Passive Automatic Flood Barriers
Innovative Flood Control Solutions
FloodBreak passive automatic flood barriers

Innovative solutions to reduce flood risk.

- Pioneers of **fully passive operation** – protecting people & property 24/7 without human intervention or power.
- Proven: field tested for over a decade, including real world deployment & long term exposure in a variety of field conditions
- Creative problem solvers not limited to a product catalog.
  - MTA NYCT
  - Sandy Resiliency
  - USACE levee-
Traditional products take time, people & training

- Human intervention increases risk.
  - People & power not always available
  - Emergency preparedness plans not always followed
- Recurring cost
  - Annual training & mobilization
  - Inventory, storage & inspection
- Early closures disrupt the community
  - Traffic + economic impact

Swing Gates not deployed for unexpected storm in Houston,
Passive flood mitigation recommended by FEMA

**Passive/active measures.** Floodproofing measures are either passive or active depending on whether they require human intervention. Passive measures do not require human intervention and are recommended whenever possible. Active (or emergency) measures require human intervention and are effective only if there is enough warning time to mobilize the labor and equipment necessary to implement them and to safely evacuate.

---

**Advanced Mitigation Planning Allows Hospital to Stay Dry During Tropical Storm Lee**

Lourdes Hospital, located in the picturesque city of Binghamton (pop. 47,376), and surrounded by rolling hills and rivers, averted major storm damage thanks to hazard mitigation and a new floodwall.

The floodwall with passive floodgates, built with hazard mitigation funds from the Federal Emergency Management Agency (FEMA) and New York State, protected this vital property from floodwaters that devastated other parts of the city during Tropical Storm Lee. City officials estimated that as many as 2,000 buildings suffered flood damage from the storm.

---

**Floodwall with Passive Floodgates Signals Commitment to Patients and Community**

Columbus Regional Hospital, the only hospital serving Bartholomew County, Indiana, is now protected from future flooding thanks to hazard mitigation and a floodwall with passive floodgates.

The floodwall with passive floodgates, built with funds from the Federal Emergency Management Agency (FEMA) Public Assistance 406 program (for hazard mitigation) and Columbus Regional Hospital, will protect this vital hospital from catastrophic flood damage, should the area be hit with flooding as was the case in 2008.
Simple concept: Let the water work against itself

Buoyant barrier is lifted by water

*No People, No Power.*

- 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.
Typical cross section

Dry Side

Flood Side

Topping Slab

Structural Foundation

Drain

FloodBreak
REVOLUTIONARY FLOOD CONTROL
Self supporting design – no height or length limit

- Permanently installed beneath grade at vulnerable openings.
- Automatically deploys lifted by flood water.
- Modular self supporting design.
- No practical height or length limit.
Designed to meet load requirements

- Each system is engineered to support all loadings that the gate may be subjected to during its installed life.
  - NYU and VAMC designed to support storm surge loads per ASCE 7-10 Section 5.4.4
  - NYU Smilow (30’ x 12’) designed to support a 32 kip impact load.
- All roadway gates are designed to support HS-25, 40 ton truck loading by default.

**Figure 6.3 - Factored Hydrostatic Plus Dynamic Pressure at Each Retention Arm Location**
Built for long-term exposure in harsh field conditions

MD Anderson – Houston TX

Lourdes Hospital – Binghamton NY

Rio Grande Valley - TX

Central Treatment Plant – Tacoma WA
Versatile - protects virtually any flood path

- Multiple Applications. Permanent 24/7 Protection. Full Access.
Versatility – parking & loading docks

Harris County Criminal Justice

One Briarlake Plaza

Hampstead at Museum

Financial Institution - NJ
Versatility - extend levees across highways

FloodBreak gates were selected by IBWC for 14 crossings along the Rio Grande. Installed 2010-2013. Still in full operation.
Versatility – pedestrian pathways

MDACC Alkek Pavilion - TX

Mercy Hospital - IA

Columbus Regional Hospital - IN

Warriewood Mall - Australia
Versatility – architectural integration

Menil Museum – Houston TX

LTA Orchard Park - Singapore

MDACC – Houston TX

Crossway Publishing – Wheaton IL
Versatility – above & below grade vents
VSL – custom sized louvered flood panels
Passive automatic vent shaft system (FB-VSS)

- Innovative solution for the MTA NYCT to protect subway vent shafts from localized flash floods.
- Passive, double gate system that automatically closes during flood events & reopens to allow airflow.
- All seals & mechanisms utilize same materials & technology as field proven FB gates.
- Device fits securely beneath street-level grates and prevents floodwater from pouring through the vent shaft to the stations underground.
- Weep hole to allow self draining & control water flow to prevent overpowering pump system.

Shop test – lower gate deployed; upper gate open
Innovative waterfront flood protection solution

FloodBreak FreeView™ Flood Barrier System

- Seawalls
- Waterfront paths
- Levees
- Riverwalks
- Boardwalks
- Dams
Case Study: Flash Floods

Houston Energy Corridor

580 Westlake
- Installed passive floodgate at loading dock after 2010 flash flood.
- Gate automatically deployed during Memorial Day 2015 & Harvey.
- Featured in FEMA Recovery Advisory for Dry Floodproofing Planning & Design, post Harvey.

One Briarlake Plaza
- Flooded by same 2010 unexpected rain event.
- Gate has automatically deployed at least four known times for both named and unexpected storms.

Dry Floodproofing: Planning and Design Considerations

Purpose and Intended Audience
The purpose of this Recovery Advisory is to provide guidance on the design of dry floodproofing measures to reduce flood damage and limit interruption of building services. This advisory incorporates observations made by the Federal Emergency Management Agency (FEMA) Mitigation Assessment Teams (MATs) in Texas and Florida after Hurricanes Harvey and Irma. It describes best design practices and successful implementation of dry floodproofing, as well as lessons learned from failures. The information in this advisory is directed toward existing and new non-residential facilities.

Dry Floodproofing
Dry floodproofing is a combination of measures that result in a structure, including its attendant utilities and equipment, being watertight, with all elements substantially impermeable to the entrance of floodwater and with structural components having the capacity to resist flood loads (ASCE 24; ASCE 2014). The image below shows an example of dry floodproofing where a passive opening protection deployed to protect a below-grade loading dock was threatened by rising floodwaters.

Photograph courtesy of Andrew Hayns, Hicks Ventures

Houston Galleria – Sage entrance

One Briarlake Plaza
Case Study: Flash Floods

Verified deployments in actual flood events, some multiple times.

- Great Neck, NY (8 times, top photo)
- Route 22 Honda – NJ (3 times, middle)
- Royal Orleans Condo – Dallas, TX (bottom)
- Kenilworth, IL (multiple times)
- Gage Ct – Houston, TX (3 times)
- Federal Courthouse – Davenport, IA
- Pentagon Federal – Alexandria, VA
- Federal Building – Oklahoma City, OK
- Braeburn CC – Houston, TX
- 1200 Post Oak – Houston, TX
- Element Condo – Norfolk, VA
Proven: Hurricane Harvey 2017
Case Study: Hurricane Harvey 2017

**Houston Galleria** suffered $2 mil+ damage in Tax Day 2016 flash flood.
- Installed passive floodgates at 3 below grade garage entrances.
- Two gates deployed during Harvey to prevent inundation.

**3000 Post Oak** – Memorial Day 2015 flash flood destroyed electrical equipment & bottom floor.
- Passive automatic vehicle gate at loading dock protected them during Tax Day Flood 2016.
- Added 5 more gates at adjoining garage. Deployed during Harvey.

**Pearl Apartments – Houston** was susceptible to street flooding.
- Deployed during Harvey.

---

*Image: Houston Galleria – Sage entrance*

*Image: 3000 Post Oak – parking garage*
Case Study: Bloomsburg PA – 2018 Flood

- Bloomsburg was decimated by floods in 2011 - nearly 1/3 of the town was under water.
- City & County officials worked with the EDA to secure disaster recovery funds for floodwalls including floodgates to protect vital business infrastructure
- Passive flood gates were used at most vulnerable openings
- Two major employers who had sustained $70 mil in damages decided to stay in the area, saving an estimated 900 jobs.
- In July 2018, flash floods threatened the plant but passive gates deployed automatically to prevent inundation.
Select worldwide customers

- University of Houston (2003)
- Bellaire Police Department (2003)
- MD Anderson Cancer Center (2004-2016)
- Christus Hospital - TX (2006)
- Harris County Courthouse – TX (2008)
- Route 22 Honda – NJ (2008)
- Lourdes Hospital – NY (2010)
- James Madison University – VA (2010)
- MTA NYCT - NY (2010, 2016-2018)
- soulbrain MI (TSC) – MI (2011)
- World Trade Center- Danang, VN (2011)
- IBWC – Hidalgo Levees, TX (2010-12)
- IBWC – URG Levees, TX (2010-12)
- Univ. of Colorado Boulder – CO (2012-13)
- Columbus Regional Hospital – IN (2012)
- Portland Water Treatment – TN (2012)
- Vattanac Capital, Cambodia (2012)
- Land Transit Authority - Singapore (2013)

- Rosenberg Library – Galveston, TX (2013)
- UTMB – Galveston (2013)
- CyRide Bus Depot – Ames IA (2013)
- Brickell City Centre – FL (2014)
- SUNO (Southern University) – LA (2014)
- Dallas Love Field – TX (2015)
- Central Treatment Plant – Tacoma WA (2015)
- EDF – France (2015-2016)
- VAMC Manhattan – NY (2016)
- Warriewood – Australia (2016)
- Moen – China (2016)
- Houston Galleria - TX (2017-2018)
- Canmore Hospital – Canada (2017)
- NYCHA – NY (2018)
Key Provider of Post-Sandy Resiliency Infrastructure
Sandy Resiliency – FloodBreak involvement

- MTA NYCT
- NYC Hospitals – NYU Langone, VAMC, NYCH+H
- NYCHA – multiple communities
- ESCR, LMCR
- Battery Park City
- NYC DEP

Building Lower Manhattan’s resiliency to coastal storms by integrating flood protection into the community fabric
FloodBreak FreeView™ Flood Barrier System

- Preserves water access and views for local community.
- Same proven concept as FloodBreak passive automatic flood barriers.
  - 24/7 flood protection without human intervention or power.
  - Remains hidden. Automatically deploys when water rises.
  - Self retracting.
- Long continuous straight runs without stanchions or vertical stops.

Conceptual drawing. Design is patented and copying or unauthorized production of this product or similar devices is strictly forbidden.
**Design flexibility to meet project requirements**

- System can be embedded or cantilevered
- Utilizes a space frame instead of standard gate pan system.
- Requires anchoring to structural elements (by others) – i.e. piles, piers.
- Small footprint with shallow set down.
- Self draining through front or bottom.
- Turns accomplished through angled wiper walls.
- For seawall applications, a parapet wall can be added to minimize wave action.
Preserves water access and views - examples

Note: Conceptual drawing. Design is patented and copying or unauthorized production of this product or similar devices is strictly forbidden.
FreeView™ Flood Barrier selected to extend USACE levee.

Addressed community backlash about blocked views and access. Will serve as a walk path that ties into the pedestrian bridge.

A win for the city - eliminating need for city personnel to mobilize & manually deploy flood logs, set on top of a permanent floodwall.
Thank You!

Victor Althoff
Valthoff@floodbreak.com
219-561-13232

floodbreak.com
Additional Slides

floodbreak.com
MTA – Flash Flood MCD (FB-VSS)

- Straightforward installation – lifting lugs allow easy drop in.
- Unit flanges rest on concrete shelf – no anchoring.
- Limited airflow restriction – always open unless street flooding.
- No disruption to vehicular or pedestrian traffic at the street level.
- Designed to meet load, seepage & drainage specifications.
Select worldwide customers

- University of Houston (2003)
- Bellaire Police Department (2003)
- MD Anderson Cancer Center (2004-2016)
- Christus Hospital - TX (2006)
- Harris County Courthouse – TX (2008)
- Route 22 Honda – NJ (2008)
- Lourdes Hospital – NY (2010)
- James Madison University – VA (2010)
- MTA NYCT - NY (2010, 2016-2018)
- soulbrain MI (TSC) – MI (2011)
- World Trade Center- Danang, VN (2011)
- IBWC – Hidalgo Levees, TX (2010-12)
- IBWC – URG Levees, TX (2010-12)
- Univ. of Colorado Boulder – CO (2012-13)
- Columbus Regional Hospital – IN (2012)
- Portland Water Treatment – TN (2012)
- Vattanac Capital, Cambodia (2012)
- Land Transit Authority - Singapore (2013)
- Rosenberg Library – Galveston, TX (2013)
- UTMB – Galveston (2013)
- CyRide Bus Depot – Ames IA (2013)
- Brickell City Centre – FL (2014)
- SUNO (Southern University) – LA (2014)
- Dallas Love Field – TX (2015)
- Central Treatment Plant – Tacoma WA (2015)
- EDF – France (2015-2016)
- VAMC Manhattan – NY (2016)
- Warriewood – Australia (2016)
- Moen – China (2016)
- Houston Galleria - TX (2017-2018)
- Canmore Hospital – Canada (2017)
- NYCHA – NY (2018)
Optional Push Button Lift
Straightforward installation + minimal maintenance
Seeing is believing
Raise levees without raising roadways

FloodBreak Roadway Gates

FloodBreak Roadway Gates are used to elevate IBWC levees along the Rio Grande
Optional lift to raise the gate easily & instantly

- Foolproof, instant operation by a single untrained operator at a moment’s notice.
- Self-contained power unit and embedded hydraulic lift arms.
- Totally independent of our unique passive operation, providing 24x7 protection and full redundancy in a single system.
- Designed for very low maintenance requirements – single annual visit.
- Can activate road closure and/or traffic signal devices for road safety measures, even if activation is an unplanned emergency event.
Optional lift to raise the gate easily & instantly

- Foolproof, instant operation by a single untrained operator at a moment’s notice.
- Self-contained power unit and embedded hydraulic lift arms.
- Totally independent of our unique passive operation, providing 24x7 protection and full redundancy in a single system.
- Designed for very low maintenance requirements – single annual visit.
- Can activate road closure and/or traffic signal devices for road safety measures, even if activation is an unplanned emergency event.