The New ASTM Property Resilience Assessment Guides Risk Mitigation Investments in Florida

SYMPOSIUM ON
FLOODING ADAPTATION

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intertek

SECTION ONE: Background

While the ASTM Property Resilience Assessment Guide is forthcoming, it has already been in use around the Country by owners of commercial and industrial real estate and hotels/resorts to:

(1) identify current hazards and future climate impacts that are present at a property;

(2) estimate the vulnerability of the property and the significance of the potential damage/losses ("sensitivity"); and,

(3) determine if feasible resilience measures exist and if they are cost-beneficial with a positive ROI.

SECTION TWO: Planning and Process

The Florida project took place over several years. Relevant questions:

- **"Given past flooding, hurricanes, climate change and sea level rise, should we keep the investments here or should we sell the properties and buy or build somewhere else?"**
- **Should we add more insurance coverage and of what type(s)?**
- **Should we budget adequate capital expenditures at the appropriate times to protect the property and make it safer and more resilient?**
- **How should we report our progress in dealing with physical climate risks to various governmental and other agencies?**

What are we talking about here?
Broad Issue = Building Resilience

Building Safety & Security

The ability of the building to keep its occupants safe and secure during a hazard event

Building Integrity

The ability of the building to resist damage during a hazard event

Building Functionality

The ability of the building to continue functioning during and after a hazard event

What Else Do We Need to Talk About – Post Helene? Post Milton? Changing Behaviors?

The Problems:

1. **Working in Silos**
    1. Government
    2. Residents
    3. Business
2. **Ignoring or Minimizing Science-based Models**
    1. Discrediting models as too extreme
    2. Politicians fear scaring the voters – “Let’s not upset them.”
3. **Politicians fear of raising taxes**
4. **Owners of large buildings don’t want to spend money on risk-mitigation. “Maybe it won’t happen, here.”**

Community Resilience
Is This a Safe Place to Invest?

Examine local government's approach to natural hazards and climate change risks.

Does the jurisdiction have a comprehensive plan in which its climate-related risks are assessed and mitigation proposed?

Look at planned infrastructure investments – Capital Improvement Plans (CIPs)

Review the status (timing, funding source, and funding) of city-wide resilience investments.

What's the history of natural hazard events?

“100 years after the Flood of 1916, the City of Asheville is ready for the next one!”
(https://lnkd.in/ehNFyaeH
The City of Ashville, June 27, 2016

Asheville is a veritable hub for academic and governmental experts on extreme weather and climate change.

1. NOAA’s National Centers for Environmental Information (NCEI): Asheville is home to one of the nation’s largest weather data centers, which plays a crucial role in collecting and analyzing climate data.

2. UNC Asheville’s National Environmental Modeling and Analysis Center (NEMAC): This center focuses on environmental modeling and analysis, providing valuable insights into climate change and its impacts.

3. The North Carolina Institute for Climate Studies (NCICS) is based in Asheville and is known for its cutting-edge research to enhance decision-making related to climate.

https://www.linkedin.com/feed/update/urn:li:activity:7246663724512550912/

“Those who cannot remember the past are condemned to repeat it,” George Santayana, The Life of Reason, 1905. Artist - Rene Magritte , 1962

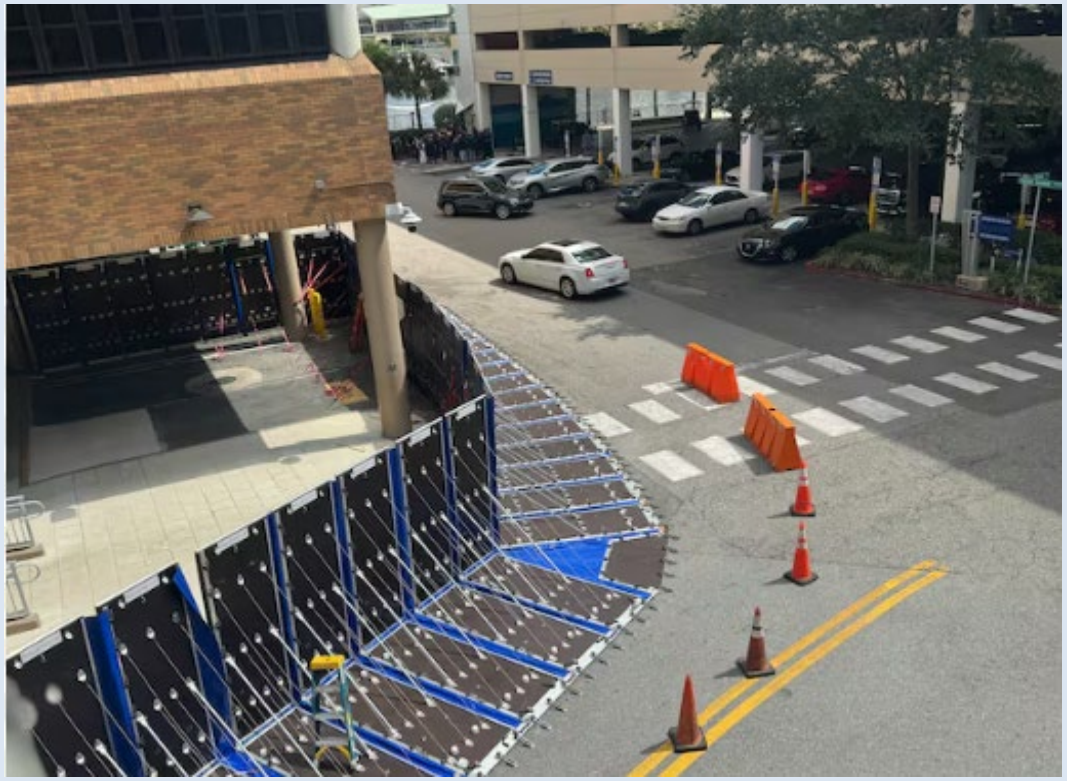
Tampa General builds 'AquaFence' as area hospitals brace for Helene

Helene flooding: Tampa General Hospital
WPLG Local 10

https://www.youtube.com/watch?v=7YcyDNelSXg

Tampa General Hospital
Parking
Garage Flooding

https://www.youtube.com/watch?v=QylhBe1BrEc



“This link demonstrates the Flood Fence installation.
https://www.fox13news.com/news/tampa-general-hospital-protected-aquafence-during-hurricane-helene-we-cant-evacuate

Tampa Flooding with Hurricane Milton

St. Pete Beach – Hurricane Milton

Hurricane Milton – Prepared or Not

When Hurricane Helene hit, this disaster-proof Florida neighborhood kept the lights on

A new development on Florida’s coast was designed to be as hurricane-proof as possible. So far, it’s working.

Fast Company - https://www.fastcompany.com/91199201/this-disaster-proof-florida-neighborhood-kept-the-lights-on

The New ASTM Property Resilience Assessment Guides Risk Mitigation Investments in Florida

- **Section One – Background**
  - ASTM Property Resilience Assessment. What is it?
  - The PRA is a common-sense approach to resilience that has actually been done for a long time.
  - Who is involved in the PRA? How many steps?
- **Section Two – Planning and Process**
  - Example of PRA+ resilient retrofit in the Florida Keys
  - Review of the process
- **Section Three – Solution and Results**
  - Implementation of resilience measures
  - Lessons learned

NEW ASTM International Property Resilience Assessment Three-Step Process

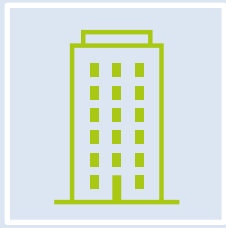
Hazard

Stage 1: Screening & Identifying Hazards* – Review Model & Mapping Outputs

Stage 1a: Hazard Verification

Risk

Stage 2: Vulnerability & Sensitivity Evaluation



Resilience Measures

Stage 3: Resilience Measures Recommendations

***Hazards include those caused by climate change, those made more extreme by climate change, and other natural hazards.**

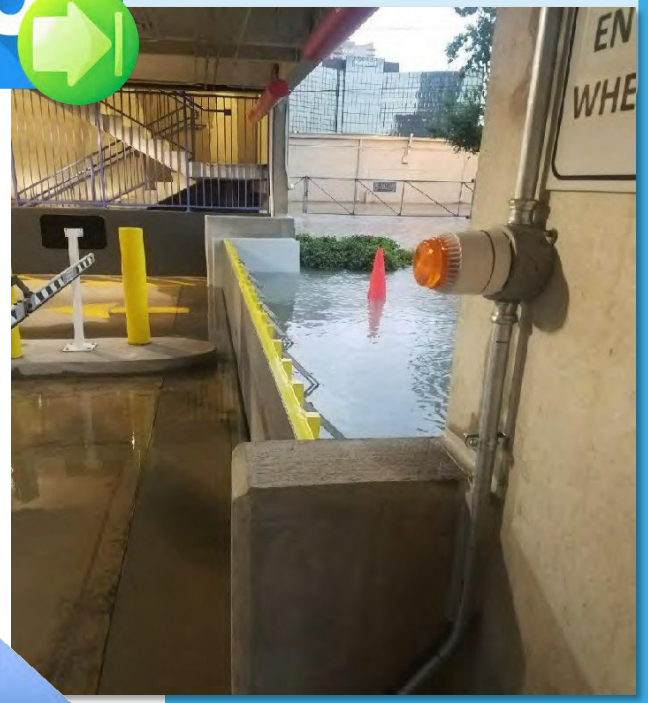
B-Resilient™ Solutions: 6-Step Process to Accelerate CRE Resilience

1. Portfolio Risk Screening
2. Property-Level Risk Assessment
3. Damage/Loss Calculations
4. Risk Mitigation Cost Estimation
5. Recommend Solutions

RISK FOOTPRINT™

STEP 6

6 Implementation!



“More than just the bad news”

COASTAL RISK

Property-Specific RiskFootprint™ Reports

- **Comprehensive and detailed**
- **30+ current hazards**
- **4+ future climate impacts**
- **Up-to-date aerial imagery**
- **Highly-granular modeling**
- **Quantitative assessments**
- **AI FFH using Google Street View**
- **Hand-drawing tool for custom property boundaries**

RISK FOOTPRINT™ REPORT

Accelerate Your Resilience

PROPERTY DETAILS:
1441 Quivira Road
San Diego, California 92109
lat: 32.76483 long: -117.24017

REPORT DATE & DETAILS:
Date: October 16, 2023
Status: Complete

weather.gov noaa.gov

1441 Quivira Road, San Diego, California 92109

Risk Summary Snapshot

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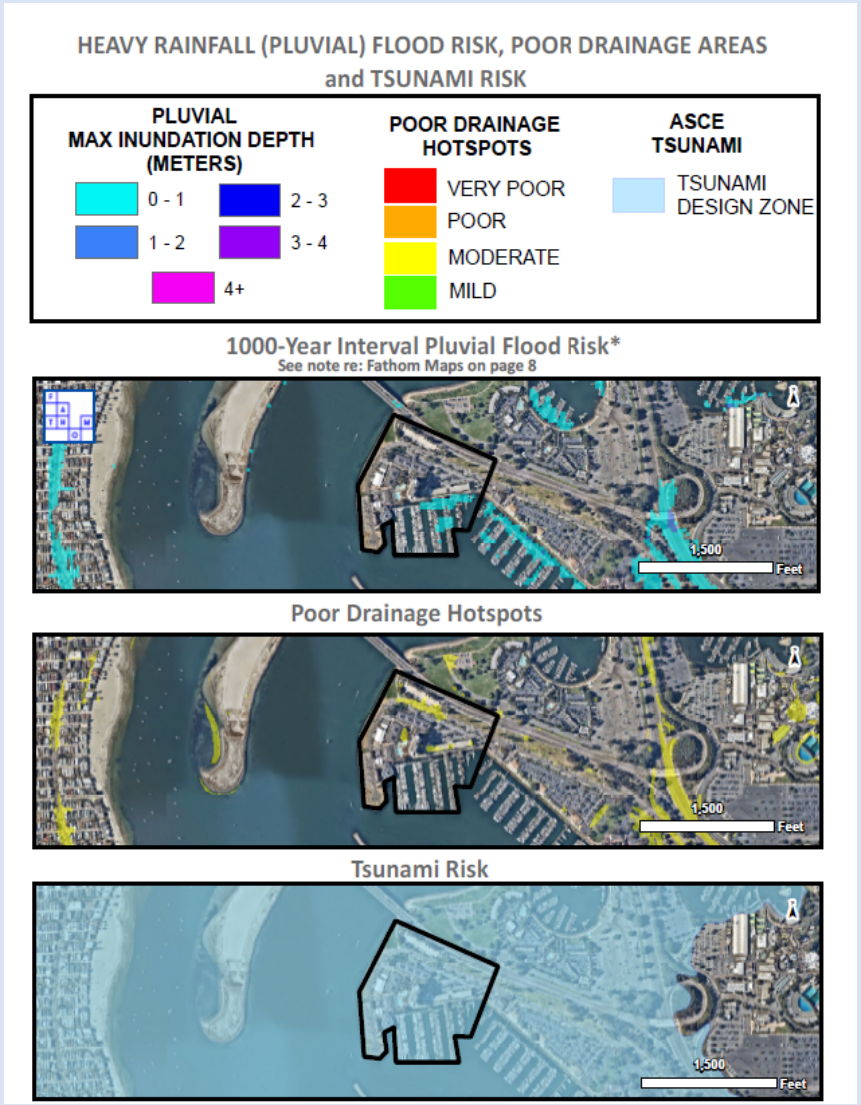
QUESTIONS?
WE'RE HERE TO HELP
CALL:
1-844-732-7473
RISK FOOTPRINT

RISK FOOTPRINT™ nearmap FATHOM TRUE Flood Risk WRN WEATHER-READY NATION



RiskFootprint™ Future Climate Change Impacts

Future Climate Change Impacts

Projections By Emission Scenarios (RCPs)*

Extreme Heat	2030	2040	2050
RCP 4.5	Moderate	High	High
RCP 8.5	Moderate	High	High

Extreme Rainfall	2030	2040	2050
RCP 4.5	Moderate	Low	Moderate
RCP 8.5	Moderate	Low	Moderate

Drought	2030	2040	2050
RCP 4.5	Moderate	Moderate	Low
RCP 8.5	Moderate	Moderate	Low

Metric Ranking Guidelines

* See Page 10 for Glossary & References

Extreme Heat	Less than 25%	25% - 50%	Greater than 50%
% of Global Climate Models predicting 20% or greater increase in days of maximum air temperature above 85° F (compared with 2021)	Low	Moderate	High
Extreme Rainfall	Less than 25%	25% - 50%	Greater than 50%
% of Global Climate Models predicting 20% or greater increase in days of annual maximum daily rainfall (compared with 2021)	Low	Moderate	High
Drought	0.0 or Greater	Between 0.0 and -0.2	-0.2 or Less
Mean annual 12-month Standard Precipitation Index (SPI) compared with 2021	Low	Moderate	High

PRA Stage 2 = Vulnerability and Value-at-Risk

- **Vulnerabilities**
  - Is the building and MEP vulnerable to flooding?
  - Is the building vulnerable to wind/hurricane?
  - Is the building vulnerable to seismic?
  - Is the building vulnerable to wildfires?
- **Values-at-Risk**
  - Gather necessary building information ("COPE" data)
  - Identify event scenarios to which building is vulnerable
  - Assess damage/loss for various event scenarios
  - Structure, Contents and Business Interruption

Is the Building Vulnerable to a Hazard and "So What"?

Where are the major vulnerabilities to flooding, storm surges, heavy rainfall, and sea level rise?

Flooding Depth-in-Structure by Event Severity-Level

The table below shows three locations within the hotel, the building elevation, and water depths for each model.

	Building Elevation NAVD88 (Feet)	FEMA 100-Year Depth of Water (Feet)	Fathom 1000-year Pluvial Depth of Water (Feet)	CAT 2 (SLOSH v3) Depth of Water (Feet)	CAT 3 (SLOSH v3) Depth of Water (Feet)	CAT 4 (SLOSH v3) Depth of Water (Feet)	CAT 5 (SLOSH v3) Depth of Water (Feet)
Lowest Adjacent Grade	3.19	8.7	1.6	4	5	7	8
Main Entrance	7.20	0.0	0.0	0	3	3	4
Service Entrance	3.91	2.3	1.1	1	1	5	6

Value-at-Risk and Restoration Days (Business Interruption)

Flood Type	Depth	Damage	Restoration (Days)
FEMA 100-year	8.2'	18.2%	540
Pluvial 1000-year	1.1'	3.1%	450
Category 3 Hurricane Surge	5.0'	9.0%	540
Category 4 Hurricane Surge	7.0'	14.0%	540
Category 5 Hurricane Surge	8.0'	18.0%	540

Costs Can Escalate With the Levels of Protection Chosen

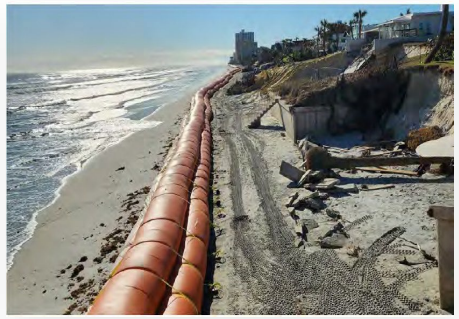
ROM Capital Costs					
	Cat. 1	Cat. 2	Cat. 3	Cat. 4	Cat. 5
Deployable Barrier - Tiger Dam	$35,000.00	$100,000.00	$350,000.00	$225,000.00	$300,000.00
Permanent Sea Wall - 900 LF	$0.00	$0.00	$0.00	$6,000,000.00	$6,000,000.00
Relocate/Elevate Utilities	$0.00	$0.00	$0.00	$250,000.00	$250,000.00
Elevator Pit Flood Proofing	$200,000.00	$200,000.00	$300,000.00	$100,000.00	$100,000.00
Replace Elevator w/ Pitless Model	$0.00	$0.00	$1,000,000.00	$1,000,000.00	$1,000,000.00
Interior Flood Barrier Renovations	$0.00	$0.00	$0.00	$500,000.00	$500,000.00
Flood Doors/Gates	$0.00	$0.00	$100,000.00	$200,000.00	$200,000.00
Wet Floodproof Lobby - 8000 SF	$0.00	$100,000.00	$0.00	$0.00	$0.00
Wet Floodproof 1st Floor - 75000 SF	$0.00	$0.00	$300,000.00	$0.00	$0.00
Dry Floodproof Lobby - 8000 SF	$0.00	$0.00	$200,000.00	$200,000.00	$200,000.00
Dry Floodproof 1st Floor - 75000 SF	$0.00	$0.00	$0.00	$1,800,000.00	$1,800,000.00
Total	**$235,000.00**	**$400,000.00**	**$2,250,000.00**	**$10,275,000.00**	**$10,350,000.00**
Design - 12%	$28,200.00	$48,000.00	$270,000.00	$1,233,000.00	$1,242,000.00

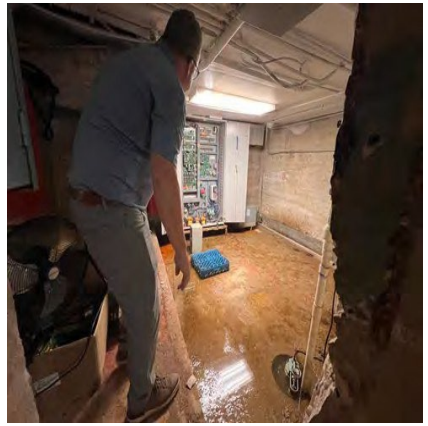
SECTION THREE: Solutions & Results

- Discuss “Risk Tolerance”, Budgets and Timing with Clients.
- Solutions included:
  - dry floodproofing
  - wet floodproofing
  - removable flood barrier systems
  - raising MEP equipment
  - floodproofing elevators and pool equipment and chemical storage, etc.
- Owners may “leapfrog” PRA into actual design level engineering and implementation of risk mitigation recommendations.
- The PRA process can be used to develop a 5-year Capex/Opex Plan.

Feasible Resilience Measures and ROM Costs

Feasible Resilience Measures – Hotel Project
Removable Barriers, Wet Flood-Proofing, Raise MEP Equipment and More





What is the ROI on Risk Mitigation Investments?

Elevating Utilities, Protecting Mechanical and Electrical Systems

Enclosing electrical substations in reinforced concrete rooms with waterproof doors, elevating generators on concrete pads or steel platforms, or relocating HVAC systems to higher floors or the roof.

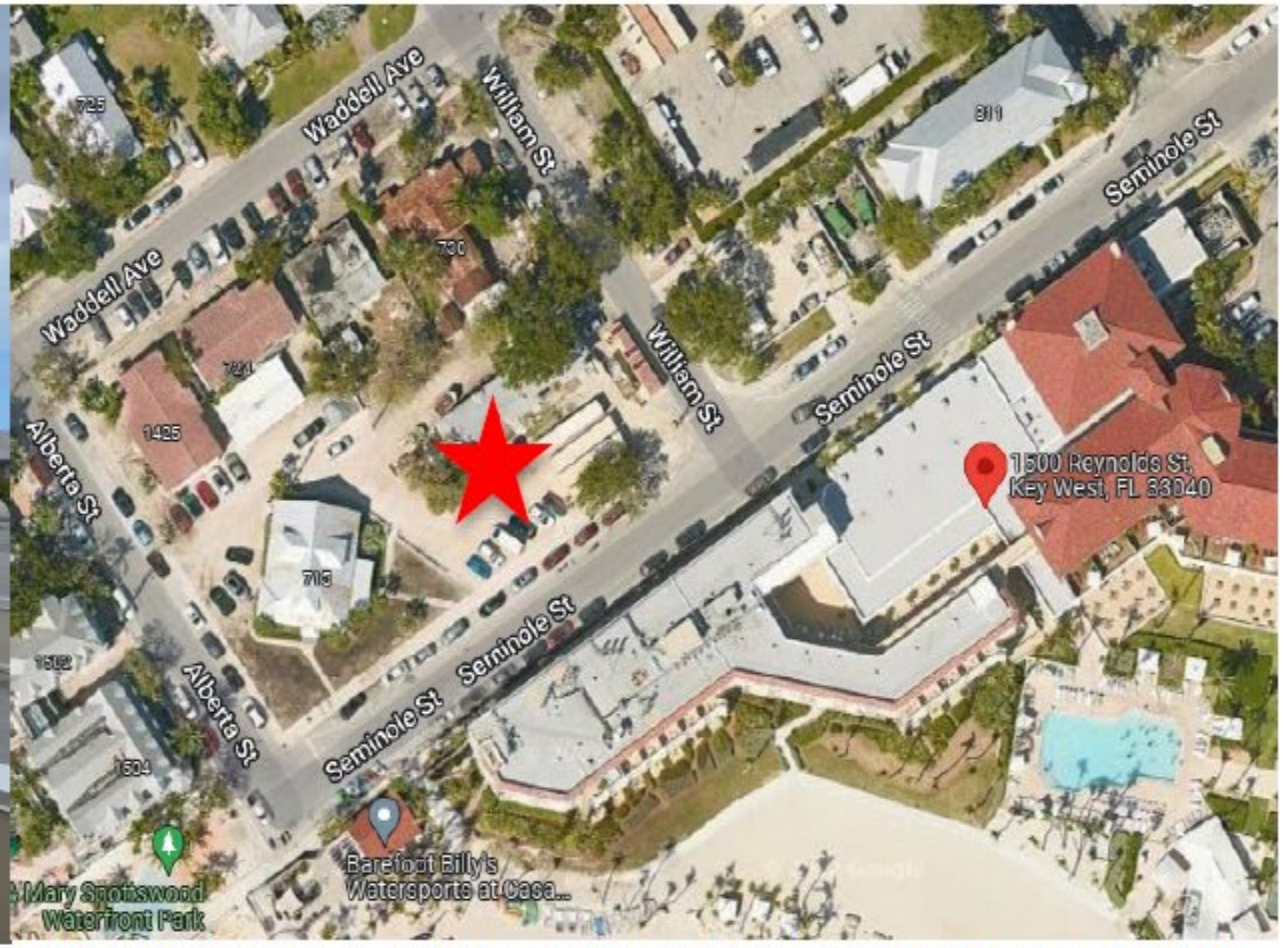


FIGURE 17: UTILITY RECOMMENDATION TO ELEVATE TO ROOF (LEFT), IF APPROVAL CAN BE GRANTED

Benefit-Cost Estimating

- **Standard methodology employed by the US Army Corps of Engineers (USACE) and the Federal Emergency Management Agency (FEMA).**
- **B/C = benefits as damages avoided over the life of the project compared with the construction, operation, and maintenance (O&M) costs.**
- **Benefits = damages without the project minus the damages with the project.**
- **If the project is technically sound, damages with the project should be less than damages without it and the net benefits will be positive.**

“Boots on the Ground” – Hazard-specific Experts

- Field Inspections by experts
- Specific recommendations (flood, wind, etc.)
- Assist with RFP prep and selection of General Contractor
- Monitor construction and implementation
- Certification of final construction
- Field test resilience retrofit

OPERATIONAL CONSIDERATIONS

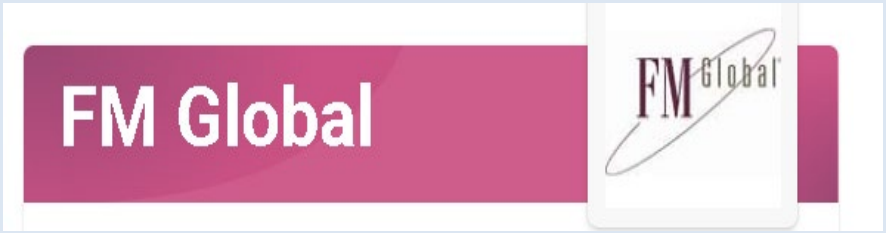
Flood mitigation analysis factors; beyond technical viability, & code & cost considerations, include deployment (human intervention) & operational & maintenance considerations.

Operational requirement & continuity plans inform selection of solutions.
Examples of how functional use/intervention paring include:

- **Operating during/immediately after flood event may require dry floodproofing w/ permanent barriers (e.g., police or fire station).**
- **Need for quick recover after an event could use deployable barriers and elevate key equipment.**
- **Tolerance for longer recovery allows design for temporarily inundated during an event. Durable/water resistant materials can reduce costly damage from temporary inundation.**

Selected interventions must also meet the ASCE 24 design requirements.

Insurance Company Incentivizes Risk Mitigation and Resilience



SEPTEMBER 12, 2023

FM Global Announces US$350 Million 'Resilience Credit' to Support Client Investment in Climate Resilience

Following allocation of last year's inaugural resilience credit of US$300 million, clients accelerated implementation of mitigation efforts to drive a forecasted reduction in economic impact of up to US$20 billion.

Thank you!

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