

# **Bridges, Bottoms, Berths, Lines, Liquids, Levees (B3L3)**

A rule of thumb for assessing risks following a San Francisco Bay Region earthquake.

B3 = Bridges, Bottoms, Berths | L3 = Lines, Liquids, Levees

## **Bridges – Risks to Waterway Crossings**

- Bridge collapse (full or partial) obstructing the waterway.
- People, vehicles, or dangerous cargo falling into the water.
- Drawbridge unable to open due to power loss or structural damage.
- Tsunami surge reducing vertical clearance beneath bridges.

## **Bottoms – Risks to Waterway Floors**

- Seismic uplift raising channel or harbor bottoms.
- Dredged channel walls collapsing and infilling with sediment.
- Seiches slamming vessels against the seabed or docks.

## **Berths – Risks to Moorings and Dock Areas**

- Mooring lines failing, leaving vessels adrift.
- Cranes tipping or collapsing into waterways.
- Berth structures collapsing or burning, eliminating mooring facilities.
- Landslides depositing sediment and reducing berth depth.
- Shore-side or facility fires forcing vessel evacuation.
- Power loss disabling berth operations.

## **Lines – Risks from Power and Pipelines**

- Live high-voltage lines sagging and reducing clearance.
- Tower structures collapsing into waterways.
- Electrical lines contacting vessels underway or at anchor.
- Emergency anchoring damaging submerged cables or pipelines.

## **Liquids – Risks from Hazardous Cargo or Facilities**

- Ship-to-shore transfer lines severed, spilling oil.
- Underwater pipelines ruptured, releasing toxic liquids.
- Cross-bridge pipes severed, spilling unknown substances.
- Refineries discharging volatile substances onto docks or water.
- Ammonia facilities releasing toxic gas over waterways.
- Tank trucks or rail cars overturning on bridges, spilling cargo.

## **Levees – Risks in the River/Delta Region**

- Levee rupture causing sudden surges or flow reversals.
- Vessel wake triggering failure of weakened levees.