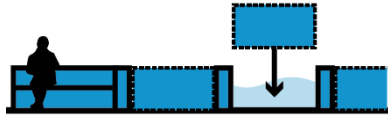


Inflatables

Flood Adaptation Measure



Physical Infrastructure



SHORELINE LOCATION:



@Flickr

DESIGN LIFE Weeks	ADAPTABILITY Low	IMPACT ON THE WATERFRONT Minor Intervention	CONSTRUCTION COST TBD
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COASTAL FLOOD HAZARDS MITIGATED:



Sea Level Rise



Storm Surge



Groundwater



Waves



Erosion

MEASURES COMPATIBILITY:		ECOSYSTEM SERVICES: Measure may affect these shoreline values			
Flood	Seismic	—	—	—	—
All	All	Aquatic Habitat	Terrestrial Habitat	Water Quality	Carbon Storage
		—	—	—	—

DESCRIPTION:

Water-filled, polyester-coated fabric or geotextile fabric tubes that can vary from 19 inches to 10 feet in diameter and 50 feet to 200 feet in length. Multiple tubes can be connected to achieve longer lengths. System provides for flexible alignments, including 90 degree turns. Tubes are stackable and may require straps and anchoring when stacked, single units are self-anchoring due to filled weight.

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<p>CONSIDERATIONS:</p> <ul style="list-style-type: none"> Requires storage location and crew of workers to set up. 	<p>ADVANTAGES:</p> <ul style="list-style-type: none"> Scalable temporary flood mitigation solution. Relative low initial cost compared to permanent measures. Short implementation time. Compact storage footprint. No change to current waterfront (during non-storm periods). 	<p>DISADVANTAGES:</p> <ul style="list-style-type: none"> Significant deployment effort (staff, multiple parts, equipment). On-/off-site logistics coordination and space required. Operation and maintenance program needed. Limited lifespan/design life. Not well suited for daily or monthly event occurrences.
<p>CONSTRUCTION IMPACTS TO THE PUBLIC:</p> <ul style="list-style-type: none"> Temporary impacts during deployment and clean-up operations 	<p>SEA LEVEL RISE ADAPTATION OPPORTUNITIES:</p> <ul style="list-style-type: none"> Not adaptable 	<p>CASE STUDIES:</p> <ul style="list-style-type: none"> Texas DOT used inflatable flood barriers during hurricane Harvey
<p>DESIGN OPPORTUNITIES:</p>		
<p>Ecological Enhancements</p> <ul style="list-style-type: none"> N/A 	<p>Urban Design</p> <ul style="list-style-type: none"> N/A 	<p>Form</p> <ul style="list-style-type: none"> N/A

DESIGN CONSIDERATIONS:

- Based on desired level of flood protection, multiple units can be stacked upon one another. Additionally, varying unit diameters could be selected.
- Tube diameters should be selected to withstand static and dynamic loads due to hydrostatic pressure, wave loads, and debris impacts.
- Susceptible to puncture from debris.
- Interface of deployable barriers with stairs and other level changes will need to be addressed.

SITE-SPECIFIC CONSIDERATIONS:

- Well suited for temporary protection at building entryways, BART entrances and the Muni Portal.
- Well suited along the waterfront in areas where the measures can be safely installed and anchored.
- Potential temporary measure for seismic joint protection.

URBAN DESIGN CONSIDERATIONS:

- As a temporary measure, the product does not improve or enhance the appearance of the waterfront or its views, nor provide benefits to the natural environment.
- Due to the low height of the product, views at standard eye level will not be blocked, but circulation (pedestrians, bikes, and vehicles) may be restricted by its use.

INSTALLATION AND CONSTRUCTABILITY CONSIDERATIONS:

- These temporary structures are easily deployed at the site by trained staff.
- No permanent infrastructure is required for deployment.

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- A portable pump is required to fill tubes from nearby water source.

ARCHITECTURAL CONSIDERATIONS:

- Deployable barriers should be placed in a manner that does not obstruct emergency pathways.
- Deployable barriers should be temporary and removed as soon as feasible such that they do not impact access to waterfront structures and public access areas post flood event.

HISTORICAL RESOURCE CONSIDERATIONS:

- Place and attach barriers in such a manner to avoid damage to historic structures.

OPERATION AND MAINTENANCE CONSIDERATIONS:

- Off-site shed/warehouse area is needed to store rolled-up tubes, pumps, and hosing.
- Some systems can be set up in a trailer unit for easy, secure storage and transportation of an inflatable dam system.
- Depending on diameter and stacked height of the barrier, the crew size can vary from 1 to 4 people.
- Tubes should be inspected regularly for tears or punctures and patched as necessary.
- The polyester-coated fabric or geotextile fabric is subject to long-term degradation due to ultraviolet exposure.
- The typical replacement time frame is 15 to 20 years.