



Flood Prevention: How Small Proactive Steps Avoid Expensive Disaster

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Agenda

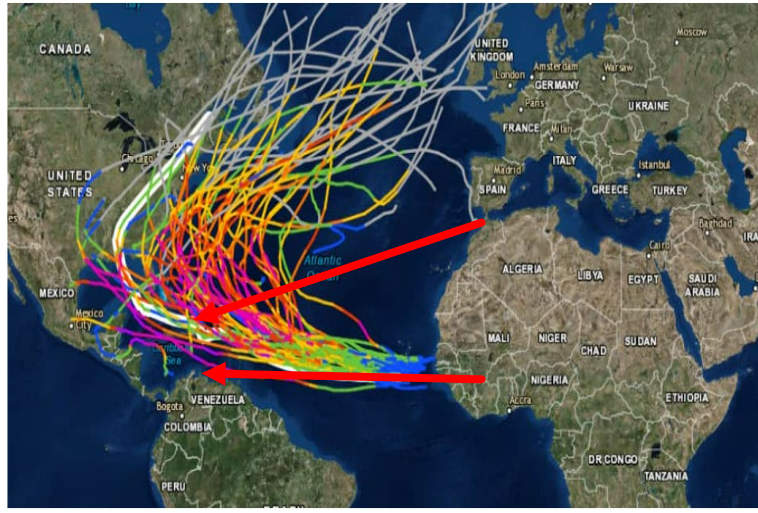
- ▶ Mitigation's Value to Society
- ▶ Temporary Barriers
- ▶ Permanent Barriers
- ▶ Economic Evaluation: Mitigation vs. Rehabilitation
- ▶ Flood Mitigation Industry Association (FMIA)

Mitigation's Value to Society

► Creates Safer Communities

- Mitigation creates safer communities by reducing loss of life and property. In any disaster, buildings constructed to a higher standard not only reduce property damage but also save lives. Homes constructed to the National Flood Insurance Program standards (NFIP) incur 80% less damage from floods.
- For both preexisting buildings and NFIP standard buildings the utilization of engineered flood barriers either temporary or permanent can reduce flood damage to zero.





Dominican Republic

Aruba

Mitigation's Value to Society

- ▶ Enables individuals and society to recover more rapidly from floods and other disasters
 - ▶ Mitigation is key to decreasing the time it takes to rebuild and recover after disaster. By using existing proven plans mitigation allows the individuals and communities to lessen post-disaster disruption and return to normal more quickly.
 - ▶ Long-term hazard mitigation planning and projects enable communities and individuals to break the cycle of disaster damage, reconstruction, and repeated loss. Time spent rebuilding takes away from economic advancement.

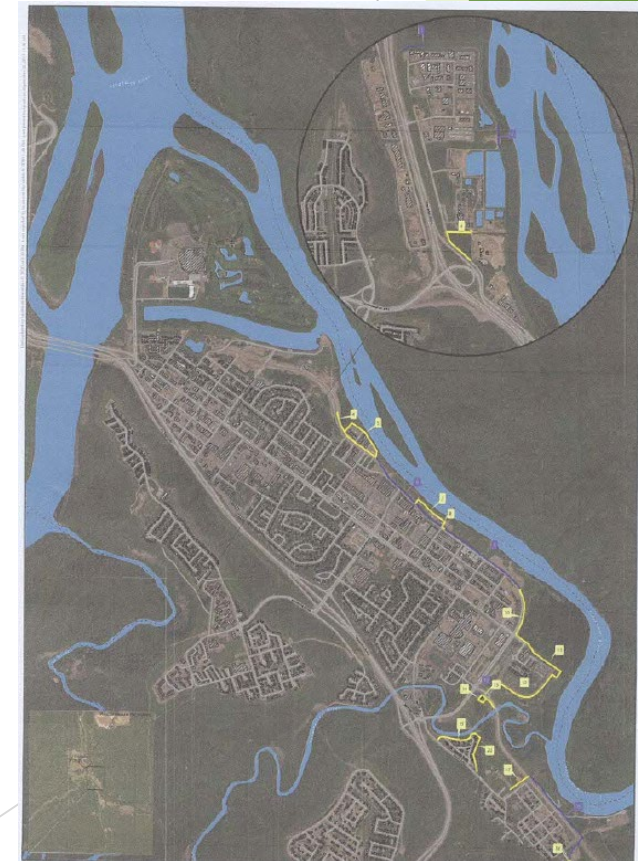
Mitigation's Value to Society

- ▶ Lessens the financial impact on the Treasury, States, Tribes and communities
 - ▶ Simple flood plain management actions save the country more than \$1 billion in prevented damages each year.
 - ▶ Temporary and Permanent flood barriers can literally cost as little as 1% or less than that of disaster recovery and rehabilitation.



Mitigation's Value to Society

- ▶ Fort McMurray spring flood causes \$522MM in damage, according to the Alberta, CA insurance bureau
 - ▶ April 26, 2020 an ice jam that formed on the Athabasca River near Fort McMurray caused water levels to rise by 4.5 - 6 meters (14.76' - 19.68') across lowest lying areas. Approximately 13K people were evacuated and 1,200 structures were affected.
 - ▶ 2021, Hydra International provided temporary protection for the entire town of Fort McMurray for the duration of spring break up for costing approximately 0.75% (>1%) of the previous insurable cost.



Temporary Barriers



Property Protection



River, Stream Diversion, & Site Isolation



Wave Block & Erosion Control

Temporary Barriers

THE STRENGTH IS IN THE TOE

The pressure of the water forces the toe downward, thus overpowering the hydrostatic force, which anchors the wall to the ground.



CUSTOMIZE YOUR PROTECTION

Our customers have the option of using a corner unit that enables a 90-degree turn. Each corner unit is also reversible, so it can be used to branch your protection off in either direction.



DESIGNED FOR SPEED

The coupler-joint connection allows each wall to securely connect one with another. The coupler-joint system allows for a 22° range of motion at each connection enabling Muscle Wall to adapt to its terrain.



NESTLE TO SHIP AND STORE

The unique “L” shaped design of Muscle Wall enables each wall to nestle together with another in order to maximize shipping and storage space

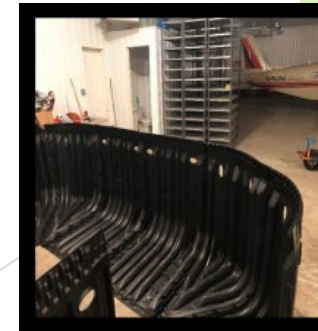


MUSCLE WALL[®]
FLOOD • CONTAINMENT • STORMWATER

Temporary Barriers

HYDRASHIELD

- ▶ **MANAGEABLE & LIGHTWEIGHT**
 - ▶ The Heaviest Component of the Wall is 21 lbs.
 - ▶ No Power Tools or Wrenches Required for Assembly. No Bolts, Pins, Legs or Pads!
- ▶ **RESILIENT STRENGTH**
 - ▶ Thermally Stabilized for Arctic Cold or Gulf Coast Heat.
 - ▶ UV Resistant for 20+ Years.
 - ▶ Impact Resistant.
 - ▶ Rust and Corrosion Proof, Chemical Resistant, No Paint to Scratch or Wear Off
- ▶ **SHAPE FRIENDLY FLEXIBLE CONFIGURATION**
 - ▶ Connect to Create 45, 90, 135 Degree Patterns.
 - ▶ Easily Run Panels in Straight Lines, Curved, or Around Obstacles.
- ▶ **ENVIRONMENTALLY FRIENDLY**
 - ▶ 100% Recycled Poly Commercial Grade Plastic
- ▶ **PORTABLE STACKABLE**
 - ▶ Minimize Transportation Costs & Storage Space.
 - ▶ Easily Stored and Transportable



Temporary Barriers



WATER-INFLATED BARRIERS: FOR CIVIL CONSTRUCTION COFFERDAMS AND FLOOD MITIGATION

- ▶ The Triple Dam features two internal stabilizing panels to provide safety and stability for all sizes from 2' (0.6m) to up to 12' (3.65m) high.
- ▶ Water-inflated dams are quickly deployed, filled with any available source of water, and are very friendly where environmental impact is a concern
- ▶ Triple Dams are reusable, provide flexible layout options, do no substrate damage, and are suitable for worksite dewatering and flood protection in waters up to 6' (1.8m) deep.



Temporary Barriers Cost Estimates

| Diameter | Control Height | Dam Width | Gallons/Ft to Fill | Dry Weight | Linear Ft/ Day |
|-----------------|----------------|-----------|--------------------|------------|------------------------------|
| 12' | 10' | 26' | 1258 gallons | 920 lbs | \$4.0 - \$5.10 |
| 8' | 6' | 18' | 1011 gallons | 620 lbs | \$3.5 - \$4.2 |
| 6' | 54" | 13' | 556 gallons | 460 lbs | \$3.2 - \$3.7 |
| 5' | 45" | 11' | 471 gallons | 380 lbs | \$3.0 - \$3.5 |
| 4' | 36" | 9' | 246 gallons | 312 lbs | \$2.8 - \$3.25 |
| 3' | 27" | 7' | 127 gallons | 220 lbs | \$2.6 - \$3.0 |
| 2' | 18" | 4.6' | 62 gallons | 150 lbs | \$2.2 - \$2.8 |
| 6' Muscle Wall | 60" | 72" | 35 gallons | 160 lbs | \$16 - \$20 |
| 4' Muscle Wall | 42" | 72" | 35 gallons | 110 lbs | \$12 - \$14 |
| 3' Hydra Shield | 36" | 39" | N/A | 21 lbs | \$5.0 Flood wall |
| 3' Hydra Shield | 36" | 39" | N/A | 21 lbs | \$2.0 Impact Protection wall |

* Service Options and Installation costs apply

Permanent Barriers and Estimated Cost

IBS Systems

- ▶ Permanent Glass Wall
 - ▶ The Glass Wall provides maximum, permanent, flood protection + clean views of waterside and high-risk properties that have difficulty with rapid deployment.



- ▶ Demountable Flood Wall
 - ▶ The Flood Wall system is used in public spaces or commercial properties that need strong flood protection with unobstructed views when not deployed.



Permanent Barriers and Estimated Cost








Flex-Cover® by ILC Dover

- ▶ Flex-Cover® by ILC Dover is a high-strength flood barrier engineered to provide a flood barrier for single or double doors. It provides a watertight and impact resistant barrier by combining a structural frame, water barrier, and impact-resistant layers with advanced compression gaskets. Flex-Cover® can be stored near the point-of-use for deployment in minutes.
- ▶ Flex-Cover® Door functions as a dry flood barrier installed at door and other building openings. Permanently installed wall anchors facilitate rapid deployment prior to a pending weather event.



Economic Evaluation Mitigation vs. Rehabilitation

| National Institute of BUILDING SCIENCES™ | | ADOPT CODE | ABOVE CODE | BUILDING RETROFIT | LIFELINE RETROFIT | FEDERAL GRANTS |
|--|--|------------------|------------------|-------------------|-------------------|----------------|
| Overall Benefit-Cost Ratio | | 11:1 | 4:1 | 4:1 | 4:1 | 6:1 |
| Cost (\$ billion) | | \$1/year | \$4/year | \$520 | \$0.6 | \$27 |
| Benefit (\$ billion) | | \$13/year | \$16/year | \$2200 | \$2.5 | \$160 |
|  Riverine Flood | | 6:1 | 5:1 | 6:1 | 8:1 | 7:1 |
|  Hurricane Surge | | not applicable | 7:1 | not applicable | not applicable | not applicable |
|  Wind | | 10:1 | 5:1 | 6:1 | 7:1 | 5:1 |
|  Earthquake | | 12:1 | 4:1 | 13:1 | 3:1 | 3:1 |
|  Wildland-Urban Interface Fire | | not applicable | 4:1 | 2:1 | not applicable | 3:1 |

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TABLE 1. Nationwide average benefit-cost ratio by hazard and mitigation measure. BCRs can vary geographically and can be much higher in some places. Find more details in the report.

Retrofitting lifelines protects the whole economy, saving up to \$31 per \$1 invested.

- A grant to Greenville Utilities of North Carolina was used to raise a berm and floodwall around its water treatment plant, protecting it from more than 3 feet of flooding during Hurricane Matthew in 2016.
- Activities that enhance resilience of water and wastewater facilities, electric utility substations, roads and railways, and communications equipment yielded benefit-cost ratios as high as 31 to 1.



FIGURE 2. Should we ignore, fix, or demolish thousands of vulnerable concrete and steel-frame buildings in earthquake country?

Flood Mitigation Industry Association



- Our mission is to create more flood resilient communities by advocating for flood mitigation and policy change.

Flood Mitigation and Preparation is a full circle process - From assessment, planning, execution, recertification of equipment, and monitor.

Test and Drill periodically to confirm proficiency (fire drill). This is done for both the equipment and the personnel benefit to ensure readiness.




Flood Mitigation Industry Association



We Support

1. Pre and post disaster flood protection actions
2. Grant funding and a revolving loan program
3. Encourage communities to inventory high-risk buildings below the BFE (base Flood Elevation)
4. Stronger floodplain regulations
5. Stronger flood design standards, codes and enhancements in the engineering practice
6. Community outreach on floodproofing options
7. Flood insurance discounts for all flood mitigation efforts
8. Outreach and education
9. Support a national standard for flood-resistant construction
10. Home elevation contractor certifications





Questions ?
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