

SHORE THING

Protecting Your Property with Bulkheads

By Nika Postnikov,
Morris Engineering, LLC



Photo: Italia LLC/Stock/Getty Images Plus

Living on the waterfront is a dream for most people but can quickly turn into a nightmare if your property is not adequately protected. Bulkheads, vertical structures built along shorelines, can be essential for keeping waterfront communities safe and preserving property value. Bulkhead failures cannot only cause the loss of land but can undermine and damage adjacent building structures. A bulkhead failure at a New Jersey condominium a few years ago destroyed not only the adjacent docks and fencing but also the building's deck structures, sweeping some of the decks into the bay. Use this article to enhance your understanding of your bulkheads and maintenance needs so you can avoid this happening to your community!

Often confused with seawalls, whose primary purpose is to protect against waves, bulkheads mainly serve to retain the soil abutting the water and prevent the land from sliding into it. While commonly associated with coastal zones, bulkheads are also used in freshwater lakes, wetlands, flood

hazard areas, and riparian lands. These structures are typically constructed from steel, wood and/or plastic composites. Bulkheads are typically composed of a network of components that rely on their combined strength and interaction with the soil behind the wall to reinforce the shoreline. The service life of any given bulkhead will vary greatly and is impacted by many factors, from the wall material and embedment to the native soil properties to the preventative maintenance that it receives.

What's in a Bulkhead?

To understand the maintenance needs of your bulkhead, familiarize yourself with these typical bulkhead components you may encounter:

- **Sheeting**

Depending on its material, the surface that forms the bulkhead wall can be referred to as wall panels, sheet piling, or sheeting. The sheeting is embedded in the earth, with weep

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holes through the face to prevent water from being trapped behind the wall. The sheeting can be backed with filter fabric to prevent soil from washing through the weep holes.

- **Soldier Pile**

Soldier Piles act as the primary structural element of the bulkhead wall that supports the sheeting and keeps it plumb. The bottom of the piles are shielded by a berm, earth formed at the bottom of the body of water, to protect the "toe" of the bulkhead.

- **Walers**

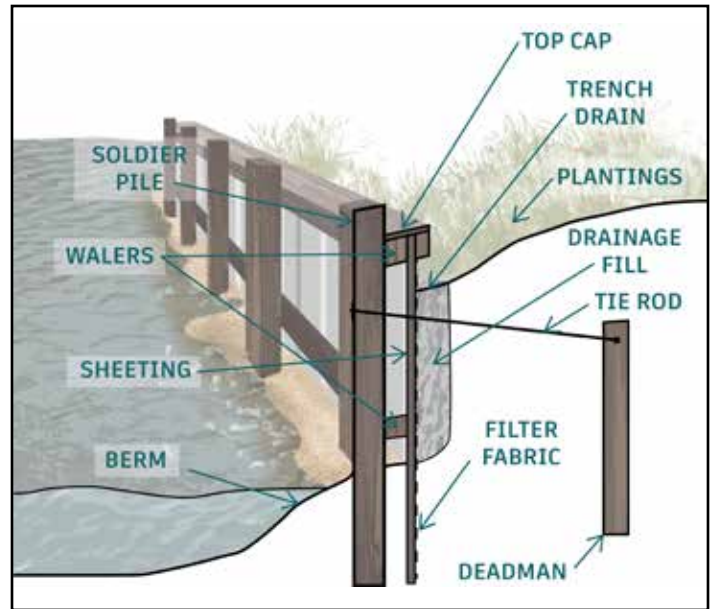
Walers are horizontal structural members attached to the soldier piles that help reinforce the sheeting.

- **Tie Rod**

Tie rods help keep the vertical sheeting stable by anchoring the bulkhead wall structure to the anchor piles further inland.

- **Anchor Pile**

Also referred to as deadman piles, anchor piles are



embedded in the soil, back from the face of the bulkhead, to provide the necessary resistance to prevent the bulkhead wall from overturning.

- **Trench Drain**

At the top of the bulkhead wall on the soil side, there is often a trench drain installed to control surface runoff

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behind the wall which can cause soil erosion. The trench contains drainage fill and is also lined with filter fabric.

• Plantings

Specific plantings can be installed to help reinforce the soil behind the bulkhead wall.

• Top Cap

The top cap anchors the bulkhead wall components together and keeps them aligned.

All these components require inspection and maintenance to ensure the integrity and longevity of the bulkhead. But what are some examples of problems to look out for and what can be done?

Navigating Bulkhead Issues

Look out for some common issues affecting bulkheads and consult your engineer for appropriate repairs.

• Oxidation/Corrosion

Particularly when exposed to saltwater, components of the bulkhead can corrode and deteriorate. Components such as tie rods frequently break due to corrosion, losing the important lateral stability provided by the anchor piles. A corrosive environment can also wreak havoc on steel sheeting which can rust, crack, and eventually break.

What to do:

- Regularly inspect components susceptible to corrosion, especially tie rods and steel sheeting. Replace components affected by loss of integrity.

• Water Pressure

Bulkheads must resist hydrostatic pres-

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sure (the force of the water on the bulkhead wall). If tidal forces or poor drainage cause uneven pressure differentials, the wall can bow and the joints between vertical panels can separate. These failed joints can often be spotted by the debris that collects at the joint on the water side of the bulkhead.

What to do:

- Inspect sheeting for signs of joint separation. With early intervention, minor seam separations and cracks may be sealed.
- Inspect top cap or exposed piles for signs of bowing or displacement.

• Drainage & Erosion

Proper drainage is important to the long-term durability of a bulkhead.

The ground behind the bulkhead must be graded to prevent excessive surface flow, which could cause soil erosion. Sinkholes can occur when soil erosion occurs behind the wall, often after storms that overwhelm the bulkhead drainage system.

What to do:

- Inspect and maintain the entire stormwater management system for the property, including surface grading and ground cover plantings. Ensure that no excessive water, such as from storm drains, landscape sprinklers or gutters is directed toward the bulkhead.
- If one does not already exist, install a drainage trench behind the bulkhead.
- Regularly inspect and clean drainage trenches and other drainage

components, such as weep holes. Clear any debris blocking the flow of water must be cleared away. Refill any drainage that is washed away.

- If erosion occurs, various repair methods may be considered to fill voids and compact loose soil.

Regular inspection by a Professional Engineer or bulkhead inspector can provide you with repair and reinforcement recommendations to prolong the life and safety of your bulkheads. If minimal weaknesses are identified, components can often be cost-effectively repaired, such as replacing tiebacks, sealing cracks, or replacing drainage mediums. Performing minor repairs such as these in a timely manner can save an association money in the long run, as putting them off can lead to major repairs down the line. Larger failures in the bulkhead can also cost money in repairing damage to adjacent sites and building structures affected.

Consult your attorney on local ordinances that must be followed. Your engineer can guide you on factors impacting significant repairs, such as the surrounding site improvements or underground utilities.

Properly constructed and maintained bulkheads can serve a waterfront condominium for many years. However, short-term neglect can become a big problem, so stay proactive to prevent costly repairs and land loss. Well-functioning bulkheads are imperative to the safety of residents and value of their property. Don't let your waterfront dreams get washed away due to failing shoreline protection! ■

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