

## FLOATING SOLUTION FOR UNDERGROUND BUNKERS

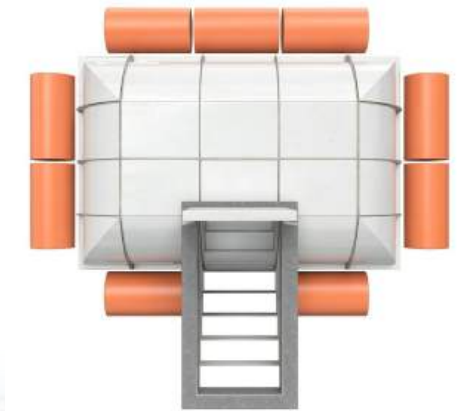


Below we present an **optional engineering solution for flood-risk scenarios**, in which a subterranean bunker is designed to **behave as a floating body** under extreme flooding conditions. This is achieved through a **fully sealed and waterproof structural envelope**, combined with the integration of **buoyancy elements** that are permanently installed during construction. These flotation devices remain **buried and protected**, preventing degradation or loss of performance over time.



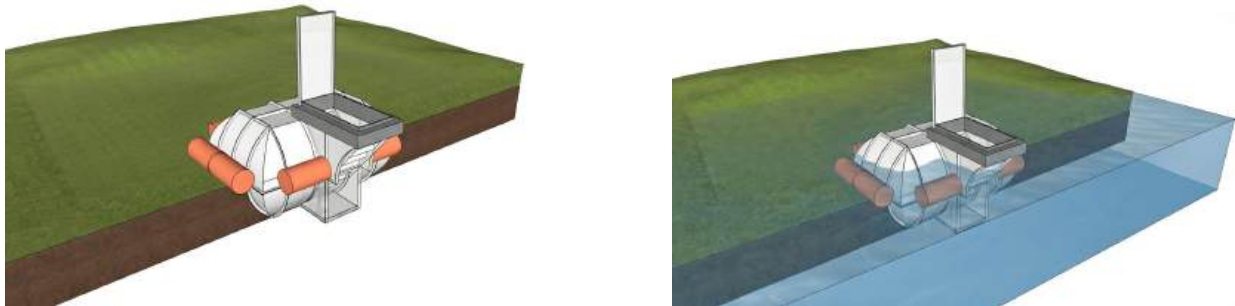
**Kratos** - Area: 131.31 Sqft - 12.20 mt<sup>2</sup> – **Good for 4 to 6 people**

The structure will **remain stable and in a fixed orientation** even under strong currents or high water levels. This stability is ensured by a **low center of gravity**, generated by the weight of the structural components and interior furnishings, together with the **elevated positioning of the flotation elements**. This configuration prevents capsizing and ensures that the bunker naturally returns to its **original upright position** at all times.



SITE IMPLEMENTATION

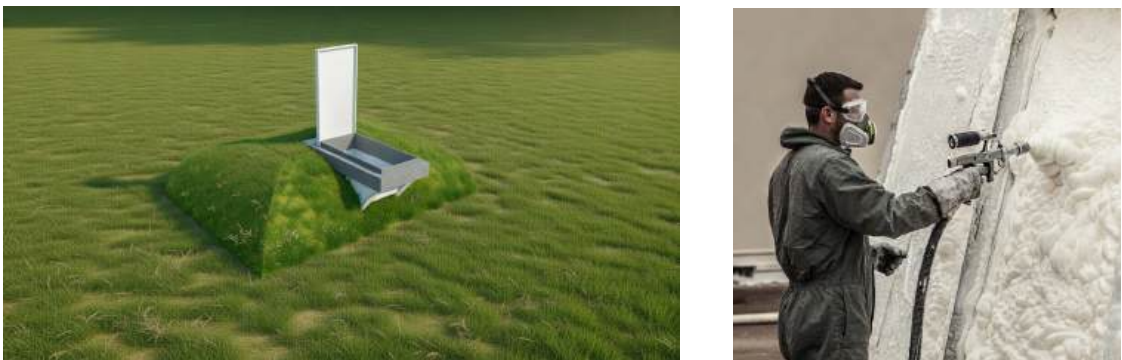
The bunker will be buried to approximately **half of its height**, with **no mechanical anchoring to the ground**. It will rest directly on the soil, allowing it to **separate freely from the terrain and float** in the event of flooding.



The bunker will be covered with a **soil mixture blended with styrofoam beads**, creating a **fertile yet lightweight backfill** that does not trap or restrain the structure against the ground. This fertile layer will be finished with **natural vegetation and landscaping**, providing both **aesthetic value** and **additional thermal insulation**.



If enhanced thermal insulation is required, particularly in **snow-prone or cold climates**, the bunker shall be **pre-coated with closed-cell spray foam insulation**, applied to a thickness sufficient to meet the **required R-value** for the specific climatic zone.



The flotation elements or buoys will be **encapsulated in a protective plastic membrane** to isolate them from direct soil contact and to ensure long-term durability and performance.

For additional information regarding the flotation buoys, please refer to: <https://walshmarineproducts.com/product/long-float-buoy/>



### LONG FLOAT BUOY

- **International Orange** – for enhanced visibility
- **Seamless Design** – rotationally-molded from UV stabilized, chemically-resistant, ultra strong, high-density polyethylene resin. No ABS.
- **No cracking, chipping or peeling**
- **Impervious** to chemicals, fuels, and solvents
- **Completely foam-filled** – with urethane foam that meets or exceeds *United States Coast Guard* requirements

Barrier Size

24" x 45"

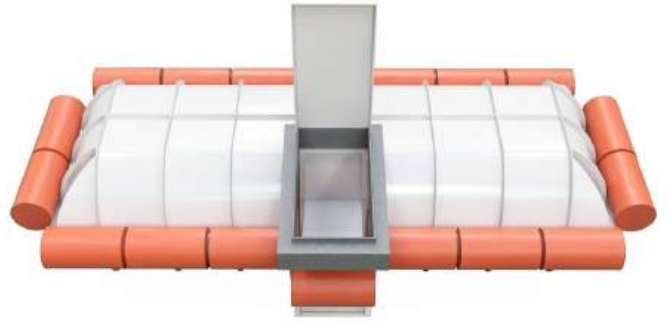
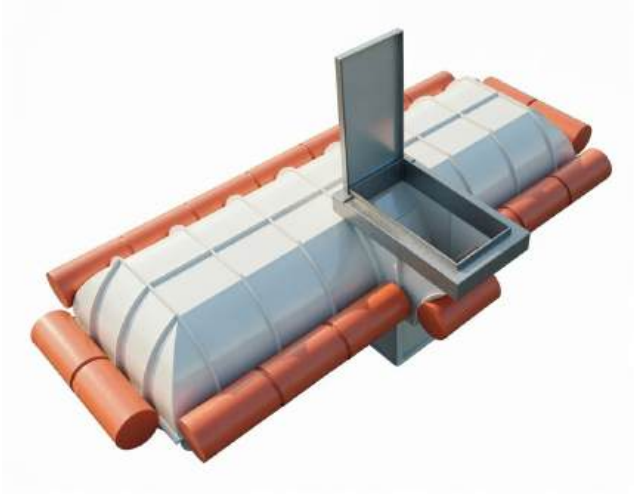
CLEAR

Models

Swivel Eye Ends Galvanized Hardware (Standard)

Color

Orange



**Survival Module - Area: 252.95 Sqft - 23.50 mt2 – Good for 10 people**

