Does Dry Floodproofing Work?

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Agenda

• Some minimum requirements
• Reasons for Failures – What are people not getting?
• Review of the new FEMA Floodproofing Certificate
• How can we reduce future failures?
Dry Floodproofing Regulatory Requirements

- Floodproofing to the BFE
- Substantially impermeable below the BFE
- Able to withstand hydrostatic loads (lateral and buoyancy loads)
- Non-residential (few exceptions)
- PE or RA develop and/or review the structural design, specifications, plans, and certify that design and methods of construction meet accepted standards of practice
- Certificates recorded with the community
Dry Floodproofing Insurance Requirements

• Floodproofing must extend to the BFE + 1 foot
• Higher premiums for active floodproofing measures, lower premiums for passive floodproofing measures
Failure to Deploy Active Dry Floodproofing Measures

• Are they being deployed for every necessary event?
  – Any event above the FFE regardless of the severity of the flood

• What is required to deploy all the shields?
  – Is any special equipment needed?
Lack of Basic Maintenance

- New penetrations though dry floodproofed wall systems
- Deteriorated gaskets
- Incorrectly stored shields
- Pumps not tested
Lack of Designer Understanding

• What does substantially impermeable mean?
• Making wall systems substantially impermeable – CMU and cast-in-place
• Using system components that are “certified” for other hazards (Miami-Dade or “weather-proof”)
• Little manufacturer feedback on whether a material is appropriate for floodproofing applications
Lack of Designer Understanding (cont.)

- Considering buoyancy forces
- Joints and seals that are not designed for hydrostatic forces
- Lack of long-term power supply (How many hours can the pump run?)
- Temporary Barrier Systems (not structurally connected)
- Wooden Shields without gaskets
Getting the Level of Protection Correct

Office Building
• 16,000 sf Building
• 3 feet of floodproofing
• Doors: 2 double glass doors and one single glass door
• Windows: 12 windows about 3 feet wide each
• Assuming an offset gap between the shields and windows about 6 inches
• 1 inch overtopping

Results
• Overflow Rate: +4 cfs about 1,834 GPM and 110,000+ GPH
• Duration to fill the space is: 196 minutes
Overlooked Requirements

- Dry Floodproofing requires a means to remove what water does accumulate
- For areas where seepage is expected, flood-resistant materials are to be used
- Resistance of lateral hydrostatic loads AND buoyancy needs to be factored into design
Some Thoughts on Freeboard

• Remember the Base Flood Elevations are rounded to the nearest foot
• Once a building overtops it is almost impossible to pump out
• Overtopping damages will be the same as if nothing was done
• We should consider future conditions:
  – Age of the maps
  – Development
  – Sea Level Rise (SLR is a stillwater elev. and waves will increase that value)
Transfer of Building Ownership

• Limited or no communication about the dry floodproofing system
• New owners may not understand the necessary steps
  – Warning Time
  – Manpower Needs
  – Evacuation Requirements
  – Maintenance of the system
  – Importance of maintaining the waterproofing
Floodproofing Certificate - 2015

- Certify designed **and constructed** to meet ASCE 24 and 44 CFR 60.3 (c)(3)
- Photographs of components
- Maintenance Plan
Should Dry Floodproofing Continue?

Retrofitting existing buildings

- Larger buildings in urban, densely developed areas
- Building life cycles upwards of 50 years
- Elevating may not be feasible
- Elevating limits street level access
Should Dry Floodproofing Continue?

**New construction**
- Urban areas where street level access is needed
- Experienced designers
- Educated/experienced regulators
- Buildings with dedicated maintenance staff
  - Maintenance and awareness of system
  - Means of passing this on as maintenance staff and ownership changes
Other Considerations

- Dry Floodproofing works best where lower flood depths are anticipated
  - Hydrostatic forces
  - Overtopping results in less damage

- Flood warning time
- Regular review and update of maintenance plan
- FEMA is considering regular “recertification”
Should there be Additional Requirements?

• Periodic recertification (under consideration) which should include updates to maintenance plan and current photos of components

• Education for designers AND regulators is essential

• Insurance claims payments based on level of design event?

• Performance standard for dry floodproofing products?
Questions?