

University of New Orleans

ScholarWorks@UNO

---

DRU Workshop 2011 Presentations - Disaster  
Resistant University Workshop: Building  
Partnerships in Mitigation

Conferences and Workshops

---

2-2011

## Floodproofing Techniques

Pat Skinner  
LSU AgCenter

Follow this and additional works at: <https://scholarworks.uno.edu/dru2011>

---

### Recommended Citation

Skinner, Pat, "Floodproofing Techniques" (2011). *DRU Workshop 2011 Presentations - Disaster Resistant University Workshop: Building Partnerships in Mitigation*. Paper 22.  
<https://scholarworks.uno.edu/dru2011/22>

This Presentation is brought to you for free and open access by the Conferences and Workshops at ScholarWorks@UNO. It has been accepted for inclusion in DRU Workshop 2011 Presentations - Disaster Resistant University Workshop: Building Partnerships in Mitigation by an authorized administrator of ScholarWorks@UNO. For more information, please contact [scholarworks@uno.edu](mailto:scholarworks@uno.edu).

# Floodproofing Techniques

Disaster Resilient Universities Workshop

February 16, 2011



Pat Skinner, Disaster Recovery and Mitigation Specialist

Department of Agricultural and Biological Engineering

# Flood Protection

---

## Structural Methods

- ◉ Major Levees and Dams
- ◉ Diversions

## Non-Structural Methods

- ◉ On-Site Flood Protection \*
- ◉ Removal (Acquisition/Relocation)



\* “Floodproofing” – general use

\* “Floodproofing” - FEMA Certifiable alternative (non-residential)

# Floodproofing - On Site

---

## Techniques to minimize damage:

---

- ⦿ Get over it! – Elevate / Build/Rebuild at Elevation
- ⦿ Stop it at the wall - Dry Flood Proofing \*
- ⦿ Stop it “in the yard” - Walls, Levees

## Designed to keep the structure dry inside

- Permanent and temporary measures
- Closures for openings
- Pumps and back-flow preventers

\* “Floodproofing” - FEMA Certifiable alternative (**non-residential**)



# Floodproofing - On Site

---

## Techniques to reduce damage:

- Use materials that floodwater won't hurt
- Elevate appliances, equipment, utilities

This is *Wet* Floodproofing

Required for areas of a structure below BFE (or DFE)

Flood Proofing Projects should be designed by  
qualified Professional Engineers  
and  
constructed by  
qualified contractors

Floodproofing must comply with  
**STATE and LOCAL**  
Floodplain Development Regulations

Comply with = Not violate

# Floodproofing - On Site



## Get over it!

Elevation is the most effective on-site method of reducing future flood damage.

# Elevating by use of Fill



Works well for new construction.

Not a “No Adverse Impact”  
solution

**NOT ALLOWED** in V-zones













# Raising a Slab







Elevated with slab attached



Elevated with slab attached



# Removed from the Slab



# Built atop old walls



Concerns?



Legal in a V-Zone?

Wind Resistant Hip Roof



# Elevating on Piers



Retrofit



New Construction



# Piers Poorly Built







**Piers Poorly Built**





Good Piers – Poorly Attached





# Option 4!

## Demolish & Reconstruct



Substantially Damaged by Fire

Rebuilt on exact footprint

Authorized for  
Katrina & Rita







NEW CONSTRUCTION

DEMOLISH REBUILD

# Elevated Burger King





# Foundation Backfill





ADDITIONAL \$25,000

# Demolition & Reconstruction

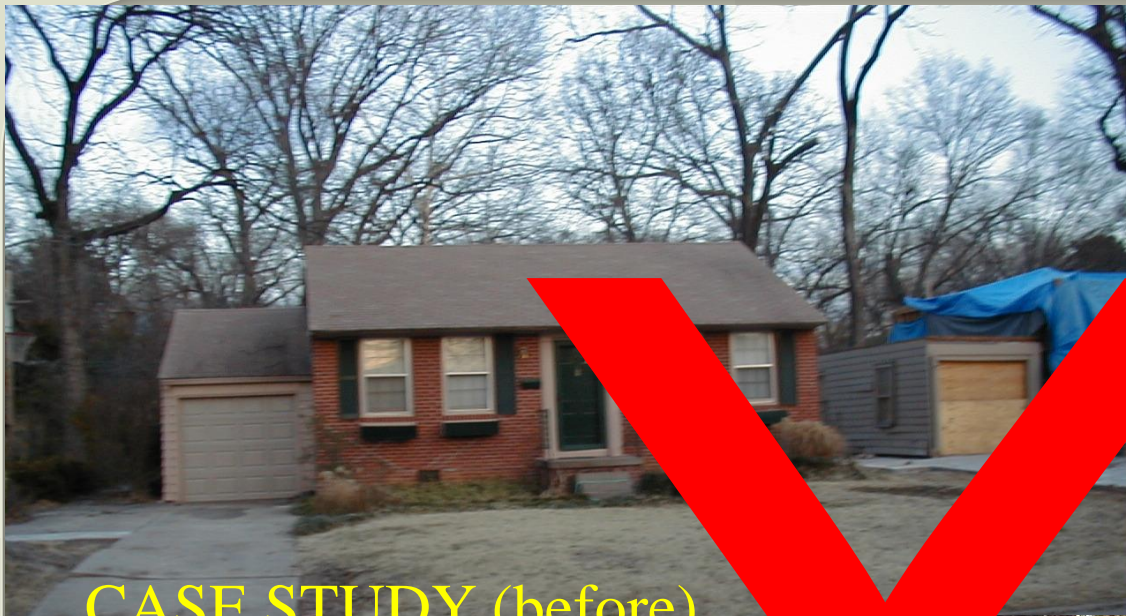
Eligible for ICC (insurance)

Was a piloted under FMA

Authorized for Katrina/Rita HMGP (name?)

Issue with mansionization





CASE STUDY (before)

Going from this...



...to this

CASE STUDY (after)



# Elevation Considerations

---

- ◉ When are you required to “elevate” the home?
- ◉ Choosing a foundation (piers, chain wall, pilings)
- ◉ Choosing a level of protection (how high?)

## **For an existing building, add...**

- ◉ Elevation vs. Reconstruction
- ◉ Three methods of getting the floor high enough

# Choosing a Level of Protection



## The 5-foot elevation

- Easier access, shorter staircases
- Slightly lower cost to design and construct the new foundation and supports
- Limited usefulness of under-slab space
- Fewer homeowners insurance complications
- Wheelchair access requires 60-foot ramp, chairlift or porch lift



## The 8-foot elevation

- Higher level of flood protection
- Slightly higher cost to design and construct the new foundation and supports
- Useful under-slab space (parking, access and limited storage)
- Greater reduction in flood insurance premiums
- Wheelchair access requires elevator or 96-foot ramp

# BFE and other standards

---

- BFE – Base Flood Elevation
- Advisory or Pre-DFIRM BFE (if adopted for regulation)
- Height above nearest drainage inlet
- Flood of record
- Height above the levee

Any of these are legal, if they're at least to regulatory BFE

All are considerations for other floodproofing techniques

# NIFP Incentive for Elevating “Above BFE”

---

Insurance savings	AE-zones	VE-Zone
at BFE	\$993	\$3127
1 ft <i>above</i> BFE	\$517	\$2412
2 ft <i>above</i> BFE	\$341	\$1624
3 ft <i>above</i> BFE	\$276	\$1224

## And with good reason!

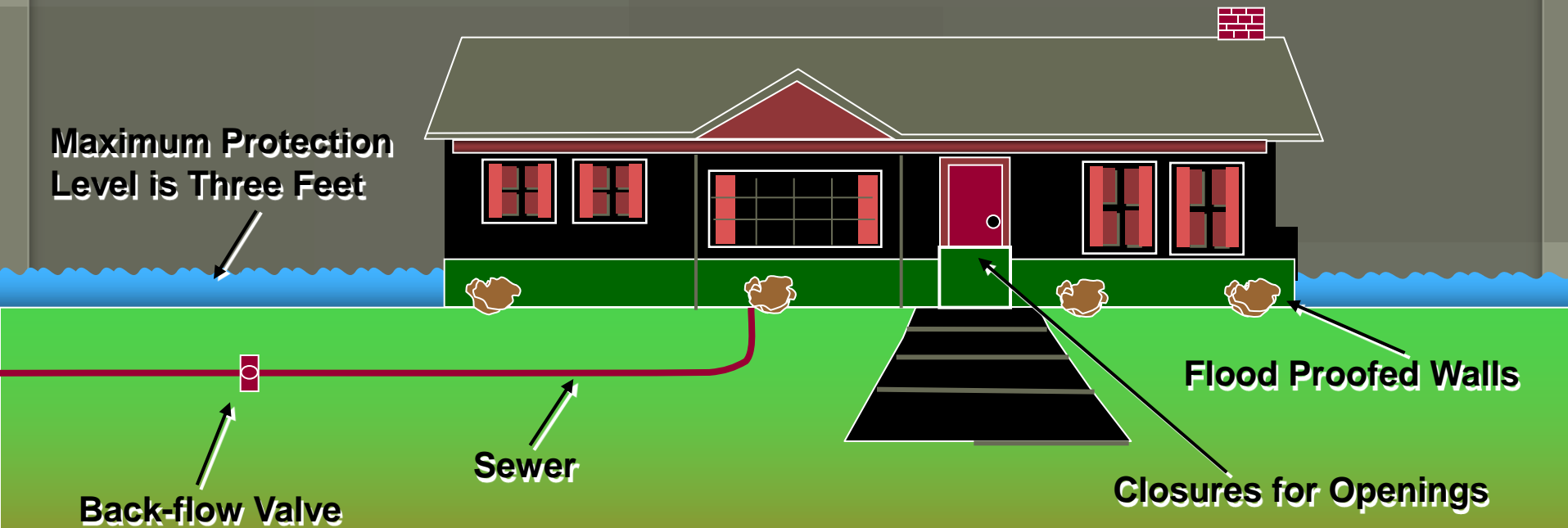
Does not apply to other floodproofing methods  
for residential structures

# Floodproofing - On Site

## Stop it at the Wall Dry floodproofing

Elevation is the most effective on-site method of reducing future flood damage.

# Dry Floodproofing

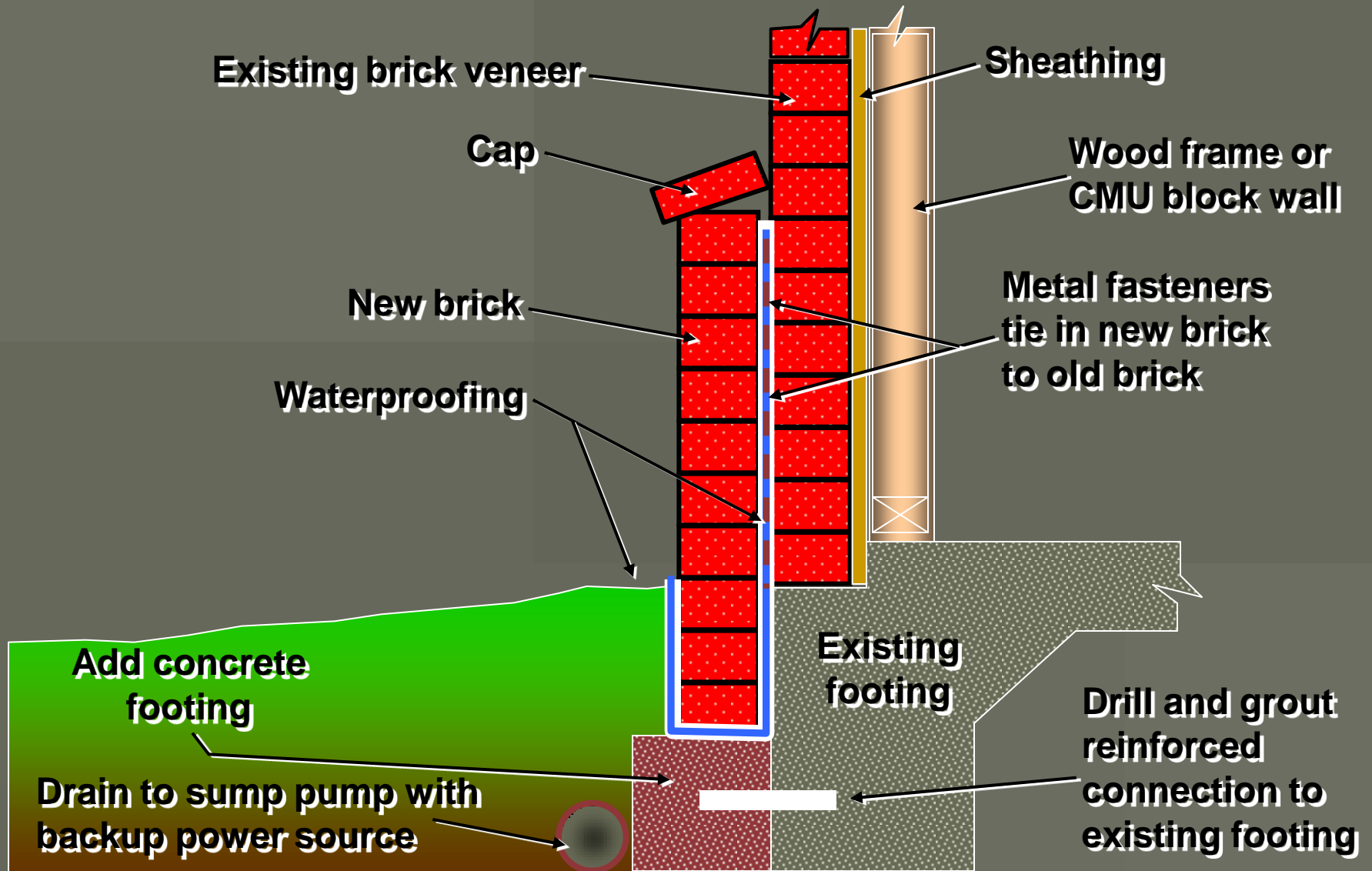


# FEMA “Floodproofing” is Dry Flood Proofing

Certifiable Alternative to Elevation for non-residential structures

Not a compliance measure for Residential

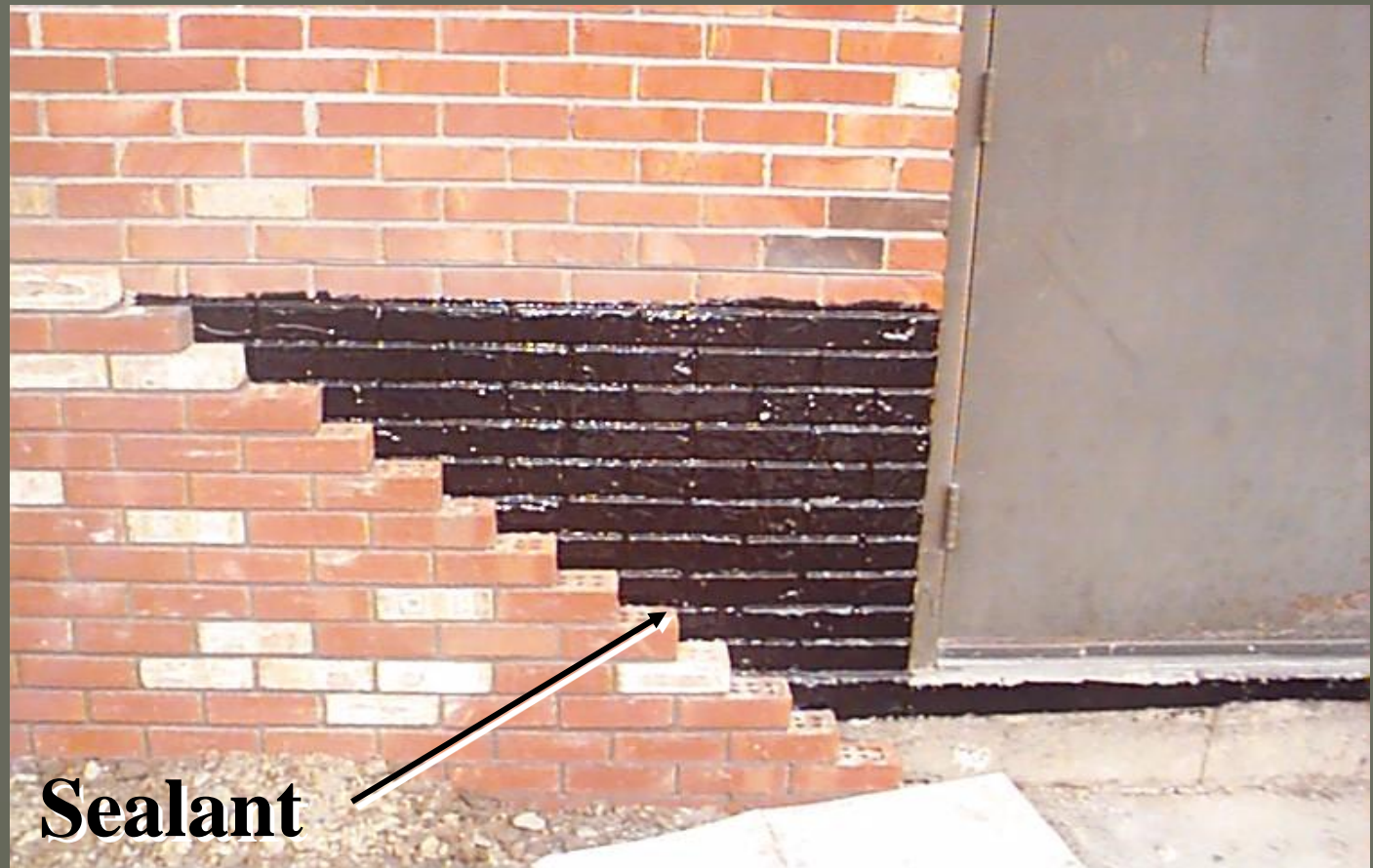
No Insurance Rate reduction for Residential



What's wrong with this picture?

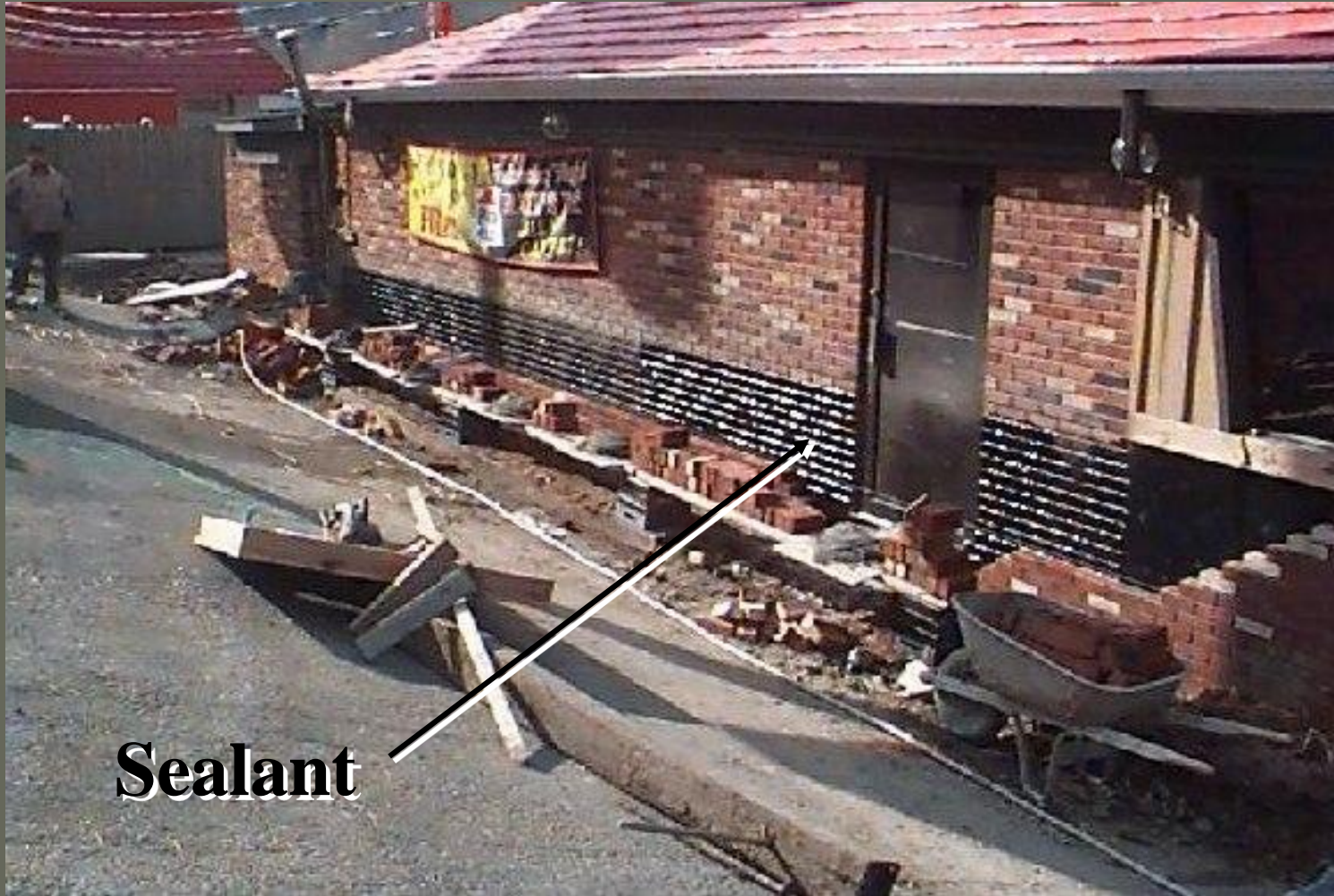


# Dry Flood Proofing Methods Waterproof Sealant



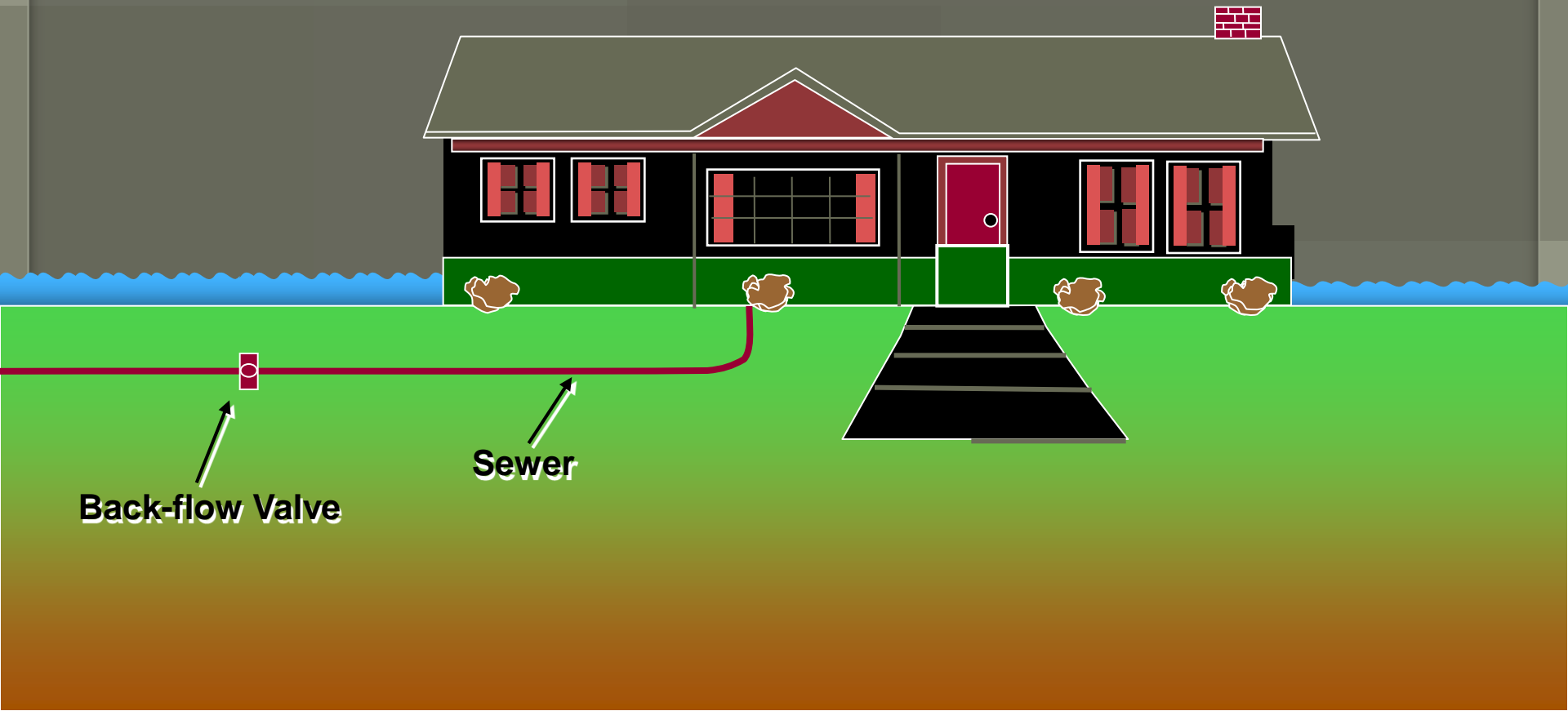
The water-proof sealant used is labeled as Gacoflex LM-60-V.

# Dry Flood Proofing Methods Waterproof Sealant



**Sealant**

# Dry Floodproofing Back-flow protection



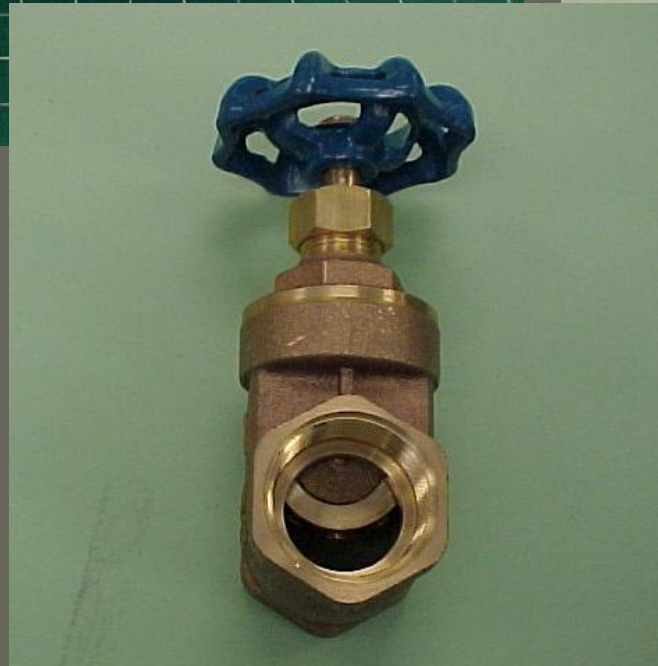




Flap Valve



Ball Valve



Gate Valve

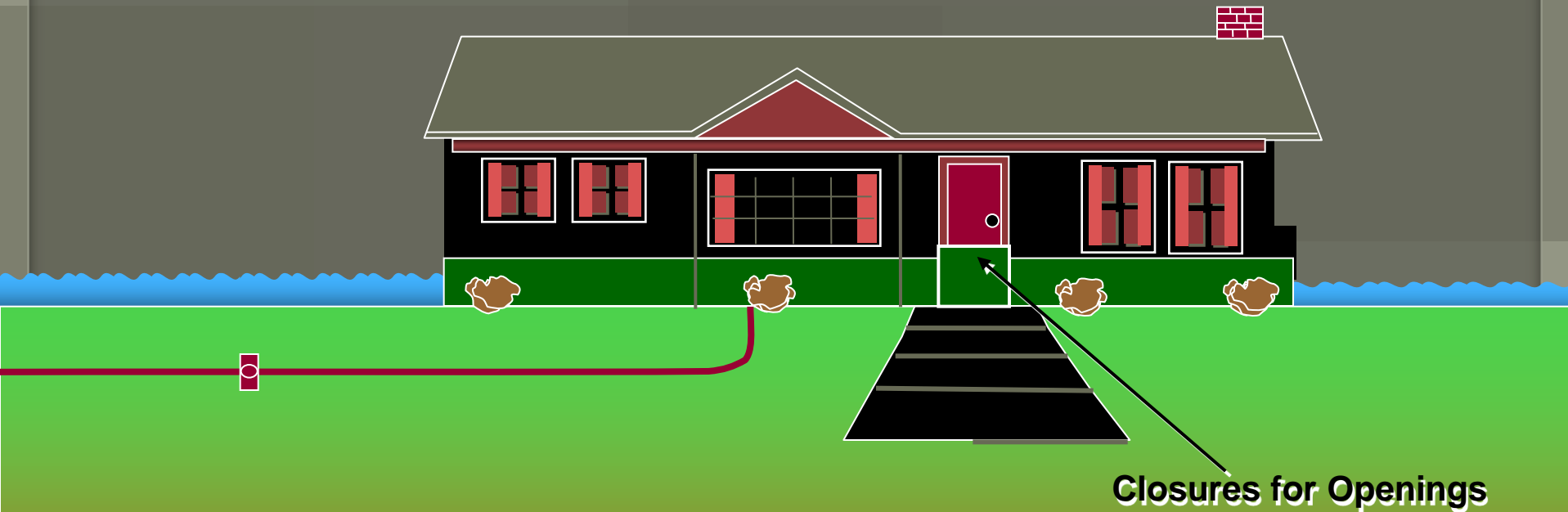


# Sewer Back-flow Valves:

## Comparative cost uninstalled

● Flap Valve (4" PVC)	\$ 40
● Ball Valve (4" PVC)	\$ 85
● Gate Valve (4" Brass)	\$ 110
● Hydraulic gate valve (4")	\$ 850

# Dry Floodproofing Panel Closures

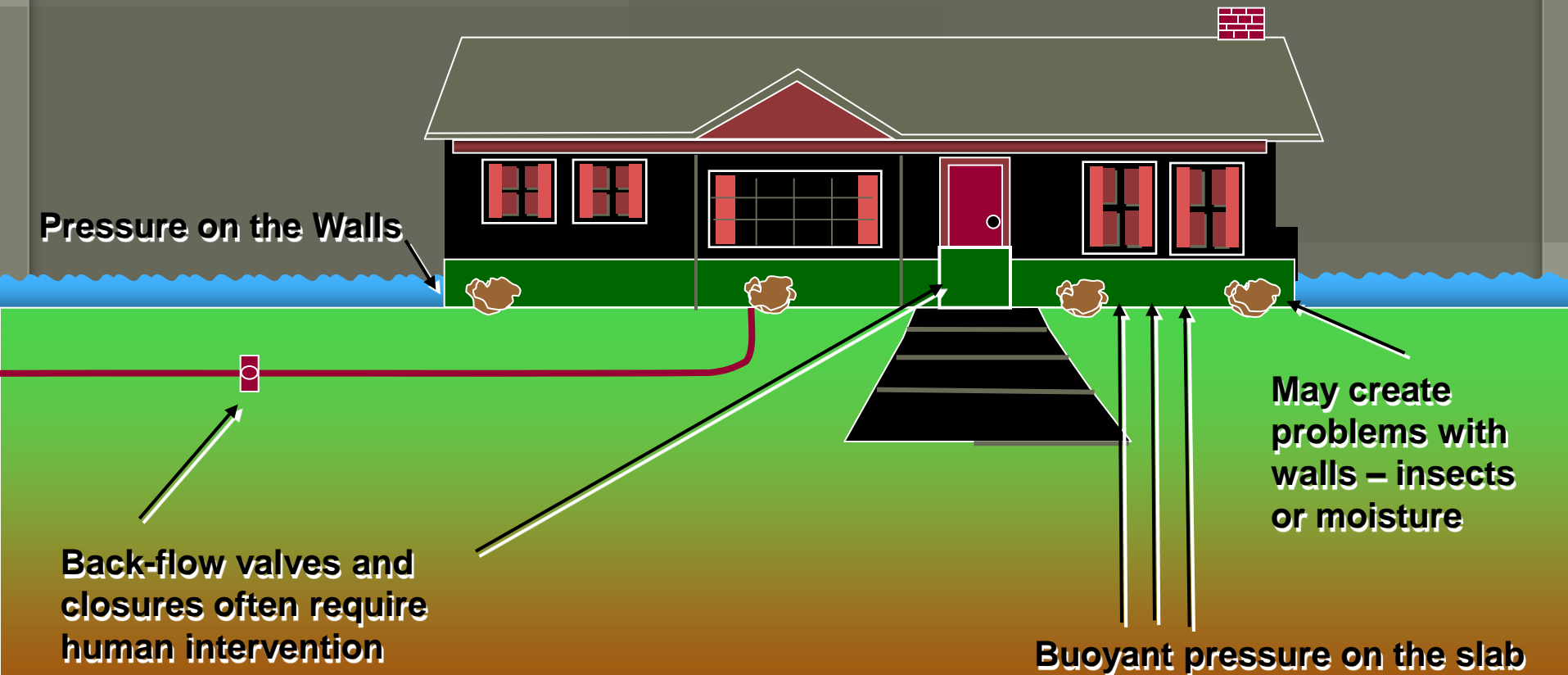




**Swinging and removable panels on residential structures**  
**Larger, commercial versions are available**



# Dry Floodproofing Potential Problems



# Dry Floodproofing Cautions

## Reduce potential moisture problems:

- Prevent water leakage behind the wall
  - Caulk window frames
  - Apply clear sealant above the floodproofing
- Allow sealed wall to dry to the building interior
  - Do not use vinyl wallpaper on sealed walls
  - Monitor moisture levels at baseboards

# Dry Floodproofing Tips

- ⦿ DON'T go > 3 feet high on the wall
- ⦿ Match sealants and films to conditions of use
- ⦿ Choose materials resistant to termite damage
- ⦿ Don't create hidden paths for termites



# Dry Floodproofing V-Zone, Overtopped by Katrina

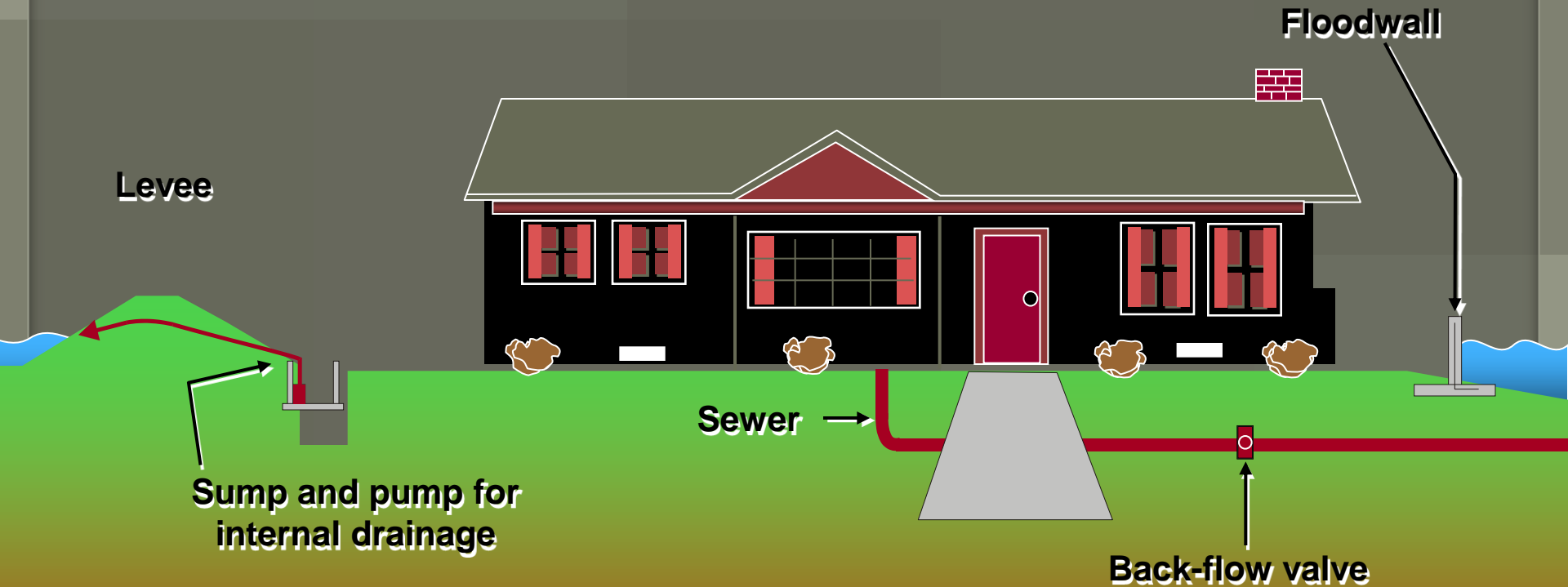


# Floodproofing - On Site

## Stop it in the Yard Levees and Floodwalls

Elevation is the most effective on-site method of reducing future flood damage.

# Levees and Floodwalls





# Floodwalls and Levees



**Self-supporting barriers  
to flood water**

















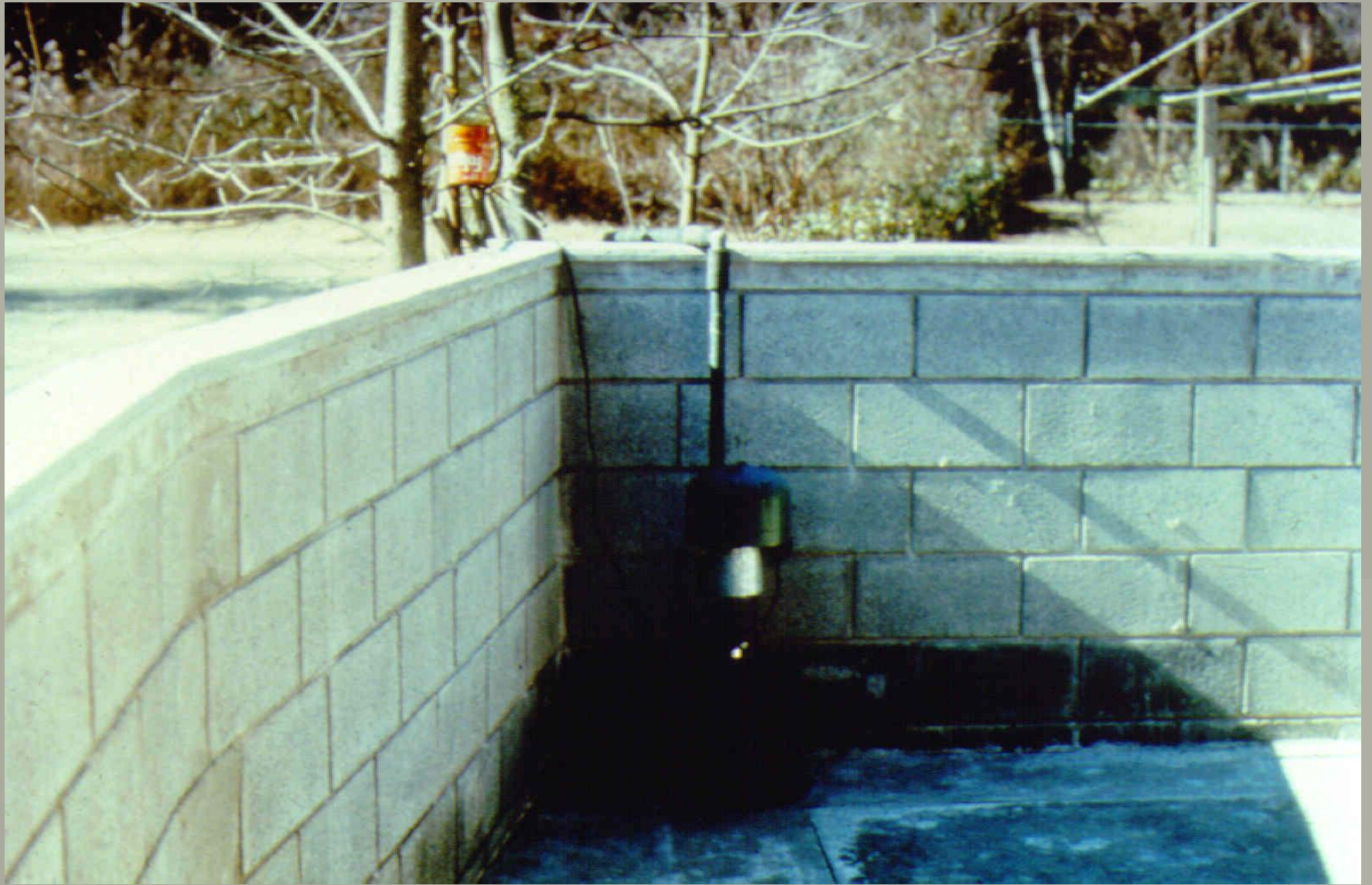






**Raised driveway through floodwall**





Pump for interior drainage





# Floodwalls and Levees - pitfalls

Rain that falls inside the barrier must get out

- when it is **not** flooding
- when it is flooding, and drain pipes are closed

have a pump inside the protected area

dump roof run-off over the wall or levee

Prevent back-flow through the sewer line

“Good fences make good neighbors...”

Good floodwalls and levees do not.

Excluding floodwater from anything more than the house is politically incorrect - and violates the spirit of ordinances that limit fill.

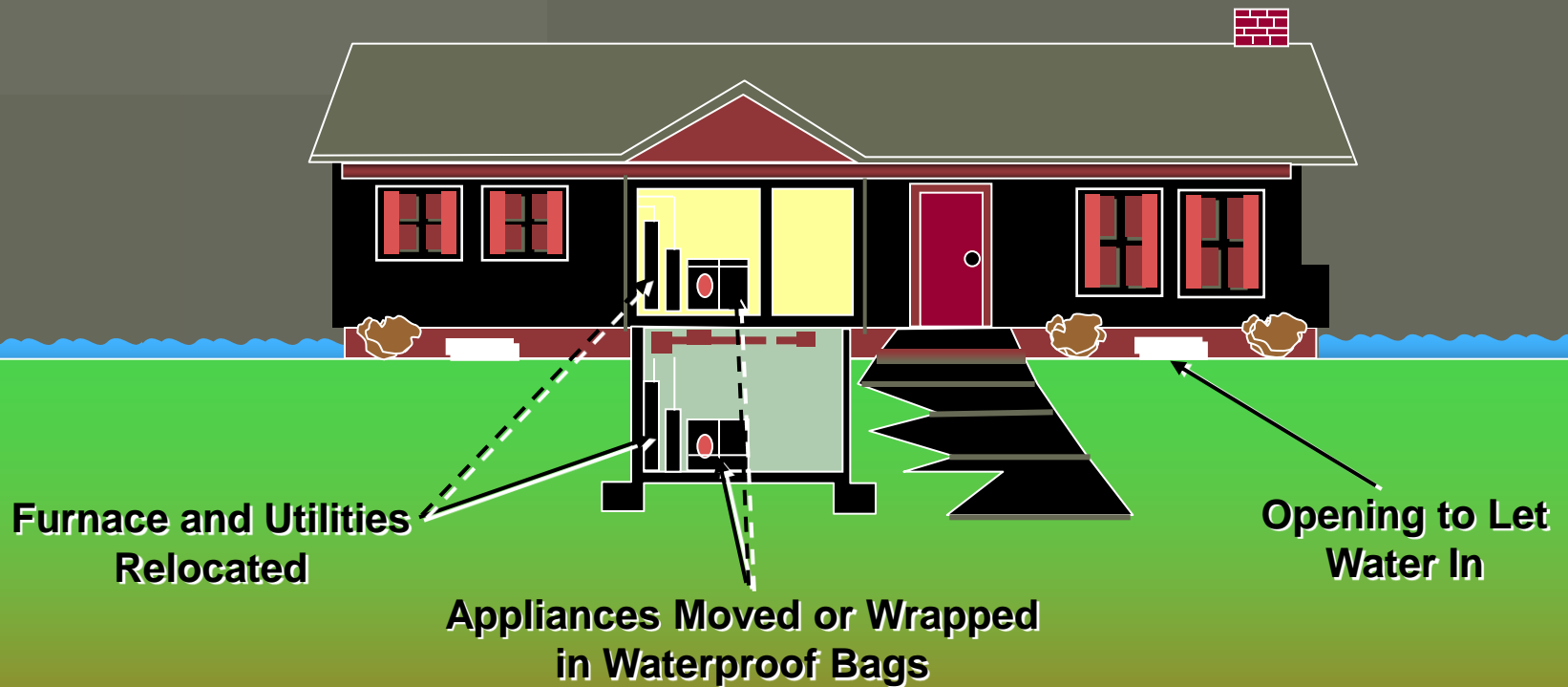
# Floodproofing - On Site

Wet Floodproofing  
Resistant Materials  
Elevated systems

Elevation is the most effective on-site method of reducing future flood damage.



# Wet Flood Proofing



# Wet Floodproofing - Allows Water Entry

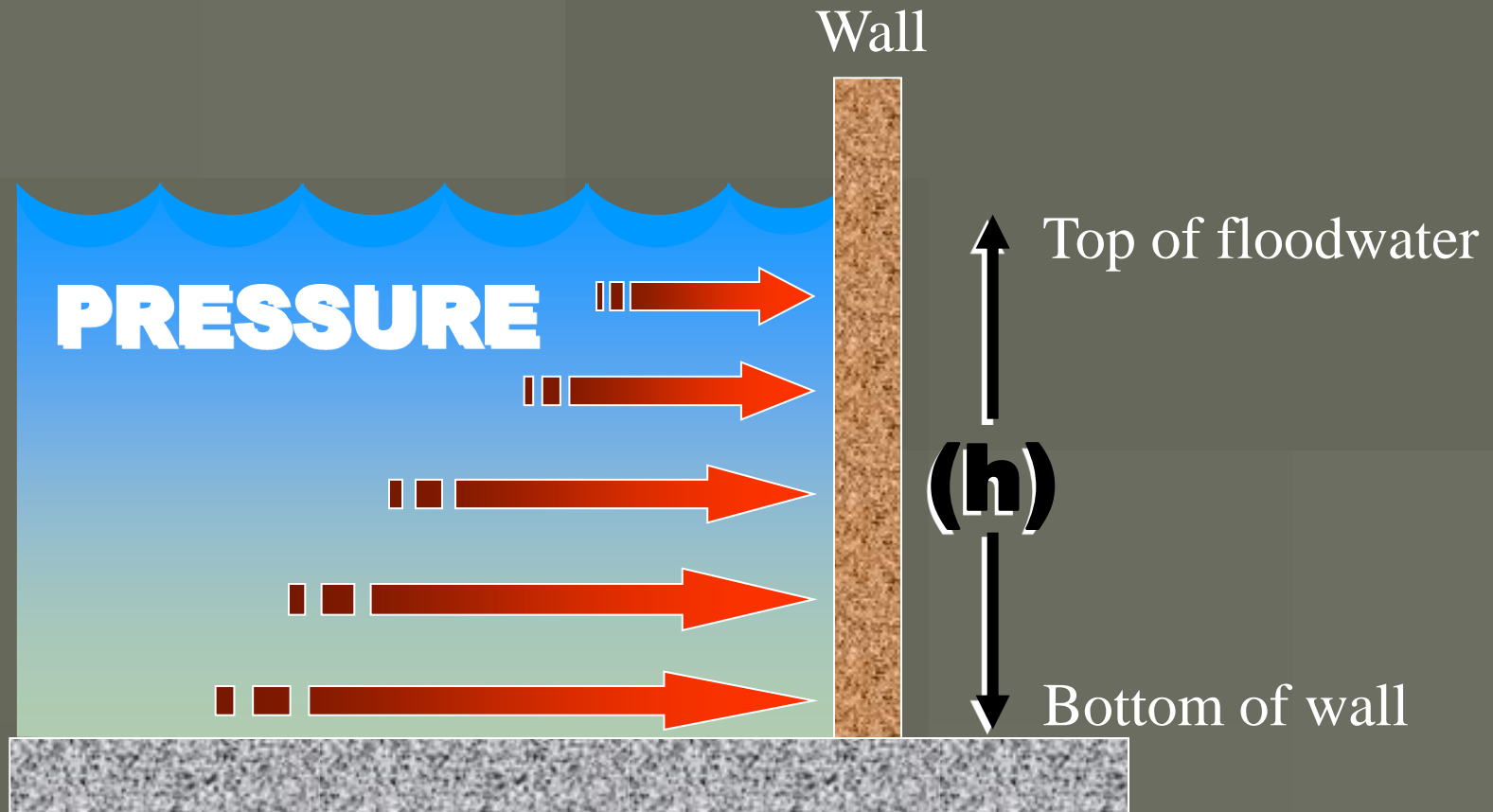


Versus



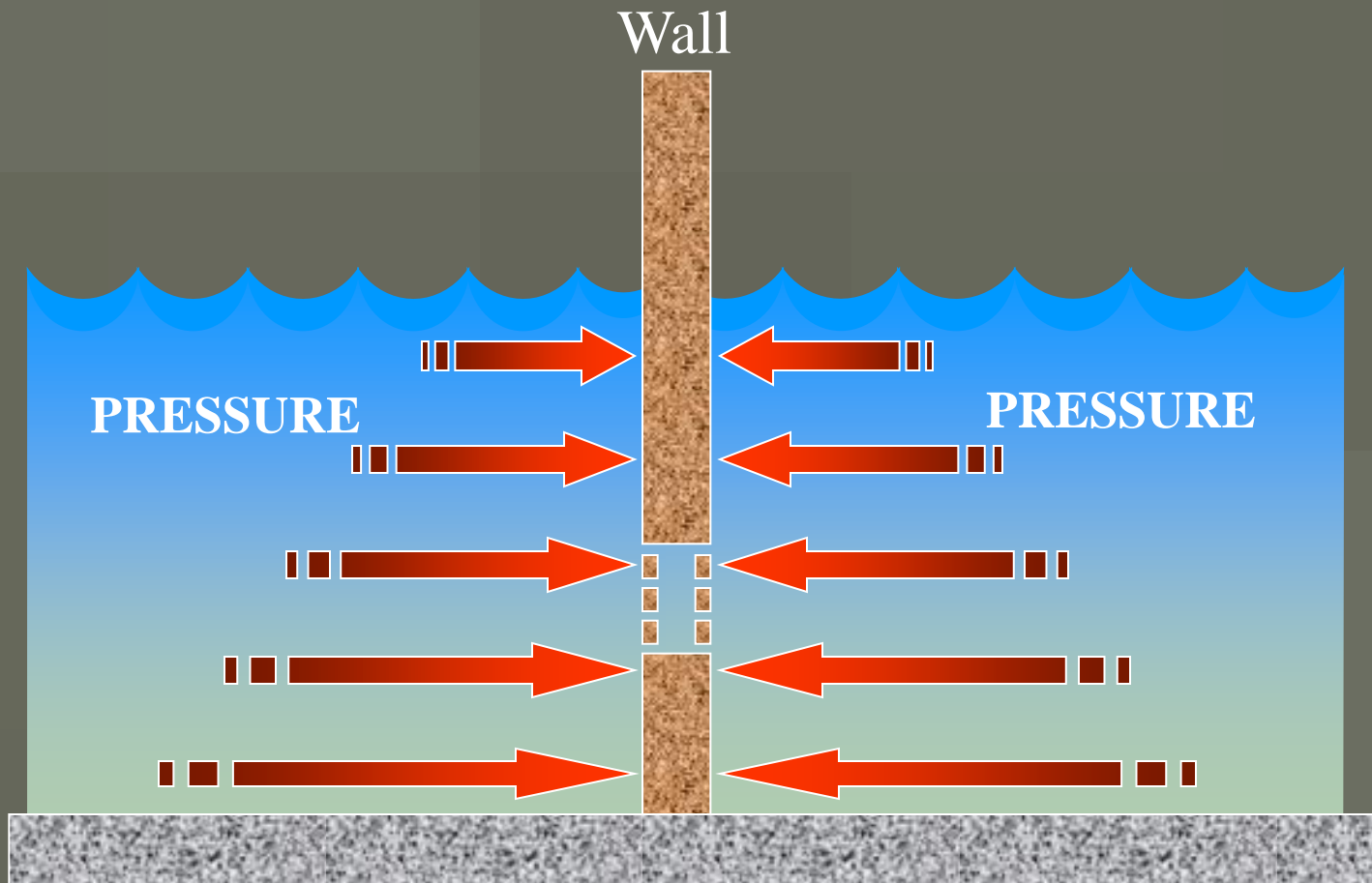
# Dry Floodproofing - Water Tight Protection

# Lateral Pressure Increases with Depth of Water





# Wet Flood Proofing Equalizes Pressures on the Structure





HISTORIC DARLINGTON WISCONSIN









Floodproofing is an important Flood Plain Management measure that can be used to reduce flood damages to buildings and their contents.



# Floodproofing Considerations

---

- Personal Safety
- Stress on the building
- Consequences of being too low in the SFHA
- Future options for retrofit (if flooding increases)



# Flood Hazard Areas – Build Above

---

**Elevated so the Lowest Floor\* is at or above DFE**  
**DFE = BFE plus freeboard**

**\* Or lowest Horizontal  
Structural Member (in  
V zones)**



**Substantial Improvement**

**Interior  
renovation**

**No addition**

**Cost**

**>\$50,000**

**BFE**

**Market value of property     \$164,000**

**Value of lot     \$ 64,000**

**Value of building     \$100,000**

**Must elevate before  
remodeling**



**Substantial Improvement**

**Lateral addition**

**Cost**  
**> \$50,000**

**BFE**

**Market value of property     \$164,000**

**Value of lot     \$ 64,000**

**Value of building     \$100,000**

**Must elevate the  
addition**

**Possibly the house**



## Substantial Damage

Cost to  
Restore  
>\$50,000

**BFE**

Market value of property	\$164,000
Value of lot	\$ 64,000
Value of building	\$100,000

Must elevate before  
making repairs

# Flood Hazard Areas – Must Elevate

## Below Base Flood Elevation, and...

Substantially **damaged**

Substantially **improved** by

- interior remodeling
- vertical addition
- horizontal addition

**Levees, Floodwalls, Dry  
floodproofing do not  
change this requirement**



# Three Homes – Common Features

## Wind:

115 mph 3 second wind gust Exposure B, per ASCE 7

## Flood:

3 feet above FEMA BFE., 2 feet above Parish requirement





# Wall/Roof Systems Similar

## Bronze & Silver

Walls: 2 x 4 SPF studs  
16" o.c.

Roof: Joists and  
Rafters

## Gold

Advanced Framing / Optimum Value Engineered

Walls: 2 x 6 SPF studs 24" o.c.

Roof: Engineered Trusses



# Foundation Systems Different



**Bronze**

Pony Wall

**Silver**

Block/Brick  
Piers



**Gold**

Poured-in-Place Piers



All have **continuous grade beam** on the perimeter, **spot footings** on interior

# Effort began with Curt McCarty

Movement toward getting prescriptive pier and beam foundation provisions in Louisiana's building code was begun under the leadership of the late Curt McCarty, former executive officer of the Louisiana State Uniform Construction Code Council.

**We embarked on this project to:**

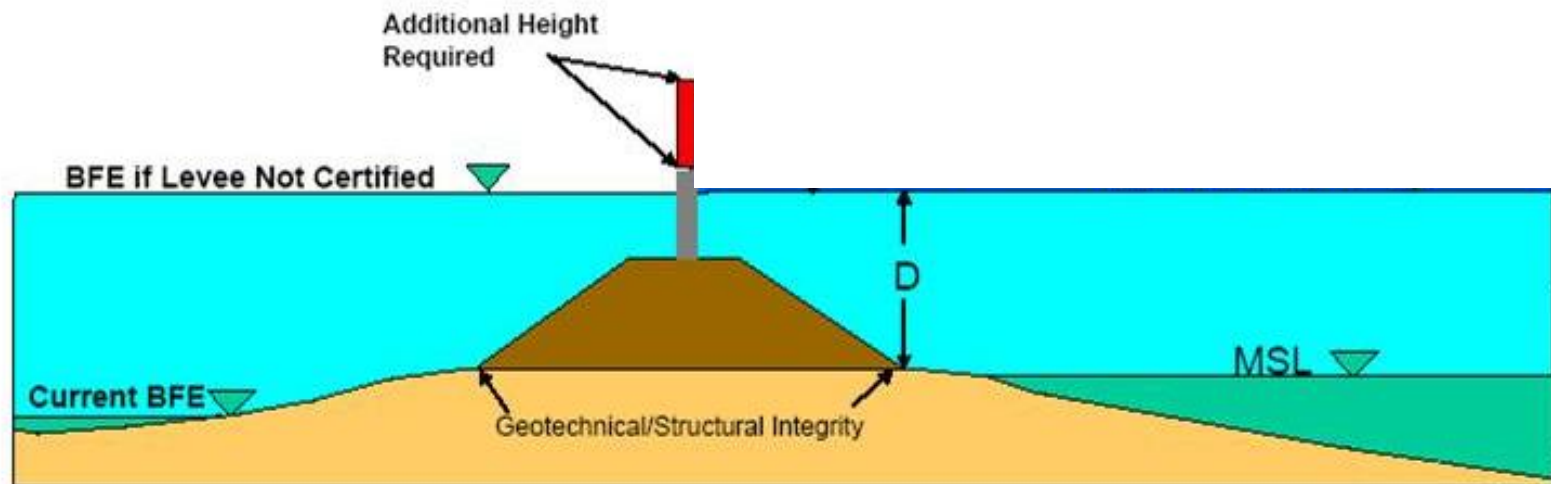
- Demonstrate how raised-floors can be done cost effectively
- Share the methods with other builders
- Further adoption of prescriptive codes for raised-floor foundations
- Promote energy-efficiency and green building



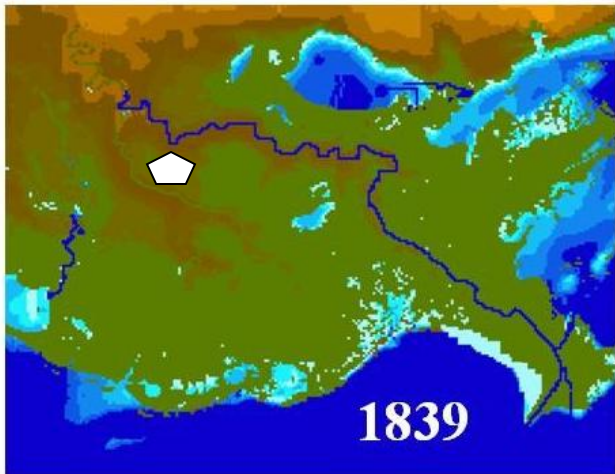


# BFE and Levees

Using Criteria from FEMA Regulations



# Louisiana Land Loss Facts



- LA loses 25 to 35 square miles of land each year
- This loss represents 80% of the coastal wetland loss in the entire U.S.



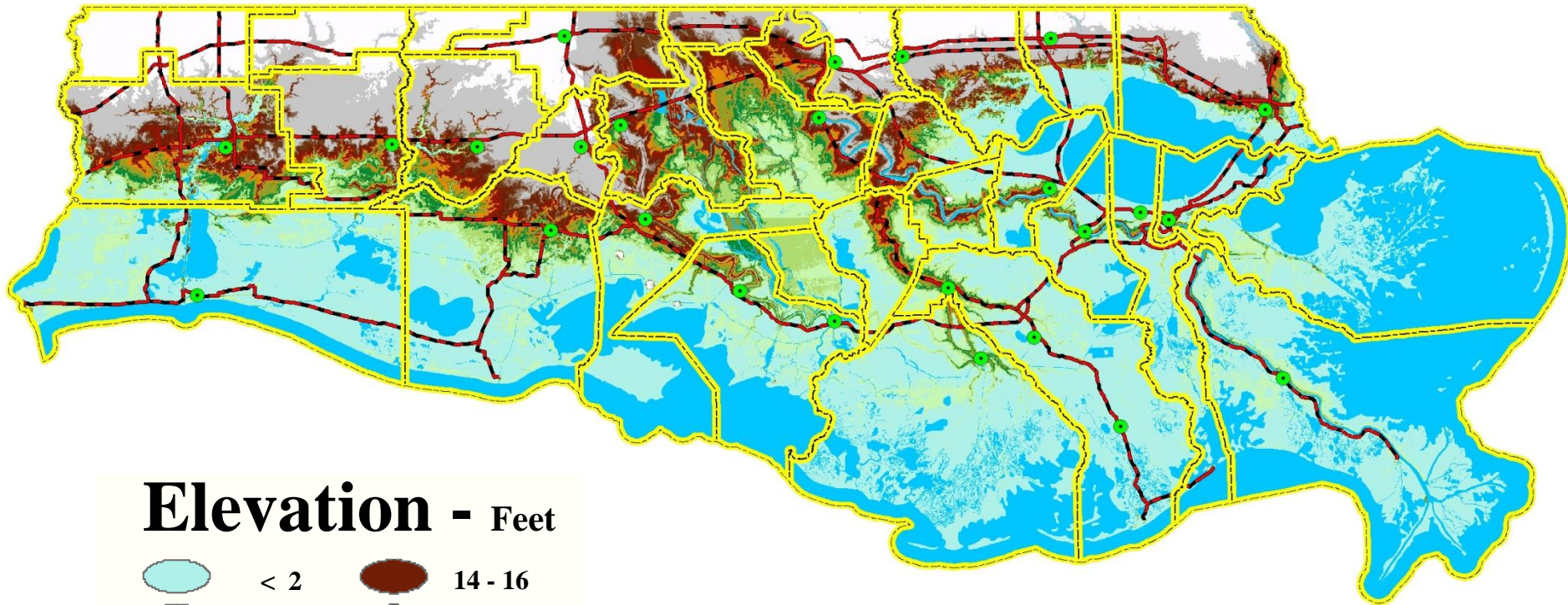
- By 2050, coastal LA will lose more than 630,000 additional acres of coastal marshes, swamps, and islands.





# ELEVATION – COASTAL LA. IS LOW

## LIDAR SURFACE ELEVATION



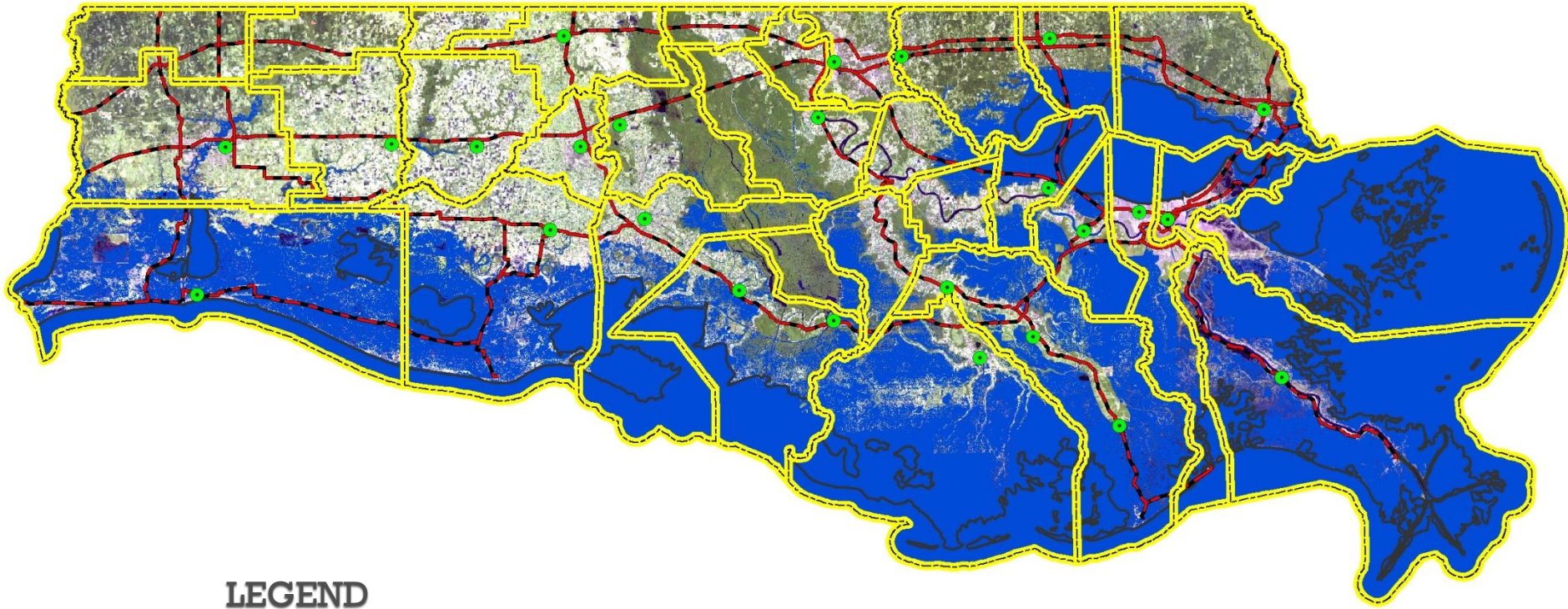
### Elevation - Feet





# POTENTIAL IMPACTS OF SEA LEVEL RISE

## Inundation to 2.0 ft. Elevation



### LEGEND

- CITIES
- PRIMARY ROADS
- PARISH BNDRY
- WATER

**Why** are we giving permits based on the Flood Insurance Rate Map in areas that will see increased flood risk thru SLR?



Do it Right, Get the Facts, Make the Choice



[www.LSUAgCenter.com/Rebuilding](http://www.LSUAgCenter.com/Rebuilding)



## WET FLOODPROOFING!

REDUCING DAMAGE FROM FLOODING

## FLOODWALLS



## USING WATER-INFLATED BARRIERS

## DRY FLOODPROOFING: SEALING & BUILDING WATER-TIGHT

## USING LEVEES FOR FLOOD PROTECTION



### POINT TO REMEMBER



## FLOOD WRAPS AND TEMPORARY SHIELDS

## USING SANDBAGS FOR FLOOD PROTECTION



## PREVENTING BACK-FLOW

## PANELS



## USING PUMPS IN FLOOD PROTECTION



### PUMP TYPES





# Floodproofing Resources



- Flood risk and insurance
- Property Protection
  - Elevation
  - Levees and floodwalls
  - Sealants
  - Temporary barriers
  - Sewer back-flow protection
  - Wet floodproofing
- Product literature
- Grants and loans
- Floodplain development regulations

[www.louisianafloods.org](http://www.louisianafloods.org)

**LSU**  
**AgCenter**  
LAND AND WATER

## READY FOR RAIN



Floodproofing Tips  
& Techniques

**LSU**  
**AgCenter**  
LAND AND WATER

[www.louisianafloods.org](http://www.louisianafloods.org)



Rising



Above the Floods



Louisiana State University  
**Agricultural Center**  
Louisiana Cooperative Extension Service

*Above the Flood*



*Raising 1600-3000+ sq. ft.  
brick-veneer  
slab-on-grade buildings with  
fireplaces in  
the Atchafalaya floodplains*

**LSU**  
**AgCenter**  
Research & Extension

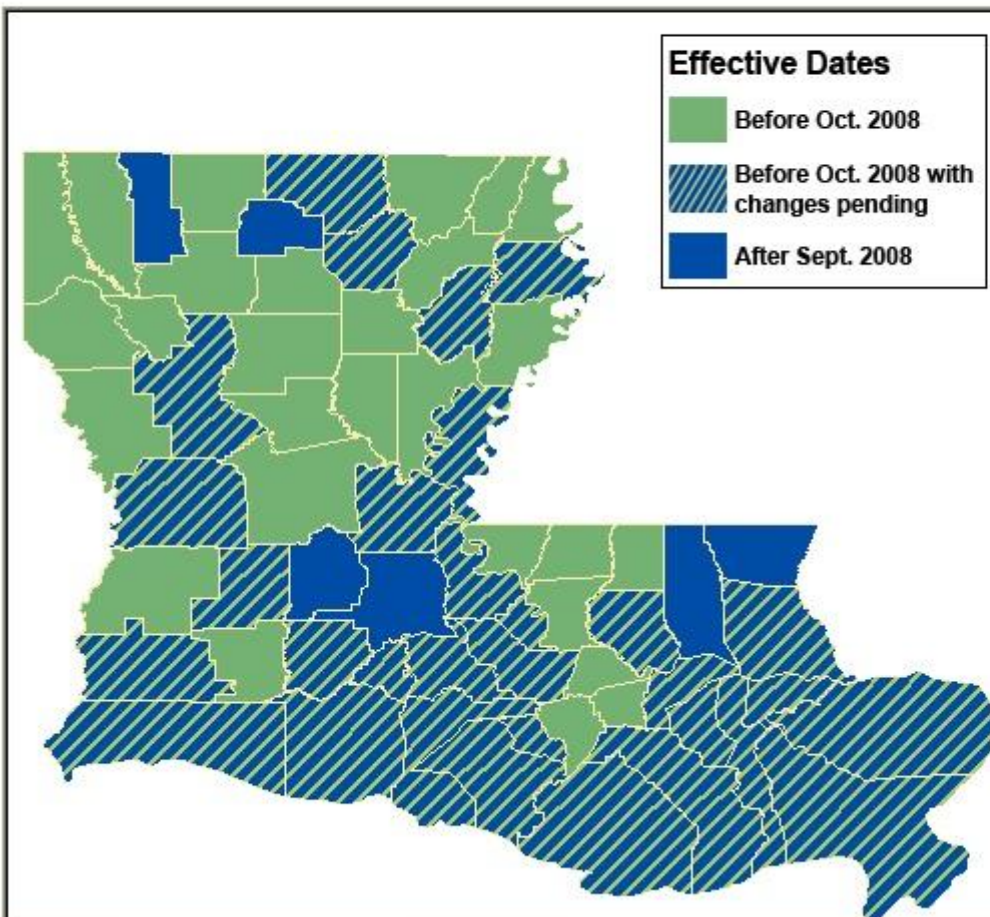
[www.lsuagcenter.com](http://www.lsuagcenter.com)

# Wind and Flood Hazards

Louisiana Flood Map Portal

Select your Parish

**Thursday – 3:30**





# Wind and Flood Hazards

