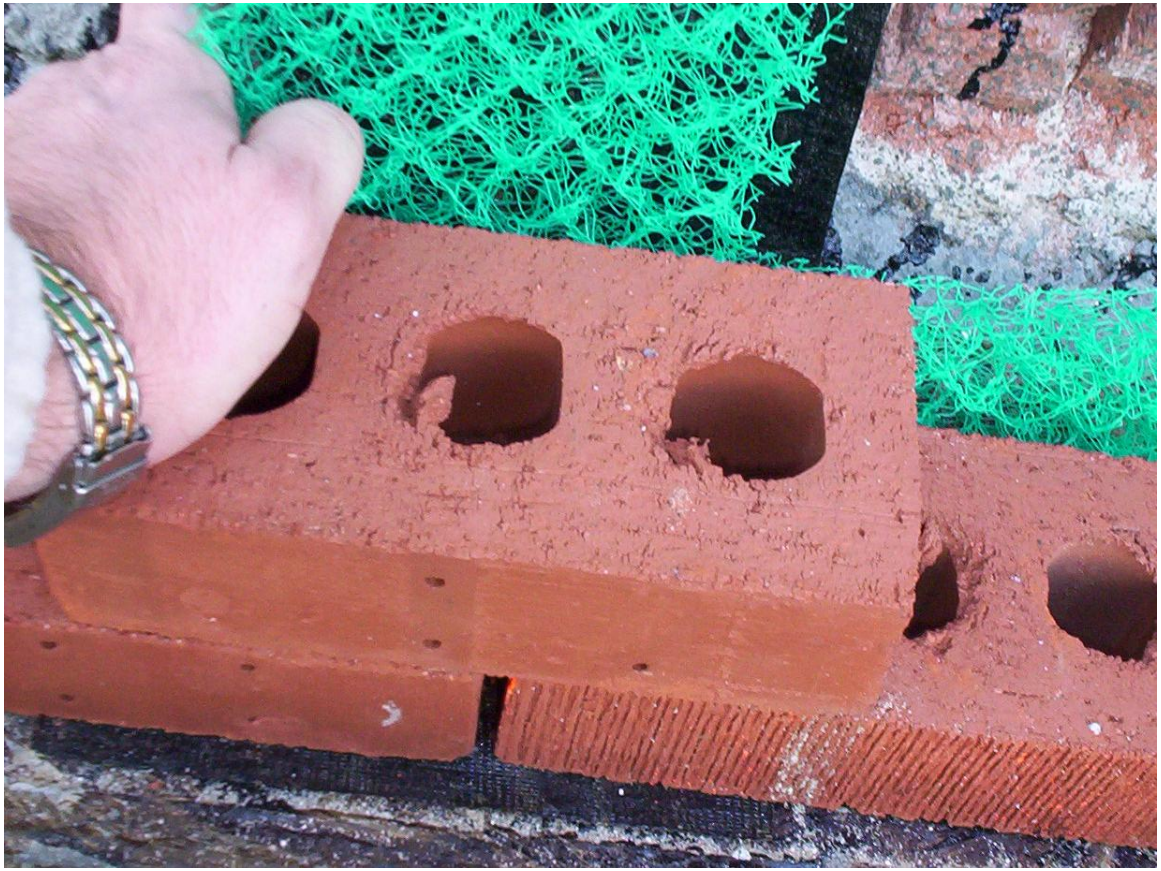
This was the water intrusion and water damage to the exterior sheathing after only 6 years albeit in a harsh environment

Prevention - Resulting Damage

This is the water damaged and molded hard wood floor s damaged as result of poor design

Brick Veneer relies on proper water management techniques

MASONRY VENEER



Prevention of Water Intrusion - Brick Veneer

Weeps should be installed every 24 inches or approx 3 bricks @ openings or floor lines. The weather resistant barrier should flange to daylight at these weeps. Care should be taken to keep slag from clogging the weeps. The green mesh above is one such product.

Understanding the unique challenges of waterfront properties

HURRICANE DAMAGE WIND V FLOOD

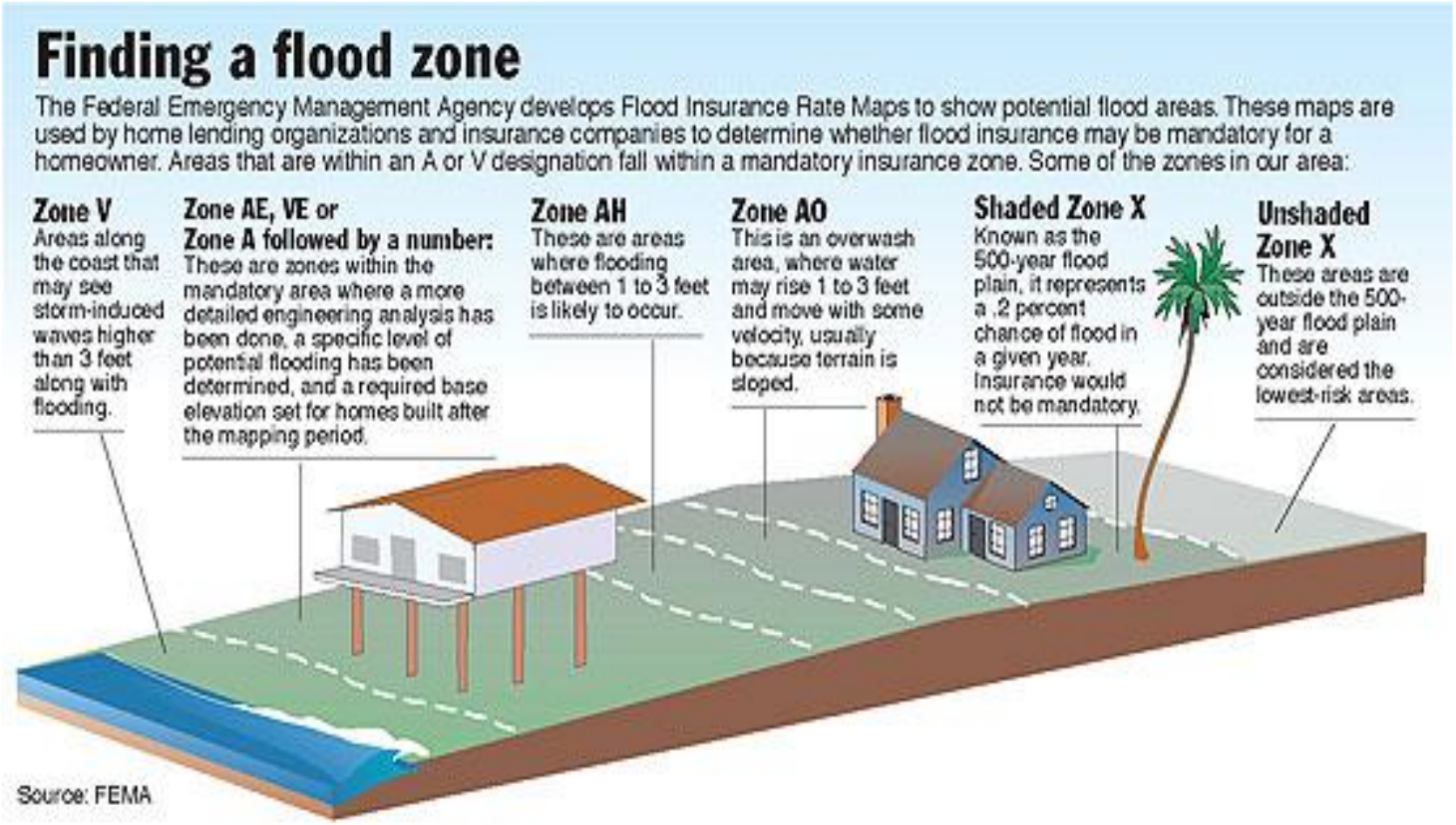
Facts

- The NFIP program was created in 1968
- DFIRM maps are an acronym for Digital Flood Insurance Rate Map
- Flood Inundation maps show the height of the flood as compared to NGVD (Sea Level)
- Hurricanes must reach 74 mph & 155 to be Category 5
- Actual cash value is replacement cost minus depreciation
- Hurricanes are called cyclones in N Indian Ocean & Bay of Bengal & Typhoons in W. Pacific

Facts

- Hurricanes greater that 155 mph are Category 5 storms and must reach 74 mph to be Cat 1 under the Saffir Simpson scale
- Replacement Cost does not equate to actual cash value. RCV is the cost to replace the structure as new
- Hurricanes drop as much as 2.4 trillion gallons of water per day

Flood Zones – FEMA



Flood Zones - FEMA – 50% Rule

More than 50 percent of the nation's population lives within 50 miles of the coast, with more than $9 trillion of insured coastal property

50 % Rule

- **The 50% Rule as identified by the International Building Code 2003 is:**
  - **R105.3.1.1 Substantially improved or substantially damaged existing buildings in areas prone to flooding-** For applications for reconstruction, rehabilitation, addition, or other improvement of existing buildings or structures located in an area prone to flooding as established by Table R301.2(1), the building official shall examine or cause to be examined the construction documents and shall prepare a finding with regard to the value of the proposed work.
  - For buildings that have sustained damage of any origin, the value of the proposed work shall include the cost to repair the building or structure to its pre-damage condition.
  - If the building official finds that the value of proposed work equals or exceeds 50 percent of the market value of the building or structure before the damage has occurred or the improvement is started, the finding shall be provided to the board of appeals for a determination of substantial improvement or substantial damage.
  - Applications determined by the board of appeals to constitute substantial improvement or substantial damage shall meet the requirements of Section R323.

Wind V Flood Damage – Hurricane

On this property of 7 buildings and 86,400 s.f. the damage was identifiable but none the less co-mingled between wind and flood.

Wind & Flood Damage – Hurricane

Flood Plain Management minimums are not always sufficient. The NFIP is active in more than 20,000 communities that are rated due their compatibility with the CRS system of points for aggressive flood plain management

Wind & Flood Damage – Hurricane

Wind & Flood Damage – Hurricane

Wind & Flood Damage – Hurricane

Elevate mechanical outside of the flood plain plus free board

Flood - Mold Remediation/ Prevention

Encapsulation of water damaged or mold affected framing components

Hurricane Claims – Critical Path

- Documentation of Existing – Pictures pre & post event especially flood line & wind damages
- Elevation Certificate -current elevation
- Understanding of current elevation, required elevation (FIRM Map) & possibly free board requirements DFIRM is the digital version of the flood map
- Pre firm & post firm for community date
- Inundation Map ***www.fema.gov/business/nfip***
- Weather Report
- Structural Analysis
- Foot Print of Structure
- Cost estimate broken between wind and flood with code broken out as well as a replacement cost estimate to code