

# Understanding Active & Passive Floodproofing Options For Non-Residential Buildings in Special Flood Hazard Areas

AIA COURSE: FP03  
AIA CREDIT: 1 HSW  
AIA PROVIDER: T058

PRESENTER: Bryan Christopherson, CFM  
*This presentation may be recorded for future use.*

## Presenter Information

---

**Bryan Christopherson, CFM**  
Certified Floodplain Manager  
Midwest Regional Manager

[bchristopherson@floodproofing.com](mailto:bchristopherson@floodproofing.com)

c 563-613-1654





# Capabilities



### Engineering & Design

- Non-structural floodproofing analysis and assessments including engineered calculations and shop drawings

### Project Estimating

- Turnkey quoting for floodproofing system and installation

### Project Management

- Full-service quality control process from design review through install

### Product Supply

- Floodproofing product selection based off building classification

### Installation

- Authorized installation team trained in all potential floodproofing systems

### Core Competencies

- Global Distribution & Procurement
- Flood Mitigation Solutions
- In-House Engineering Capabilities
- New Construction & Retrofits
- Erosion Control Solutions
- Levee & Dune Core Support
- Complimentary Floodplain Design
- Commercial & Residential
- New Product Innovation
- Product Manufacturing
- Custom Design Abilities
- Project Consulting

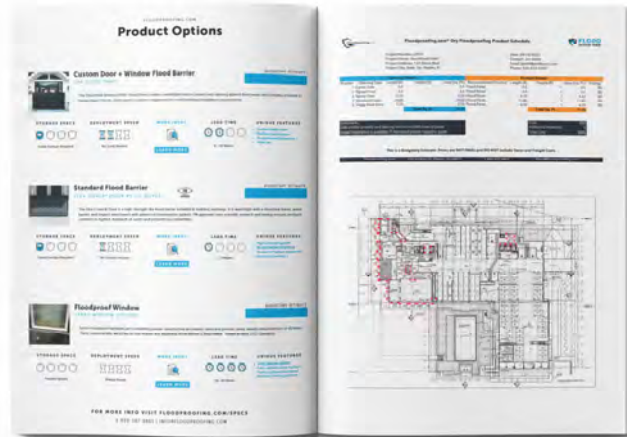
9B5Q5 CAGE	VHXRFU1RMQ57 UNIQUE ENTITY ID			
SAM.GOV SMALL BUSINESS				
<b>NAICS CODES</b>	332312	423390	541310	
236210	237990	339999	423440	541330
236220	238150	423850	423840	541690

Affiliated  
Companies





## Floodproofing Design Services and Installation Division



Floodproofing analysis and assessments including recommended and multiple options

### Supported by:

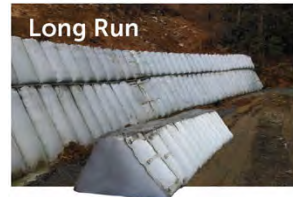
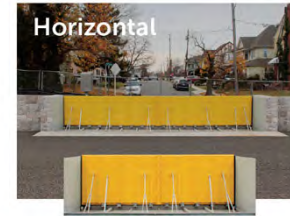
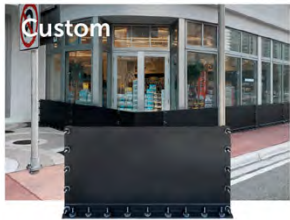
- Project Management Team
- Engineering Division
- Technical Sales Representatives across the United States
- Product Technicians
- Internal Support Specialists



Send plans to: [PLANS@floodproofing.com](mailto:PLANS@floodproofing.com)



# Floodproofing.com Product Portfolio



## CEU Registration

---

Floodproofing.com is a registered provider with The American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES records for AIA members.

This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product.



AIA COURSE TITLE:	Understanding Active Vs Passive Floodproofing Options for Non-Residential Structures in a SFHA
AIA COURSE NUMBER:	FP03
AIA CREDIT:	1 HSW
AIA PROVIDER:	FLOODPROOFING.COM
AIA PROVIDER NUMBER:	T058



# CFM

ASFPM  
EDUCATION  
PROVIDER

# Flooding by the Numbers

**2.4M**

Damage claims  
since the 1970's

*NRDC*

**80**

Average Deaths Per  
Year by Flood  
Events

*Weather.gov*

**99%**

of all US counties were  
impacted by flooding since  
1996

*First Street Foundation*

**40%**

of all natural disasters  
have flooding

*Nationalfloodinsurance.org*

**14.6M**

Properties face  
substantial flood risk

*University of Maryland*

Every **2–3 Days<sup>5</sup>**, America faces an  
urban flooding event

## Learning Objectives

---



- Describe floods, floodplains, and the potential hazards to buildings.
- Identify regulations, codes, and standards as they relate to sustaining foundations and overall business continuity in flood hazard areas.
- Active vs. passive floodproofing solutions and the overall impact of ownership.
- Analyze the role of building compliance in securing lowering flood insurance rates and what mitigation solutions are available.

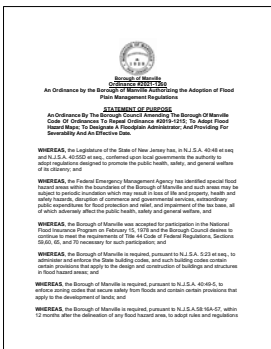
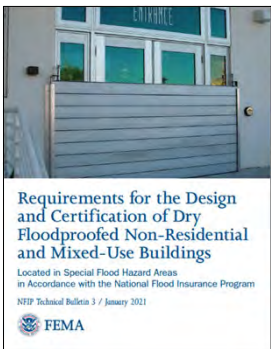
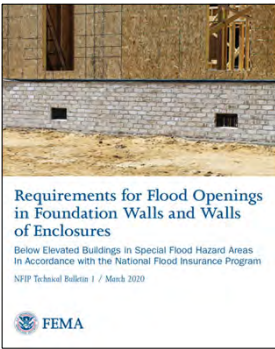


# Where To Get Started in Floodplain Design and Construction

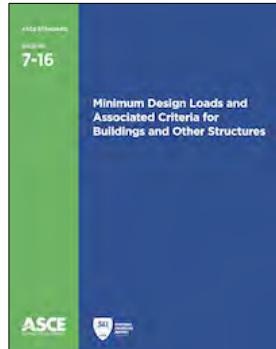
**Codes:  
National + State**



**Regulations:  
FEMA, NFIP, Floodplain Ordinances**

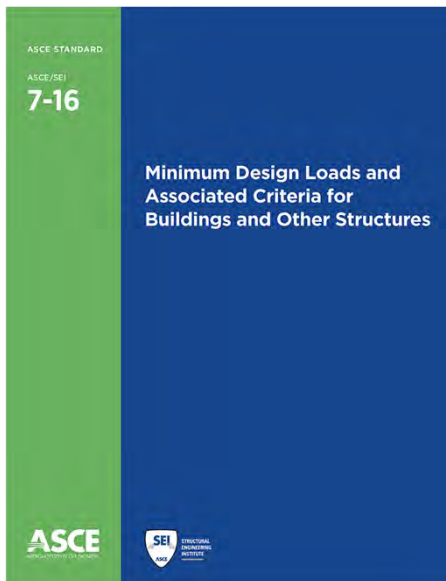


**Standards: ASCE**



## ASCE Adds 500-Year Flood Protection to 7-22 Design Standard

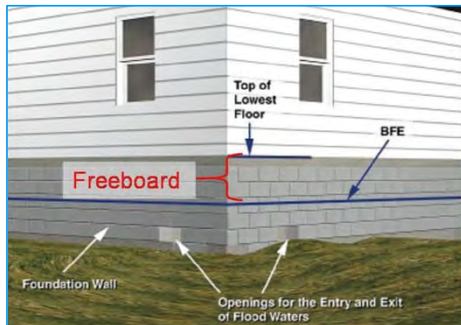
---



- Beginning with ASCE 7-22 Supplement 2, the Flood Hazard Area was increased from the 100-year floodplain (the Special Flood Hazard Area) to the 500-year flood plain (the SFHA and the shaded X-zone) for Risk Categories II, III, and IV structures to improve the performance of these structures subjected to flood events and to meet the target reliabilities of the Standard.
- In prior versions of ASCE 7, debris loads were only required for the 100-year flood zone. ASCE 7-22 Supplement 2 increased the design criteria to include the Shaded X-Zone (area between 100-year and 500-year flood) which increased the zone of debris requirements.
- The supplement also introduces a new requirement for relative sea level change as it relates to each individual structure. The sea level rise estimated over the service life of the structure must be added to the design's flood mitigation plans.

## Basic Terms

- **Base Flood Elevation (BFE)** is the calculated level that flood waters will rise to during a Base Flood.
- **Design Flood Elevation (DFE)** is the elevation of the highest flood (generally the BFE including freeboard). Also, referred to as Flood Protection Elevation.
- **Special Flood Hazard Area (SFHA)**
  - **A zones** have low impact from waves.
  - **Coastal A zones** are expected to receive 1.5-foot or greater breaking waves.
  - **V zones** have high impact from waves.
- Both A and V zones subject to experiencing a 1% annual chance flood event. This translates to a 26% chance of flooding over the life of a 30-year mortgage.



**Freeboard:** Elevating a building's lowest floor above and beyond BFE. This is a built-in safety factor resulting in lower flood insurance premiums. Freeboard ordinance regulations are popular in CRS communities.



## Different Types of Flood Risk

---



# CONVENTIONAL DRY FLOODPROOFING METHODS



## ACTIVE

- Storage required
- Labor needed for deployment
- Equipment may be required for deployment
- Annual deployment / inspection



## PASSIVE

- No storage required
- No deployment required
- Ready to protect at all times
- No human intervention required





# Dry Floodproofing Methods



## FEMA Technical Bulletin 3 / January 2021



### Requirements for the Design and Certification of Dry Floodproofed Non-Residential and Mixed-Use Buildings

Located in Special Flood Hazard Areas  
in Accordance with the National Flood Insurance Program

NFIP Technical Bulletin 3 / January 2021



- Goal to make a building watertight, impermeable to floodwaters.
- NFIP allows dry floodproofing in **non-residential buildings only**.
- For new construction or substantial improvements to existing buildings. Acceptable in A, AE, A1-A30, AO, & AH Zones.
- Design must be certified.
- Page 26 – *“ASCE 7 should be used as the source of how to calculate debris impact loads..”*
- FEMA has identified that dry floodproofing solutions should withstand impacts from a minimum weight of 500 to 1,000 lbs at a minimum, considering site specific conditions.





# FEMA TB-3: Floodproofing Certificate (Page 33)

## FEMA "DRY" FLOODPROOFING CERTIFICATE

U.S. DEPARTMENT OF HOMELAND SECURITY  
FEDERAL EMERGENCY MANAGEMENT AGENCY  
National Flood Insurance Program

**FLOODPROOFING CERTIFICATE**  
FOR NON-RESIDENTIAL STRUCTURES

FIRM NO. 1402.0003  
Form Number 01, 2017

The floodproofing of non-residential buildings may be permitted as an alternative to elevating to or above the Base Flood Elevation, however, a floodproofing design certification is required. This form is to be used for that certification. Floodproofing of a residential building does not alter a community's floodplain management elevation requirements or affect the insurance rating, unless the community has been issued an exception by FEMA to allow floodproofed residential structures. The permitting of a floodproofed residential structure requires a separate certification specifying that the design complies with the local floodplain management ordinance.

BUILDING OWNER'S NAME \_\_\_\_\_ FIRM INSURANCE COMPANY USE \_\_\_\_\_  
STREET ADDRESS (including Apt., Unit, Suite, and/or Wing, Number, OR P.O. BOX) AND ZIP NUMBER \_\_\_\_\_ CITY/STATE \_\_\_\_\_  
OTHER DESCRIPTION (as on Block Number, etc.) \_\_\_\_\_ COUNTY/ZIP NUMBER \_\_\_\_\_  
CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP CODE \_\_\_\_\_

**SECTION I-FLOOD INSURANCE RATE MAP (FIRM) INFORMATION**  
Provide the following from the page FIRM:

COMMUNITY NUMBER	FIRM NUMBER	DATE	DATE OF FIRM NO. 1	FIRM DATE	DATE FIRM CANCELLED (If No Date, Use Digit)

**SECTION II-FLOODPROOFING INFORMATION (By a Registered Professional Engineer or Architect)**  
Floodproofing Design Elevation Information:  
Building is floodproofed to an elevation of \_\_\_\_\_ feet MVD. (Elevation datum used must be the same as that on the FIRM).  
Height of floodproofing on the building above the lowest adjacent grade is \_\_\_\_\_ feet.  
(NOTE: For insurance rating purposes, the building's floodproofed design elevation must be at least one foot above the Base Flood Elevation to receive rating credit. If the building is floodproofed only to the Base Flood Elevation, then the building's insurance rating will result in a higher premium.)

**SECTION III-CERTIFICATION (By a Registered Professional Engineer or Architect)**  
Non-Residential Floodproofed Construction Certification:  
I certify that, based upon development and/or review of structural design, specifications, and plans for construction, the design and methods of construction are in accordance with accepted standards of practice for meeting the following provisions:  
The structure, together with attendant utilities and egress factors, is watertight to the floodproofed design elevation indicated above, with walls that are substantially impervious to the passage of water.  
All structural components are capable of resisting hydrostatic and hydrodynamic flood forces, including the effects of buoyancy, and anticipated debris impact forces.  
I certify that the information on this certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1002.

CERTIFIER'S NAME \_\_\_\_\_ (PRINT NUMBER (if App. Use)) \_\_\_\_\_  
TITLE \_\_\_\_\_ COMPANY NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_ CITY \_\_\_\_\_ STATE \_\_\_\_\_ ZIP CODE \_\_\_\_\_  
SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_ PHONE \_\_\_\_\_

Copies should be made of this Certificate for: 1) community official; 2) insurance agent/company, and 3) building owner.

FEMA Form 01-05, Rev 08 REPLACES ALL PREVIOUS EDITIONS F-004 (2/08)

## Planning: What to consider?

- Warning time, Safety & Access
- Flood Velocities, Depths, and Debris
- Frequency
- Cost & Liability

## Inspection & Maintenance Plan

- Mechanical equipment, sump pumps & generators
- Inspect & test all flood shields (check gaskets)
- Inspect foundation walls for cracks

### REQUIRED DOCUMENTS FOR NFIP FLOOD INSURANCE POLICIES FOR DRY FLOODPROOFED BUILDINGS

When building owners apply for NFIP flood insurance policies for a dry floodproofed building, the NFIP requires a signed and sealed NFIP Floodproofing Certificate, flood emergency operations plan, and inspection and maintenance plan.

## Emergency Operation Plan

- Establish the chain of command & responsibilities
- Procedure for notifying necessary parties
- A list of specific duties & location of all dry floodproofing materials
- Evacuation plan with and without duties
- Annual training drills with community officials
- The plan is required to ensure that the floodproofing components will operate properly under all conditions, including a power failure which is often seen during floods.

## FEMA Technical Bulletin 3 / January 2021

### ASCE INTERPRETATION OF ASCE 24-14 FLOOD SHIELD REQUIREMENTS AND FEMA POSITION ON WHETHER A FLOOD SHIELD CONFIGURATION MEETS NFIP DRY FLOODPROOFING REQUIREMENTS

In November 2016, ASCE issued a formal interpretation of whether a specific configuration of flood shields meets the dry floodproofing requirements of ASCE 24-14.<sup>1</sup> The configuration is described as a building that is supported by an impermeable reinforced concrete stem wall (foundation) with permeable exterior walls such as glass curtain walls. The question was whether the use of removable flood shields as a component of the exterior building façade would render the exterior walls impermeable along the entire length of the façade. Diagrams included in the request for the interpretation show flood shields attached at the base to the impermeable foundation stem wall and attached to vertical, structural columns between spans of the glass curtain wall system.

The ASCE interpretation determined that the flood shield configuration described and shown in the request meets the dry floodproofing requirements of ASCE 24-14 provided the building and shields meet all other dry floodproofing requirements, provided the flood shields are “close to and attached to the building façade,” and provided the shield attachment is “via guides, fasteners or supports that are permanent parts of the building façade.”<sup>2</sup>

The FEMA position is that the ASCE interpretation is contrary to the NFIP requirements because exterior wall sections that are neither substantially impermeable nor able to resist flood loads will not meet the intent of 44 CFR § 60.3(c)(3) that walls must be “substantially impermeable to the passage of water and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and effects of buoyancy.” Therefore, any temporarily installed means of flood protection that cover such walls would not be considered compliant.

<sup>1</sup> Jonathan C. Esslinger, Director, Technical Advancement and Codes & Standards, ASCE, written communication, November 29, 2016.


<sup>2</sup> *Ibid.*, Page 5.

- ASCE 24-14 allows you to have glass curtain walls protected by deployable flood barriers as long as they bolt back into the structural and substantially impermeable elements of the building, including the building facade.
- FEMA identifies a glass curtain wall as a “wall”, therefore a deployable flood barrier system over a glass curtain wall, that is not structural and substantially impermeable, **would not be compliant** and does meet the CFR, in their eyes.
- NFIP participating communities always have to meet the minimum FEMA requirements. The CFR states walls need to be substantially impermeable. A community not enforcing FEMA’s stance on glass wall systems is technically not meeting the minimum requirements.
- A CAV performed by FEMA could put a town on probation due to non-compliance, if these FEMA standards are not met.

# FEMA TB-3: Flood Insurance

## 4 NFIP Flood Insurance Implications

Careful attention to compliance with the NFIP requirements, local building codes and standards, and floodplain management regulations is important during design, plan review, construction, and inspection. Compliance influences both vulnerability to flood damage and the cost of NFIP flood insurance.



An insurance agent with NFIP experience should be consulted during the design phase of buildings with dry floodproofing to estimate the cost of NFIP flood insurance. The consultation is particularly important when considering whether to include dry floodproofing of non-residential portions of mixed-use buildings or dry floodproofing of below-grade parking areas under non-residential and mixed-use buildings (see NFIP Technical Bulletin 6, *Requirements for Dry Floodproofed Below-Grade Parking Areas Under Non-Residential and Mixed-Use Buildings*).

Designers should pay particular attention to the flood protection level (level to which buildings will be dry floodproofed). The NFIP regulations applicable to non-residential structures in Zone A require the lowest floor (including basement) to be elevated to or above the BFE or the structures may be dry floodproofed below the

### NFIP FLOOD INSURANCE FOR DRY FLOODPROOFED BUILDINGS

While current owners and developers who are considering constructing dry floodproofed non-residential buildings may not intend to purchase NFIP flood insurance coverage, the cost of the coverage may be a factor for future owners.

## FEMA TB-3 + Others: Periodic Drills & Deployment Time

Where removable shields are to be used, a flood emergency plan shall be approved by the authority having jurisdiction and shall specify, at a minimum, the following information: storage locations of the shields, the method of installation, conditions activating installation, maintenance of shields and attachment devices, periodic practice of installing shields, testing sump pumps and other drainage measures, and inspecting necessary material and equipment to activate or implement floodproofing. The flood emergency plan shall be posted permanently in at least two conspicuous locations within the structure.

ASCE 24-14 (Section 6.2.3 pg. 21)

- Flood Emergency Plan that includes:

- > Chain of command;
- > Notification procedures;
- > Personnel duties;
- > Location of floodproofing components, install procedures, repair procedures;
- > Evacuation procedures for building occupants;
- > Component maintenance procedures during flooding event;
- > Drill and training program (at least once a year);
- > Regular review/update of Flood Emergency Plan; and

NFIP FLOOD INSURANCE MANUAL  
APRIL 2020 (pg. 70)

### PERIODIC PLAN REVIEWS, DRILLS, AND INSPECTIONS

An annual review of flood emergency operations plans, with exercises for personnel to practice installing and deploying measures that require human intervention, is critical for success when flooding occurs.

Some communities conduct periodic inspections of dry floodproofed buildings, and some require the submission of reports documenting third-party inspections.

FEMA TB-3 (pg. 16)

**6.2.3 Limits on Human Intervention** Dry floodproofing measures that require human intervention to activate or implement prior to or during a flood shall be permitted only when all of the following conditions are satisfied:

1. The flood warning time (alerting potential flood victims of a pending flood situation) shall be a minimum of 12 h unless the community operates a flood warning system and implements an emergency plan to ensure safe evacuation of flood hazard areas, in which case human intervention is allowed only if the community can provide a minimum flood warning time equal to or longer than the cumulative time
  - (a) to notify persons responsible for installation of floodproofing measures,
  - (b) for responsible persons to travel to structures to be floodproofed,
  - (c) to install, activate, or implement floodproofing measures, and
  - (d) to evacuate all occupants from the flood hazard area.

ASCE 24-14 (Section 6.2.3 pg. 21)

- ASCE 24-14, FEMA TB-3, & NFIP FLOOD INSURANCE MANUAL require flood emergency and inspection plans approved by authority having jurisdiction.
- Calls for a periodic and annual deployment of shields and barriers.
- Just like a fire drill we need to practice to ensure the system will work.
- Calls for the flood warning time to be a minimum of 12 hours. Floodproofing measures should be installed within the warning time.

# DRY FLOODPROOFING COST CALCULATOR

CASE STUDY– Protecting (8) 4' x 6' openings, comparing only floodproof window systems against traditional windows protected by 4' tall flood panels.

## PASSIVE -Floodproof Windows

Initial Investment - \$138,752

Annual Upkeep - \$0

5 Year Cost of Ownership - \$138,752

**RETURN ON INVESTMENT  
IN LESS THAN 5 YEARS!**

## ACTIVE – Flood Panels

Initial Investment - \$100,544

Annual Upkeep - \$8,274

5 Year Cost of Ownership - \$141,914

# PASSIVE SOLUTIONS = LONG-TERM SAVINGS



## FLOODPROOF GLASS SYSTEMS



**Floodproof Window**



**Glass Flood Wall**

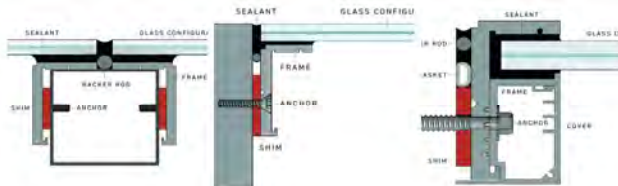
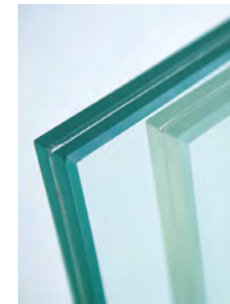
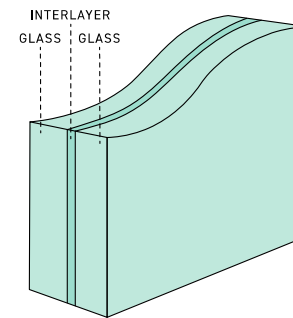


## Floodproof Window and Wall Systems



- Passive flood barriers that maintain your view and aesthetic
- Custom configured glass and laminate
- Designed to meet impact testing standards, fire or ballistic rating, or sound & energy performance standards
- Patented customizable frames designed to withstand impact & heavy loads
- Sealants & gaskets with custom engineered anchoring specifications
- Tested for 10' water (ANSI/FM 2510 Standards) & up to 1,000 LB debris impact
- No issues with installation due to environmental corrosion, lack of maintenance
- Does not interfere with pedestrian pathway

### A COMPOSITION OF GLASS – INTERLAYER - GLASS



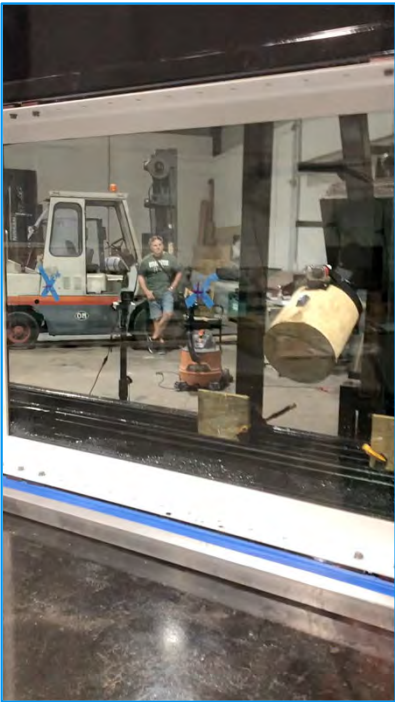
Complete window systems can be pre-glazed in a factory-controlled environment, delivered ready to be installed. This eliminates unnecessary handling of glass & frames and creates a higher quality product that is more cost-effective.



## Tested to ANSI/FM 2510 Standards

---

1,000 LB. IMPACT AT 8 FPS ASCE 7 REQUIREMENTS



LOAD TEST OF 9' OF WATER ON 20' X 11' FLOOD WINDOW







## Case Study: Jersey City Medical Center – Jersey City, NJ



- PROJECT LOCATION: Jersey City, NJ
- TYPE: Dry Floodproofing
- Products: (14) 4'x6' Fenex® Floodproof Windows with faux mullions
- FLOOD PROTECTION: 6'8" DFE
- INDUSTRY: Healthcare
- BUILDING USE: Hospital





## Case Studies

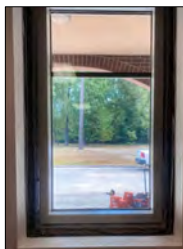
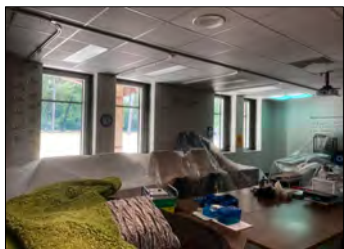
**NAME:** KINGWOOD HIGH SCHOOL  
**PROJECT LOCATION:** Kingwood, TX  
**FLOOD PROTECTION:** 8' DFE  
**PRODUCTS:** (38) Floodproof Windows



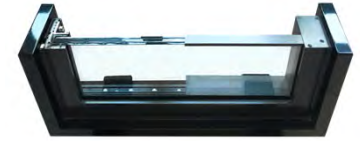
**NAME:** WORLD TRADE CENTER PAC  
**PROJECT LOCATION:** New York, NY  
**FLOOD PROTECTION:** 5' DFE  
**PRODUCTS:** (2) 5' x 8' Floodproof Windows with one-way mirror tint, Level 8 ballistic rating



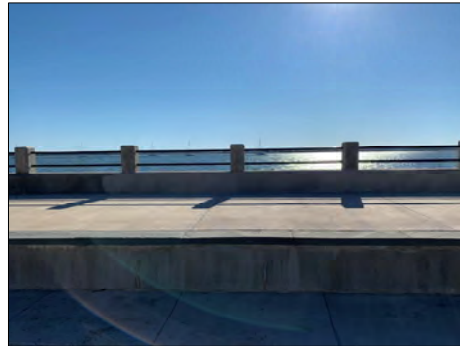
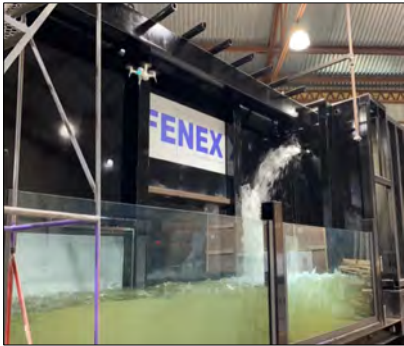
**NAME:** WHITEHALL MILL  
**PROJECT LOCATION:** Baltimore, MD  
**FLOOD PROTECTION:** 6'8" DFE  
**PRODUCTS:** (14) 4' x 6' Floodproof Windows



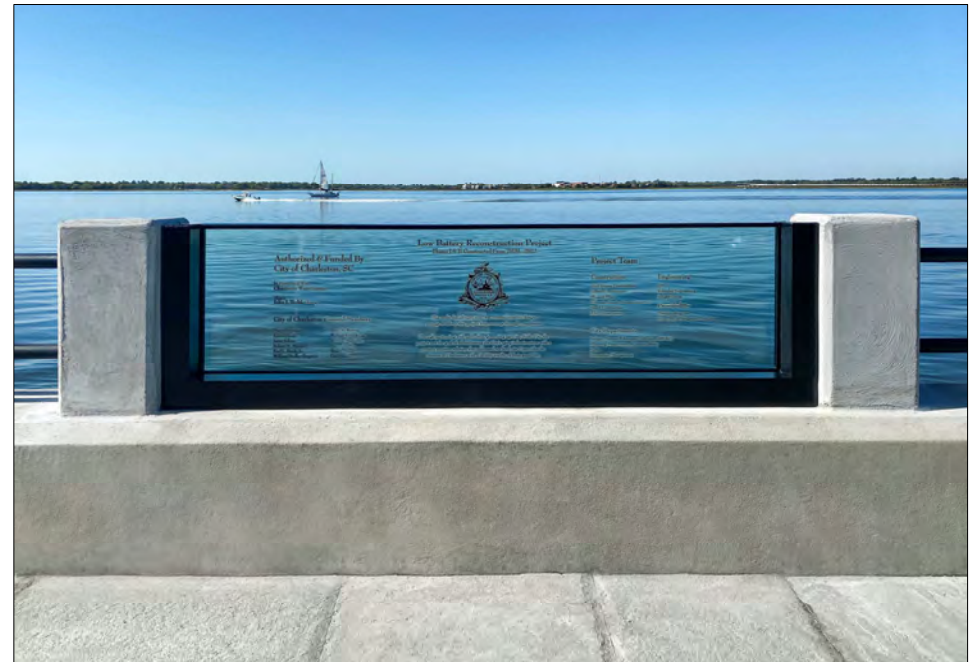
# Glass Flood Wall Systems



- A permanent, passive system. Always ready. Extremely resistant to coastal and environmental corrosion.
- Installation feasible on sea walls/bulk heads to avoid blocking the view.
- Resists up to 8-ft. of water with debris. 1,000 LB impact tested.
- Can be used as a railing in addition to an aesthetic pleasing flood wall solution by waterfront application.



Charleston, SC Battery Seawall  
Total: 4,800 linear ft.  
Glass Wall Sections: 7' wide x 2' high



*"The reconstruction of the Low Battery Seawall will serve as one of the City's newest lines of defense against rising sea levels and the constant threat of flooding to the downtown peninsula. This sample represents a possible solution to provide additional future flood protection with minimal visual obstruction to the Charleston Harbor and surrounding area."*

Ryan Mattie, PE, Senior Associate at Johnson, Mirmiran & Thompson, Inc.

# PASSIVE FLOOD BARRIERS



**Horizontal**



**Vertical**

# Horizontal Self-Activating Flood Walls



### KEY BENEFITS

- Fully passive operation – protecting people & property 24/7 without human intervention or power
- Passive flood mitigation measures preferred by FEMA
- Flood barriers that remain hidden, blended into the surrounding architecture
- Long service life with minimal maintenance
- Proven: field tested for over a decade, including real world deployment & long-term exposure in a variety of field conditions
- Over 2,500 flood barriers installed worldwide

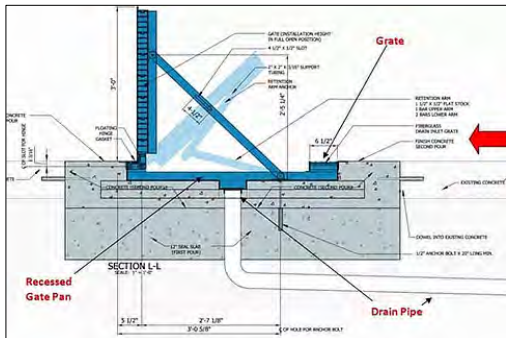
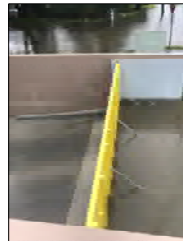


Lourdes Hospital – Binghamton, NY - FEMA Mitigation Best Practice Story

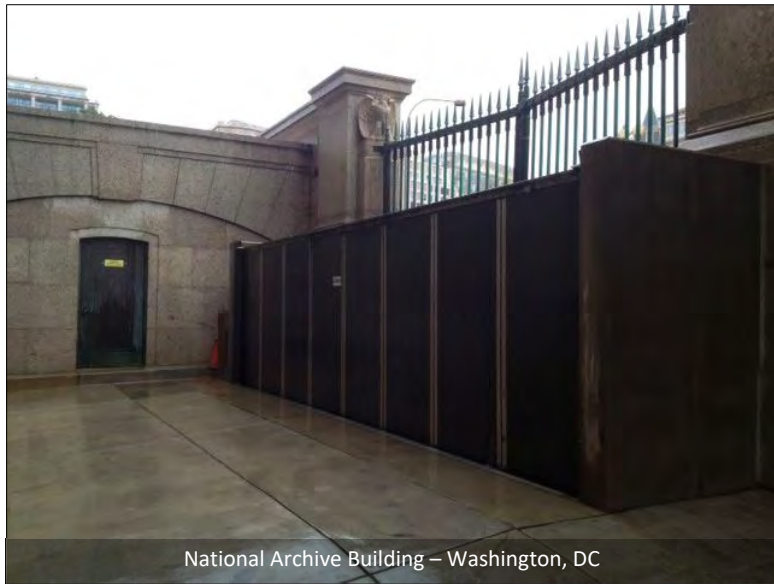
# Horizontal Self-Activating Flood Walls



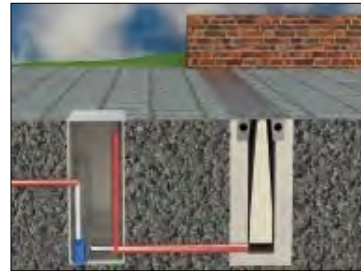
- Buoyant barrier is lifted by water
- Hinged beam floats up with water.
- Self closing – floats back down to hidden position as water recedes.
- Permanently installed beneath grade to protect 24/7.
- Structurally anchored to prevent overturning.
- Self activating gaskets seal against the wiper walls.



# Vertical Self-Activating Flood Walls

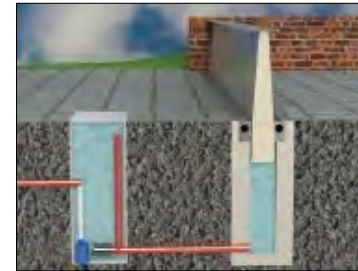


National Archive Building – Washington, DC



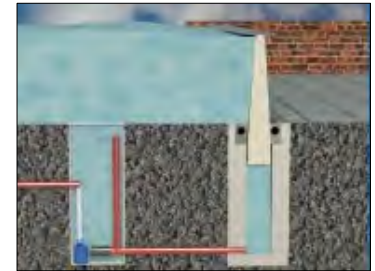
## Resting Position

In non-flood conditions, all operational parts of the barrier are concealed in the underground basin.



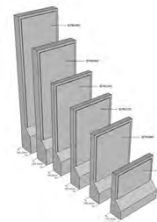
## Deploying

When floodwater rises to within a predetermined level below flood level, the basin housing the floating wall starts to fill up through an inlet pipe from the adjacent service pit.



## Fully Deployed

The flood wall floats and rises. When the basin is totally filled, the angled support block will lock the barrier into position making it watertight.



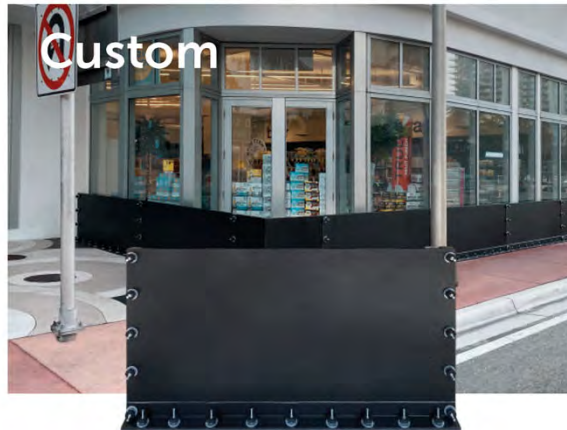
## FLOOD LOG SYSTEMS

---



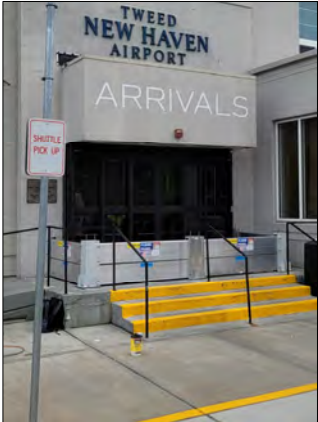
## FLOOD BARRIER PANELS

---





# Flood Logs



Tractor Supply Co. – Belen, NM



Flood Log Storage



# Flood Logs



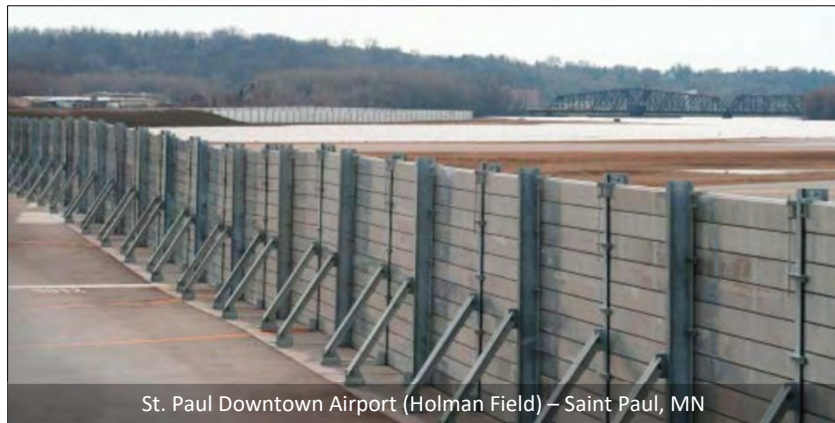
Customized Wall Plates Finished Look



## Wall Mount Customization

<p><b>Offset Mount</b> Offset wall mount provides an offset when the barriers need to make room for trim, door handles or other protrusions. Most popular mounting type.</p>	<p><b>Jamb Offset Mount</b> Jamb Offset Wall Mount has a smaller profile than the OSW. Great for areas with limited wall space.</p>	<p><b>Jamb Mount</b> Jamb mounts can be used in combination with our offset mount when one side of the opening has a 90-degree wall. It can also be used in jamb to jamb conditions.</p>	<p><b>"Z" Mount</b> The Z mount allows the channel to mount within the jamb to minimize the aesthetic impact on the building. The Z design also gives and offset to go around any protrusions.</p>	<p><b>Interior Mount</b> Interior Offset wall mount allows the flood barrier to be on the interior when an exterior barrier is not an option. The compression bolts are reversed allowing the system to be accessed with the door open.</p>	<p><b>Extended Offset Mount</b> Flood barriers may need an extended offset but not enough for a U shaped corral. Our offset mount can be extended 1' 6" to ensure nothing is in the way of the barrier, like a gas meter or architectural detail on the building.</p>	<p><b>Custom Interior Mount</b> Interior mounts, like exterior, may have limited mounting space. We can customize solutions to ensure the barriers will fit within the space provided and work as intended.</p>	<p><b>Custom Jamb Mount</b> For every problem we have a solution! Our customized mounts all allow us to provide you with a flood barrier that works as intended within the space provided.</p>

# Flood Planks



St. Paul Downtown Airport (Holman Field) – Saint Paul, MN

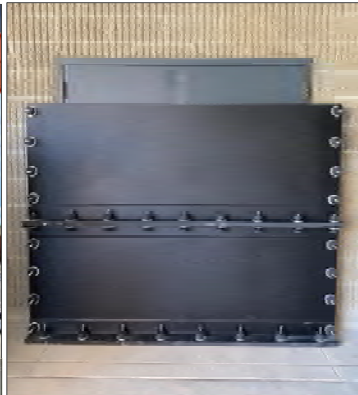




## Custom Door & Window Flood Barriers



- Custom sizes available
- Lightweight (less than 4 lbs. per sq. ft.)
- Easy to install and remove
- Fiber-reinforced plastic skin with engineered coating for extreme impact



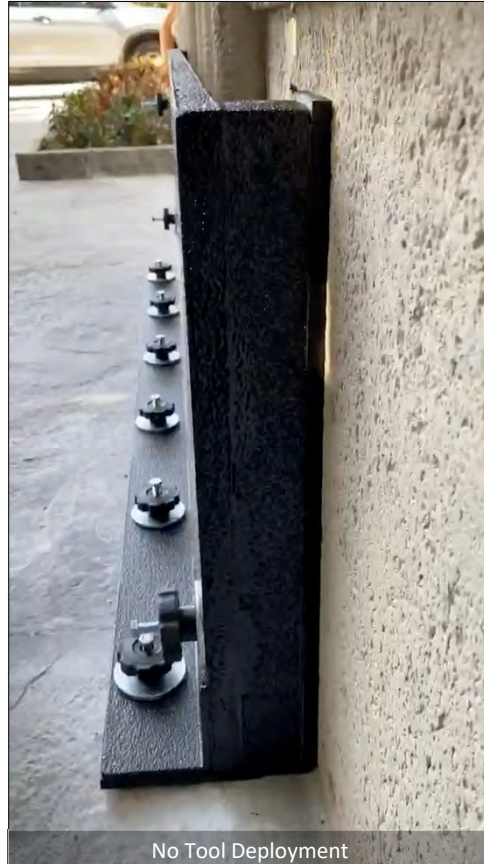
Gasket Compression Technology Conforms to Uneven Surfaces



Decorative Caps (paintable)



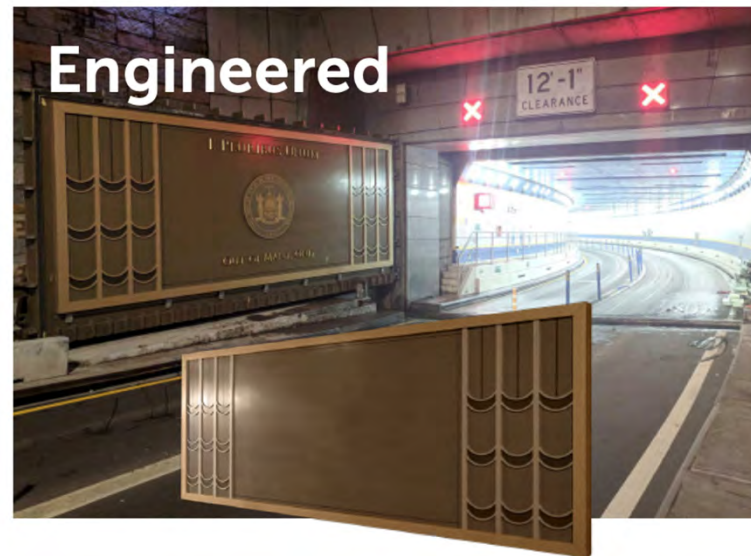
## Custom Door & Window Flood Barriers



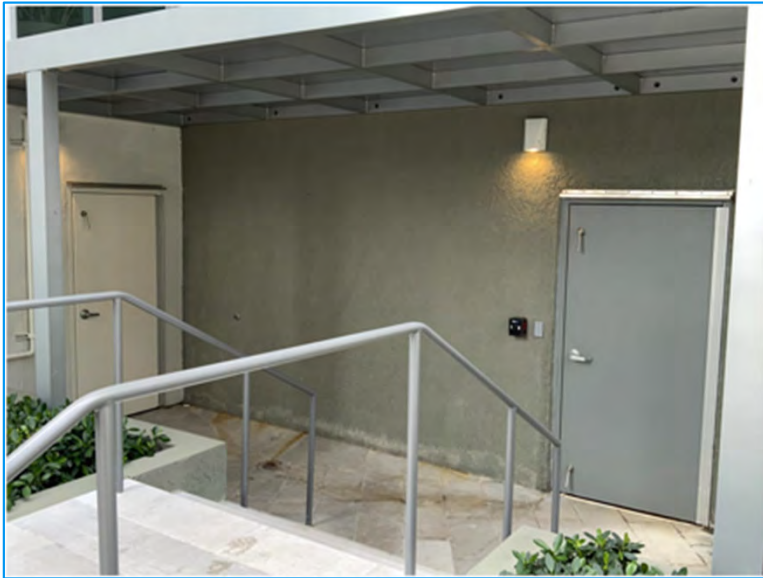
## COMMERCIAL FLOOD DOOR



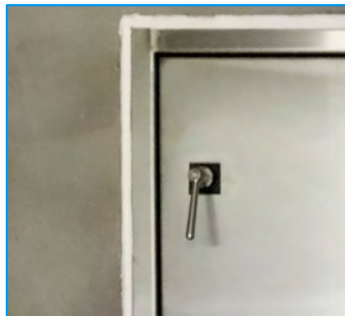
## INDUSTRIAL FLOOD GATES



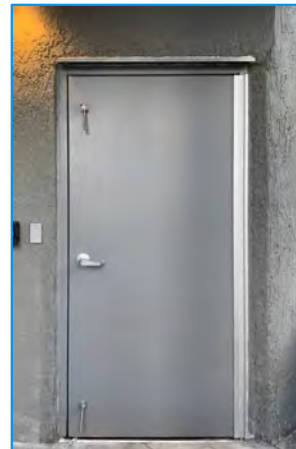
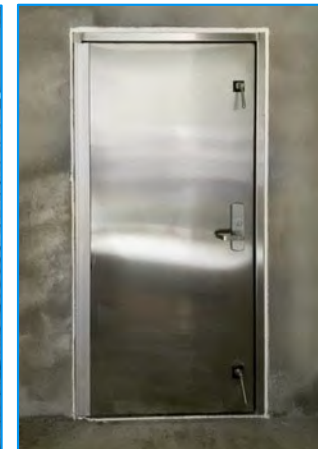
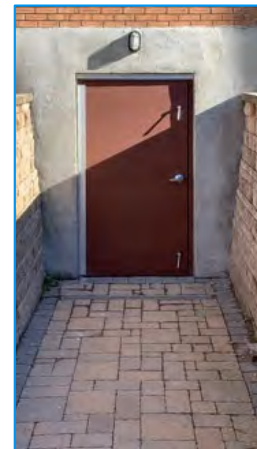
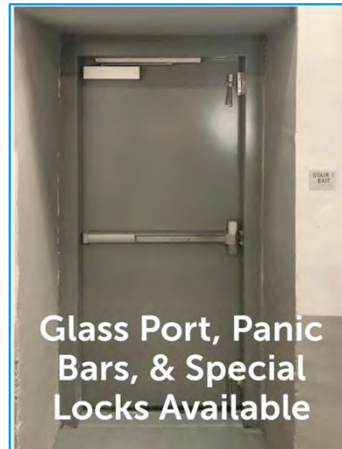
## Commercial Flood Doors



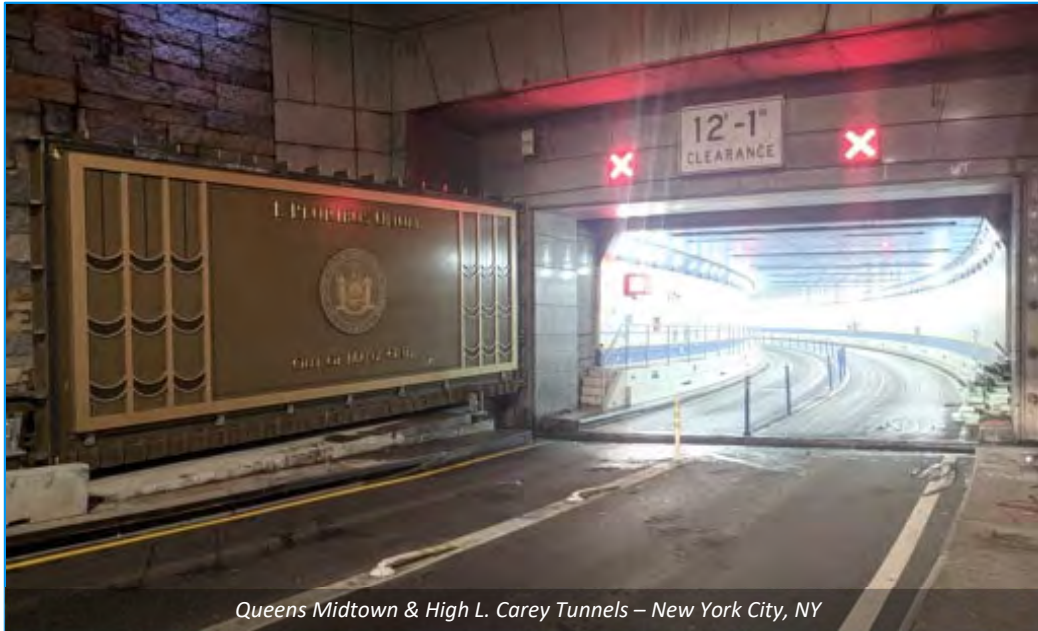
- Operates as a standard door
- Hydrostatic Tested up to 6-ft.
- Powder Coat Paint Options Available
- Mechanical Sealing Mechanism housed within the frame
- Manufactured in aluminum or steel
- Customization options including standard panic bars, specialized locking hardware, small glass view ports, and more.



Door Dog Removable  
Sealing Latch



## Custom Industrial Flood Gates

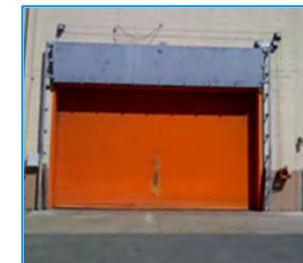


- Engineered to fit any size and application
- Manual, full automation, or powered
- Multiple material and finish options
- Permanent, removable, and automatic options
- Lip seal, inflatable, or compression gasket options
- Projects for US ARMY Corps of Engineers, US NAVY, and State Transit Departments

SIDE-HINGED



SLIDING



REMOVABLE

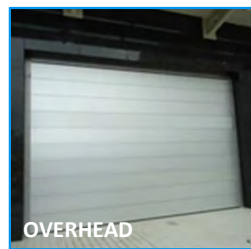




# Custom Industrial Flood Doors & Hatches

## WATERTIGHT DOORS

- Single or Double Doors
- Automatic or Button Activated
- Custom Engineered for Variety of Pressure Requirements



## WATERTIGHT HATCHES

- Sealed with Logs, Wheels or Drop Bolts
- Larger Hatches May Require Mechanical Assistance
- Can Fit Any Size or Pressure Requirements



Individually-Dogged Flush Hatch



Manual Drop-Bolt Hatch



## PERIMETER FLOOD BARRIERS



Flexible



Standard



Customizable



Semi Self-Fill

## SAND-FILLED FLOOD FIGHTING SYSTEMS



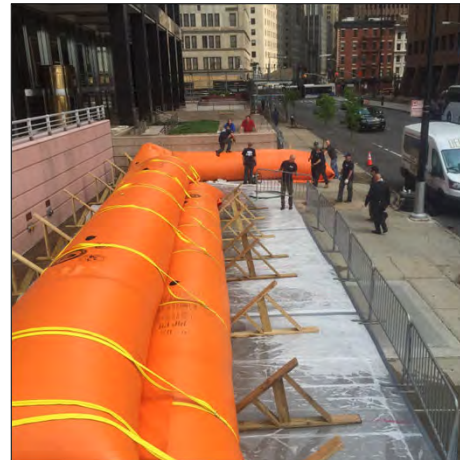
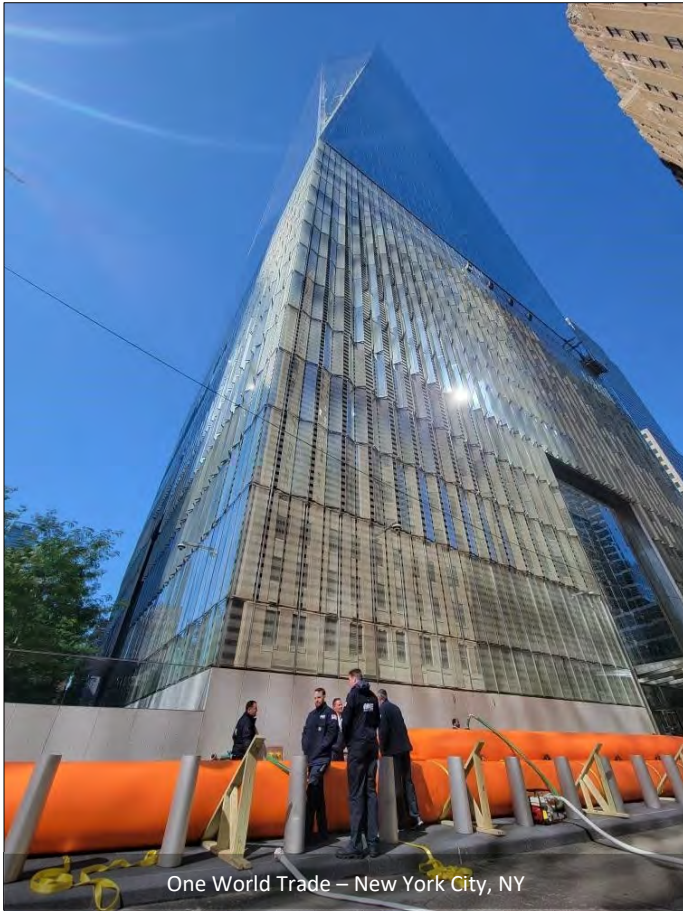
Long Run



Short Run



## Flexible-Tube Flood Barriers



- Standard heights of 18", 24", 30", 36", & 42"
- Length sold in 50' sections
- Heavy duty double coated nylon/ PVC material
- Rapid deployment when filled using fire hydrant
- Can be turned at any angle to fit any shape
- Engineered to be stackable to 32'

This flood protection system has been thoroughly tested at The University of British Columbia, and is Platinum Certified by the U.S. Army Corp. of Engineers, the Association of State Floodplain Managers, and FM Approvals.





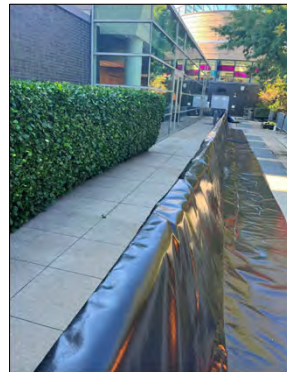
## Standard Perimeter Flood Barriers



- One 4-foot section replaces 468 sandbags
- Unlike sandbags, can be installed during the flooding event
- Sustainable, reusable, and reliable
- Can be deployed quickly and safely when time is low
- Stackable for use and storage
- Tongue and groove panel interface for easy connections
- Connections allow for 11-degree flexibility in either direction
- Corner pieces allow for 90-degree turns
- All-season compatibility



Battery Park City Ball Fields – New York City, NY



## Customizable Perimeter Flood Barriers



- Custom sizes available
- Double structural zipper to connect sections
- Rolls up for easy storage
- Coated PVC engineered material



## Semi Self-Fill Perimeter Flood Barriers



- Semi Self-Filling – every other pod fills and empties itself
- No liner required – barriers have gaskets
- Comes in 25" (20" protection height) and 36" high (25" protection height) models
- 25" high model is 48" wide with built in connector keys
- 36" high model is 40" wide with separate connector keys
- Multi-hubs allow for wall connections and corners
- Stackable for use and storage and no anchoring required
- Reusable and all-season compatibility

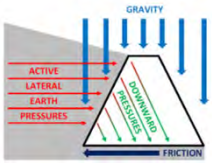


Public Utilities – San Francisco, CA



National Grid – Quincy, MA

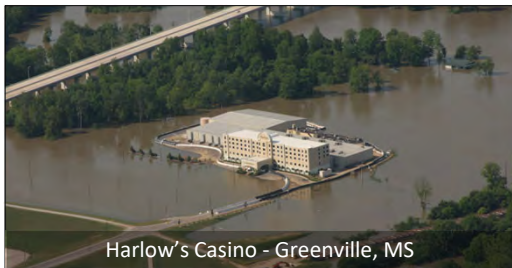




# Sand-Filled Flood Fighting Systems: Long and Short Run



- 50-ft. length sections; vary in height from 2' to 6'
- Can be cut to size to fit in confined spaces and stackable
- Baffles sewn together forming 25 trapezoidal shaped compartments
- Highly resistant to damage from debris impacts
- USACE Tested
- Resists sliding and withstands rotational forces
- Angular walls redirect active lateral water pressure downward
- 8 oz. woven polypropylene with highest UV protection.



Harlow's Casino - Greenville, MS



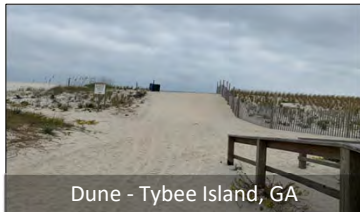
Straps with D-Rings



Female to Male Connection



Waterfront - Peoria, IL



Dune - Tybee Island, GA



Singular, Connectable Version





## Flood Pumps

---

- Required for any dry floodproofed design
- Special consideration for perimeter flood barrier systems
- Float switches, wheel kits, remote monitoring & operation available
- Diesel driven permanent installation models
- FM Approved models for large areas

ASCE 24-14 (Section C6.2 pg. 61)

Sump pumps should be provided to handle inevitable seepage, and emergency power should be provided to run the pumps, especially in areas where inundation duration is expected to last more than 12h.



Electric  
Submersible Pumps



Gasoline Driven  
Wet-Prime Pumps



Gasoline Driven  
Dri-Prime Pumps



Inside Installation

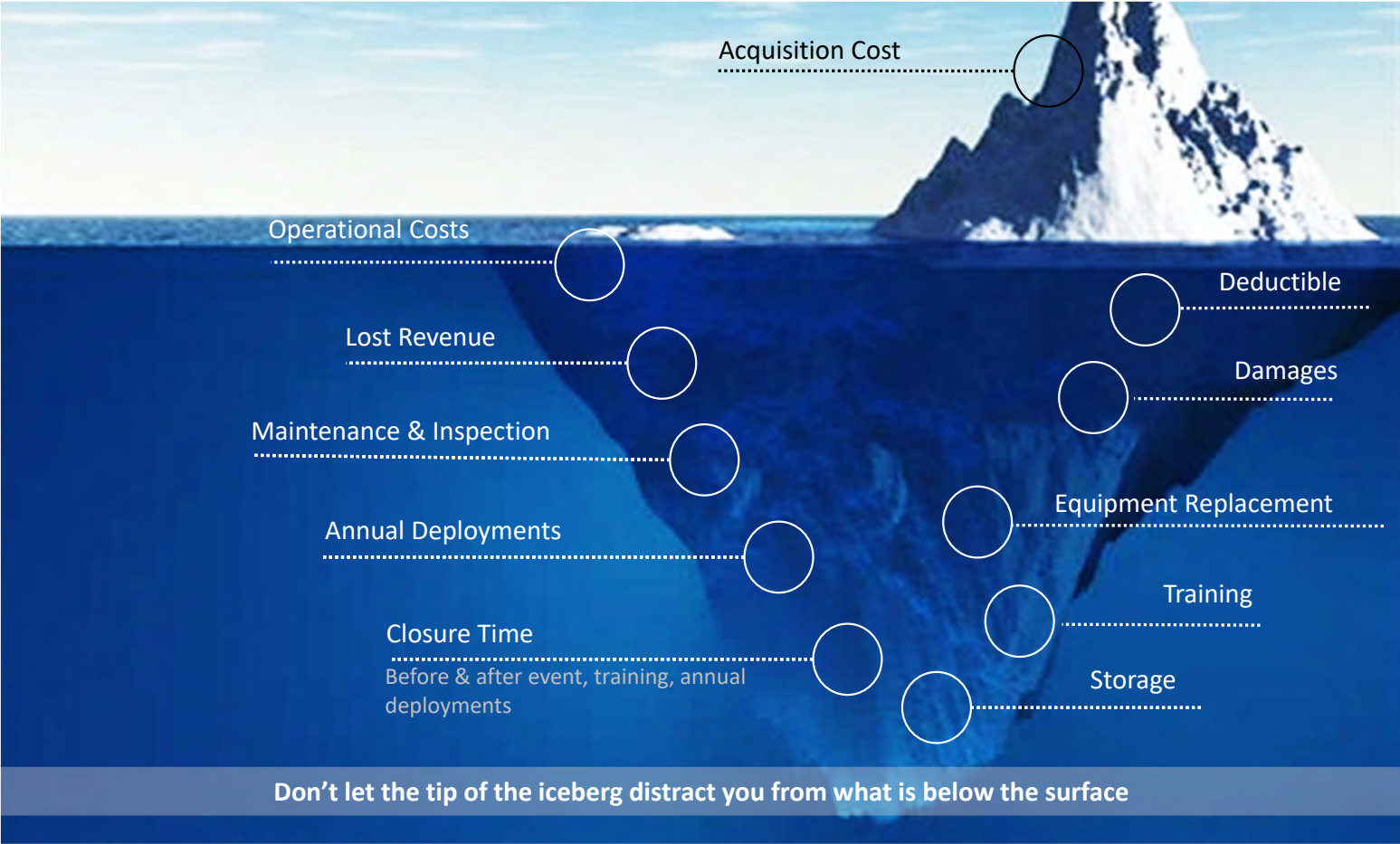


Permanent Installation



# Considerations for Floodproofing Strategy

TOTAL COST OF OWNERSHIP





## Thank You For Your Time!



**GO TO [www.floodproofing.com/education](http://www.floodproofing.com/education)  
TO RECEIVE AIA CONTINUING EDUCATION CREDITS &  
COURSE CERTIFICATE**

AIA COURSE TITLE: Understanding Active & Passive Flood Barriers for Non-Residential Structures in a Special Flood Hazard Area

AIA COURSE NUMBER: FP03

AIA CREDIT: 1 HSW

AIA PROVIDER: FLOODPROOFING.COM

AIA PROVIDER NUMBER: T058



**Bryan Christopherson, CFM**  
Certified Floodplain Manager  
Midwest Regional Manager  
[bchristopherson@floodproofing.com](mailto:bchristopherson@floodproofing.com)  
c 563-613-1654



Send plans to: [PLANS@floodproofing.com](mailto:PLANS@floodproofing.com)



# Thank You!

Go to [www.floodproofing.com/education](http://www.floodproofing.com/education) to receive course certificate and submit AIA number

---



Send plans to: [PLANS@floodproofing.com](mailto:PLANS@floodproofing.com)

---



AIA COURSE TITLE: Understanding Active & Passive Flood Protection

AIA COURSE #: FP03

AIA CREDIT: 1 HSW

AIA PROVIDER: FLOODPROOFING.COM

AIA PROVIDER #: T058

---

Presenter Information:

**Bryan Christopherson, CFM, LIA**

Midwest Regional Manager

[bchristopherson@floodproofing.com](mailto:bchristopherson@floodproofing.com)

c 563-613-1654



# Glass Flood Wall

- 2' Freeboard added to Flood Wall – Passive Flood Protection

# The Flood Design Team

HELPING YOU NAVIGATE YOUR PROJECT IN A FLOOD ZONE



Save time to focus  
on other tasks



Clear communication  
& deliverables



Peace of mind your  
design is compliant



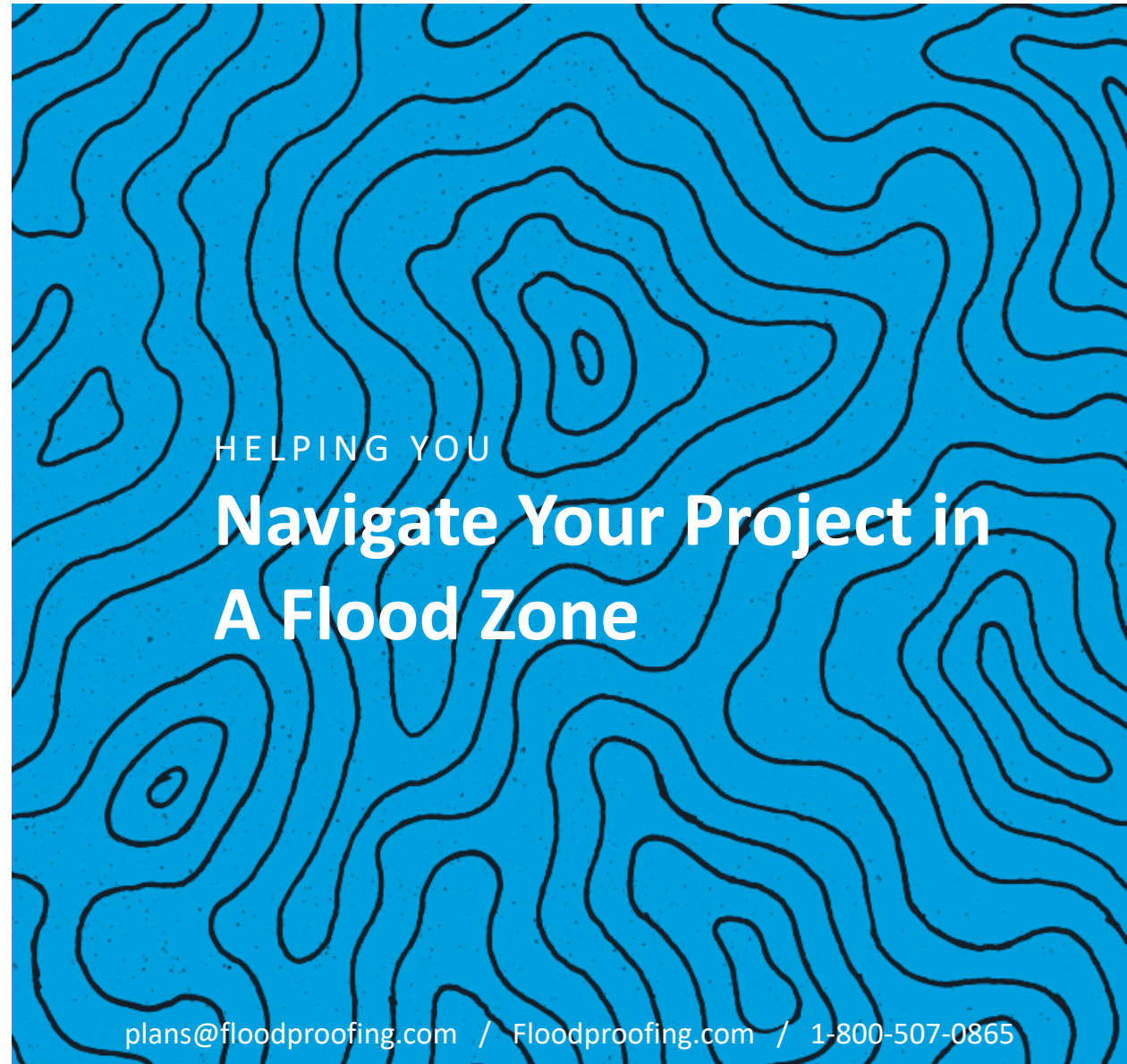
Save money & fit in  
your budget

Want to learn more about our Flood Design Team? Stay on for an extra 15 minutes for a brief introduction.



# Floodplain Design

(Simplified)



HELPING YOU  
**Navigate Your Project in  
A Flood Zone**

[plans@floodproofing.com](mailto:plans@floodproofing.com) / [Floodproofing.com](http://Floodproofing.com) / 1-800-507-0865

01

**Designing & building in  
the floodplain presents  
many challenges**

FLOOD DESIGN TEAM



**FLOOD**  
**DESIGN TEAM**

- Comparing product solutions
- Meeting specific testing standards
- Building for code compliance
- Proper installation and deployment
- Maintenance schedules

02

## **We Have An Experienced In-House Team**

20+ years of working in the floodplain

- Certified Floodplain Managers
- Engineers
- Flood Insurance Risk Specialists

### **Extensive Knowledge of Standards**

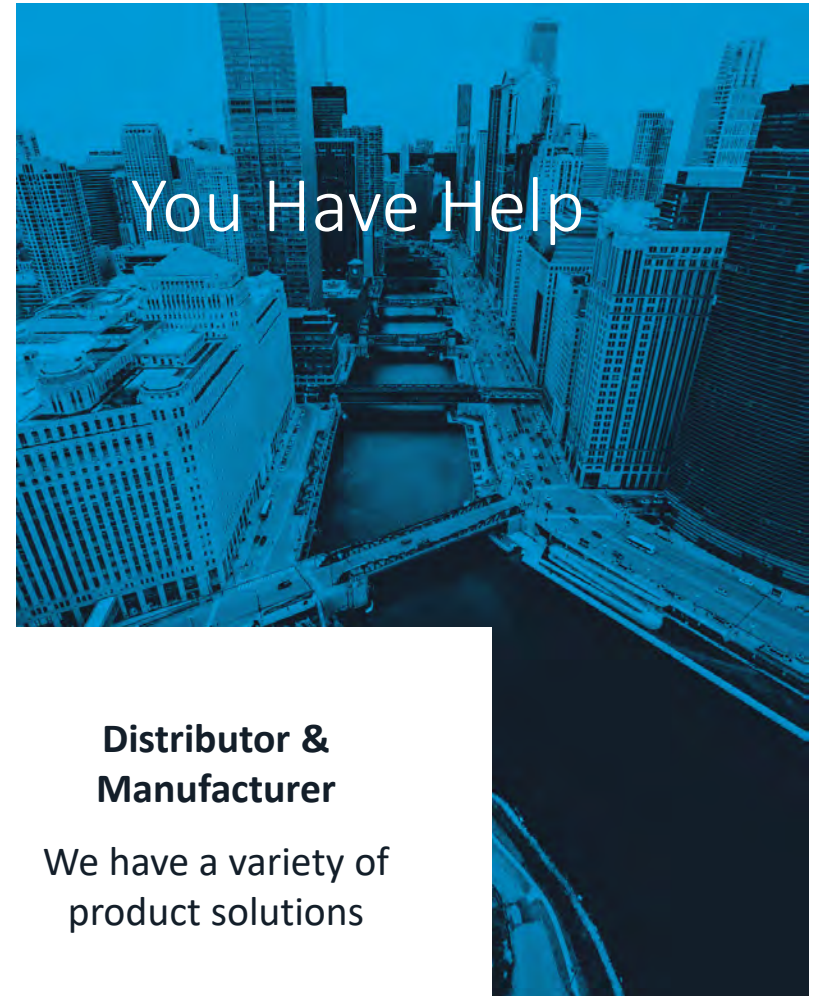
We study Federal, State &  
Local Building Codes

### **Product Installation Partners**

We can supply expert  
installers

### **Distributor & Manufacturer**

We have a variety of  
product solutions





03

# Where We Come From



FLOODPROOFING.COM

FLOOD DESIGN TEAM

04

# Our Complimentary Solutions

## Educational AIA Flood Courses

Multiple AIA approved  
courses on Floodplain  
Design

## Complimentary Design Analysis

Product Comparisons, Timelines &  
Deliverables, 3-Part Specs, &  
Budgetary Estimates

## Flood Insurance Review & Quotes

Dry Floodproofing  
Credits, Mitigation  
Savings

# Custom Product Options

## Door & Window Barriers



Custom



Standard

## Flood Logs



Flood Planks



Flood Logs



## Passive Barriers



Horizontal



Vertical

## Floodproof Glass Systems



Window Systems



Wall Systems



## Perimeter Barriers



Standard



Collapsible



Custom

## Point-of-Use Barriers



Point-of-Use Barriers

## Flood Vents



Flood Vents

06

BENEFITS OF

# Working With Us



Save time to focus  
on other tasks



Clear communication &  
deliverables



Peace of mind from  
compliant solutions



Save money & fit in  
your budget

PSSST....

Did I mention it was Complimentary?

07

# Who We've Helped

THIS YEAR, IN 2021

**1,000+**

PLANS  
REVIEWED

**1,200+**

ASSESSMENTS  
COMPLETED

**850+**

FIRMS  
HELPED

08

# We've Worked For Some of the Best

RETAIL



DOLLAR TREE

RESTAURANTS



CRITICAL FACILITY



TRANSPORTATION



EDUCATION



HOSPITALITY





# What You Can Expect

01

## Submit Plans & Project Documents

Send us the necessary plans & drawings so we can review the details of your design

02

## Review Call with Project Coordinator

Get your own Project Coordinator to review any issues, budgets and design requirements

03

## Get Complimentary Design Analysis

A complete assessment with product solutions, budgetary estimates & 3-part specs

04

## Follow Up With Project Coordinator

Review assessment to address any questions & talk through the best solution for your project

10

# What You Receive

## Design Analysis

- Good | Better | Best
- Timelines & Deliverables
- 3-Part Specs
- Budgetary Estimates

**Added Bonus!**  
Ownership Cost Calculations

**Product Options**

**Custom Door + Window Flood Barrier**

The Flood Risk America (FRA) Flood Panel creates a watertight seal to protect any opening against flood water and is highly resistant to heavy impact forces. Each panel is custom-engineered to meet individual installation requirements.

**STORAGE SPACE:** Some Storage Required

**DEPLOYMENT SPEED:** No Tools Needed

**LEAD TIME:** 8 - 10 Weeks

**UNIQUE FEATURES:** Customizable Size, Tool-free deployment, No permanent brackets, +15lb psi

**Standard Flood Barrier**

The Flex-Cover® Door is a high-strength dry flood barrier installed at building openings. It is watertight with a structural frame, water barrier, and impact-rated layers with advanced compression gaskets. FM approvals uses scientific research and testing ensures products conform to highest standards of safety and property loss prevention.

**STORAGE SPACE:** Some Storage Required

**DEPLOYMENT SPEED:** No Concrete Anchors

**LEAD TIME:** 2 - 3 Weeks

**UNIQUE FEATURES:** High-strength panel, No permanent brackets, Tested to highest standards, No ground anchors

**Floodproof Window**

Fenex Floodproof windows are completely passive systems that are impact-rated and provide clarity, beauty and protection at all times. These customizable windows do not require any additional effort before a flood event. Tested to ANSI Z98.1 standards.

**STORAGE SPACE:** Passive System

**DEPLOYMENT SPEED:** Always Ready

**LEAD TIME:** 18 - 20 Weeks

**UNIQUE FEATURES:** Truly passive system, Fully customizable systems, Factory-applied sealant, Multiple framing options

**Floodproofing.com® Dry Floodproofing Product Schedule**

Project Number: 2254  
Project Name: Beachfront Hotel  
Project Address: 123 Shore Blvd  
Project City, State, Zip: Naples, FL

Date: 08/14/2021  
Contact: Jon Smith  
Email: jon.smith@floodproofing.com  
Phone: 888-555-5555

Number	Opening Type	Opening Details		Product Details				
		Length (ft)	Height (ft)	Length (ft)	Height (ft)	Area (sq. ft.)		
1	Egress Side	3.5	3.5	3.5 Flood Panel	3.5	1	3.5	\$5
2	Egress Front	3.5	3.5	3.5 Flood Panel	3.5	1	3.5	\$5
3	Egress Side	3.33	3.33	3.33 Flood Panel	4.33	1	4.33	\$5
4	Ground Floor Span	10.82	10.82	10.82 Flood Panel	11.82	1	11.82	\$5
5	Single Back Door	3.33	3.33	3.33 Flood Panel	4.33	1	4.33	\$5
<b>Total Sq. Ft.</b>							<b>27.08</b>	

**Comments:** Side anchor quantity and spacing mirrors on both sides of panel  
Contract installation is available, if structural engineer request a quote.

**Cost:** Additional Materials: \$15  
Total Cost: \$555

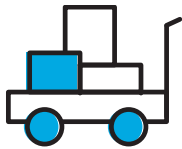
**This is a Budgetary Estimate. Prices are NOT FINAL and DO NOT include Taxes and Freight Costs.**

Floodproofing.com | 430 Androm Dr. Princeton, NJ 08507 | 1-800-507-0865 | Plan#DF-floodproofing.com

**FOR MORE INFO VISIT FLOODPROOFING.COM/SPECS**  
1-800-507-0865 | INFO@FLOODPROOFING.COM

# It Doesn't End There

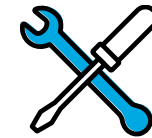
We'll work side-by-side with you, from the design process all the way to completion.



Product Sales &  
Procurement



Annual Maintenance &  
Deployment Drills



Installation  
Services

FLOOD DESIGN TEAM

# Thank You

Questions? Ask Away.

You can also send plans to [plans@floodproofing.com](mailto:plans@floodproofing.com)

REACH OUT

**Let's discuss your project**

1 (563) 613 - 1654

[bchristopherson@floodproofing.com](mailto:bchristopherson@floodproofing.com)



FLOODPROOFING.COM









































































































