Working Waterfront Resiliency Requirement Guidelines

Purpose:

To communicate industry standards and practical best methods for construction that increases resiliency in waterfront infrastructure for various types of structures on the coast of Maine. This guide is to provide basic guidance to Working Waterfront Resiliency Grant Program applicants for resiliency engineering to mitigate the effects of sea level rise, increased storm frequency and intensity from the southeasterly direction, and general fortifying of structures to resist or mitigate overtopping and uplift. This list serves to outline qualifiers for meeting the grant program's resiliency requirements. This is a guide and not intended to be a comprehensive list of all resiliency engineering practices or approaches.

Piers / Wharves:

These crucial pieces of infrastructure are most vulnerable to the effects of climate change and most dramatically impacted by storm severity, frequency, and storm surge / sea level rise.

1.) Raising existing structures to mitigate overtopping and uplift. Recent rule changes allow for up to 4' of elevation increases under a Permit by Rule.
2.) Utilizing through bolting and heavy galvanized hardware wherever practical to make more positive physical connections between structural members such as piles, pile caps, stringers, and bracing.
3.) "Tie Down" practices (Galvanized plate strapping, bolts etc.) to replace or augment dead weight connections such as "pinned" pile caps.
4.) Heavier decking with timberlock or GRK augmentation of traditional spikes. Decking should be 4" dimensional lumber (3.5" actual) and a width appropriate for application (6-12") with appropriate gaps (1/2" recommended) between to allow unimpeded flow of water both up and down yet allow safe pedestrian and hard wheeled (forklift, pallet jack, dolly) traffic.

Buildings:

Pier based buildings can exert tremendous lateral forces upon their host structure during inundation / overtopping conditions. Mitigation efforts to these forces include the following.

1.) Raising the host structure by an appropriate amount to mitigate inundation, overtopping and uplift.
    a. Ramping into a storage facility may be needed to ensure safe access and egress by users.
2.) Installation of blow out panels.

    a. These panels are made to blow out from hydraulic force during inundation allowing the unimpeded flow of water through the structure minimizing lateral forces exerted by wave action, and tidal currents.
    b. Typically, these panels are 18” to 36” high and placed in exterior walls. They can be hinged, or force fit.
3.) Drainage systems, scuppering , wave breaks.
    a. Other systems designed to allow water to flow through the structure or be diverted around the structure resulting in a lessening of wave and tidal current forces against the structure.

Electrical and Mechanical Systems:

Most Working Waterfront facilities have multiple electrical and mechanical systems in use. These include refrigeration, water pumps, hoists, hydraulics, 110v and 220v outlets, and other conveyance and material handling equipment. Mitigation of inundation and overtopping are crucial to ensure longevity of these systems.

1.) Raise all electrical systems to a height well above recent water levels witnessed on site.
2.) Cofferdam sensitive mechanical equipment on pier faces and ensure proper breakers and GFCI circuits are employed.
3.) Put in place policies to de-energize equipment that is known to be in the flood zone prior to high water events.

Fuel Systems and Tanks:

Fuel Systems and tankage are ubiquitous along the working waterfront and protections must be made to ensure resiliency to high water events. These can include:

1.) Moving tankage up and away from flood prone areas
2.) Ensuring emergency shut offs and tank monitoring systems are online and functional. Where practical, control equipment should be elevated and accessible during flood conditions.
3.) Raising pier side pumps to mitigate inundation.
4.) Ensuring tank vents and caps are functional and vents are high enough to resist inundation and caps are sealing properly.
5.) Ensure a working spill plan is in place and a spill kit is on site and stocked.