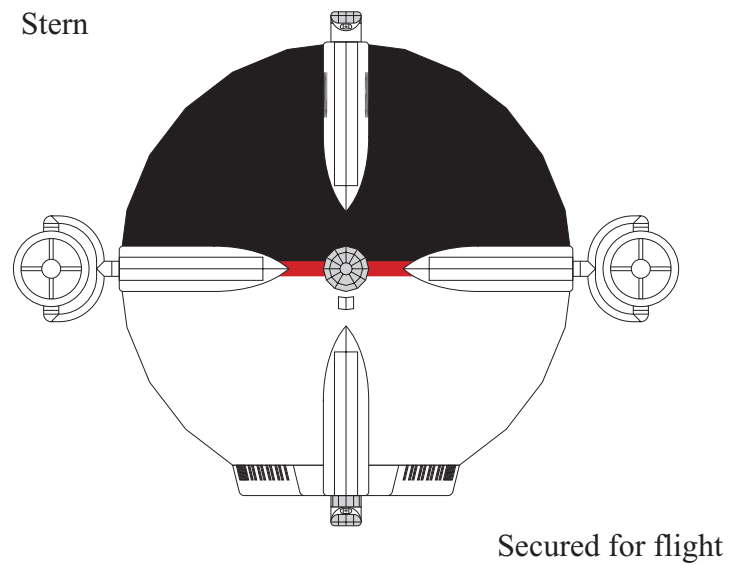
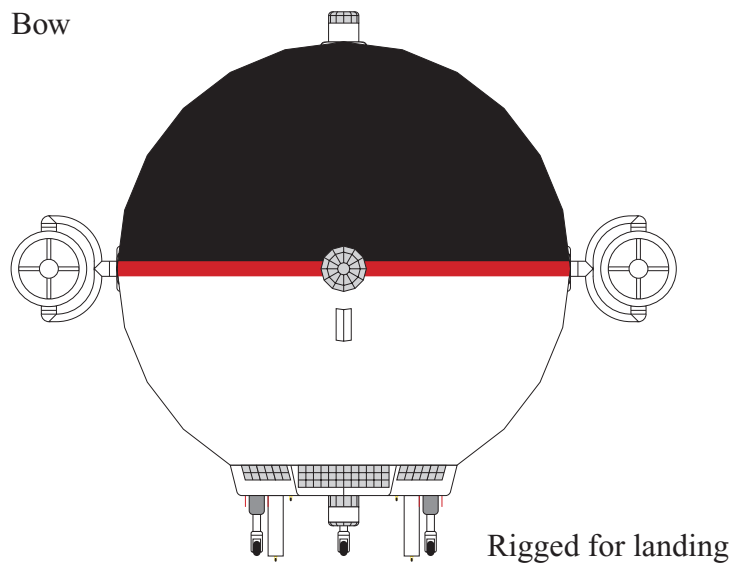
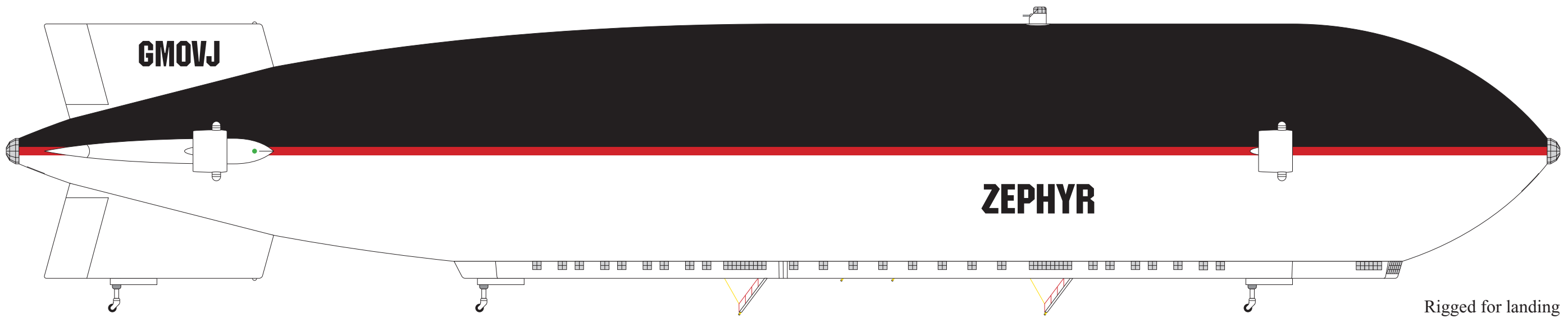
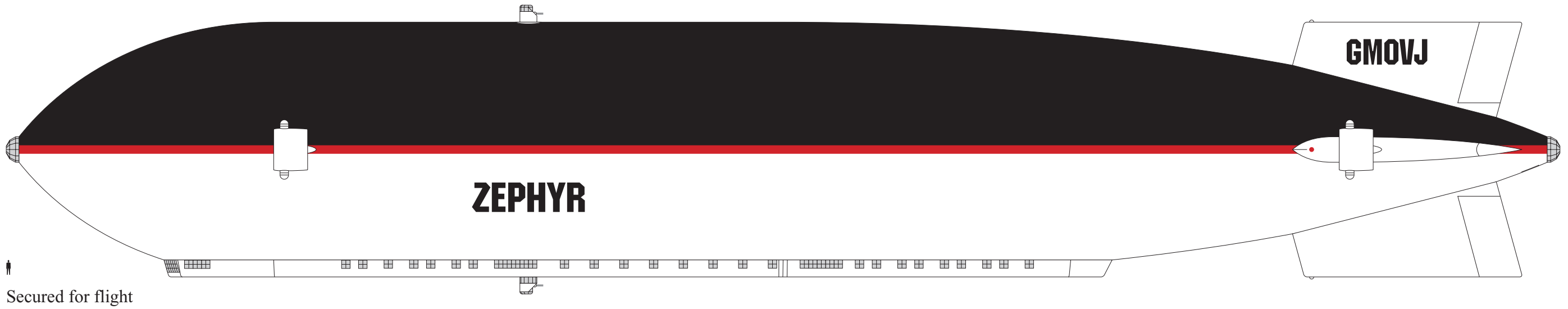


Exterior elevations



**Airship Zephyr (registration GMOVJ)**

**Dimensions overall:** length, 183 m (591 ft); beam, 44 m (144 ft); height, 34 m (112 ft)

**Dimensions of envelope:** length, 183 m (591 ft); diameter, 30 m (98 ft)

**Gross vehicle mass:** approximately 80 tonnes fully loaded (weight 88 tons)

**Payload:** cargo, 30 tonnes (33 tons); passengers, 30 in 6 single cabins and 12 double cabins

**Propulsion:** 4 fixed-pitch 6-blade ducted fans in U-brackets; 360-degree vertical rotation, 240-degree horizontal rotation (FOD screens and propellers removed from drawings for clarity)

**Speed:** cruising, 100 kph (62 mph); maximum, 150 kph (93 mph)

**Altitude:** cruising, 1200 to 1800 m (~4000 to 6000 ft); maximum, 3000 m (~10,000 ft)

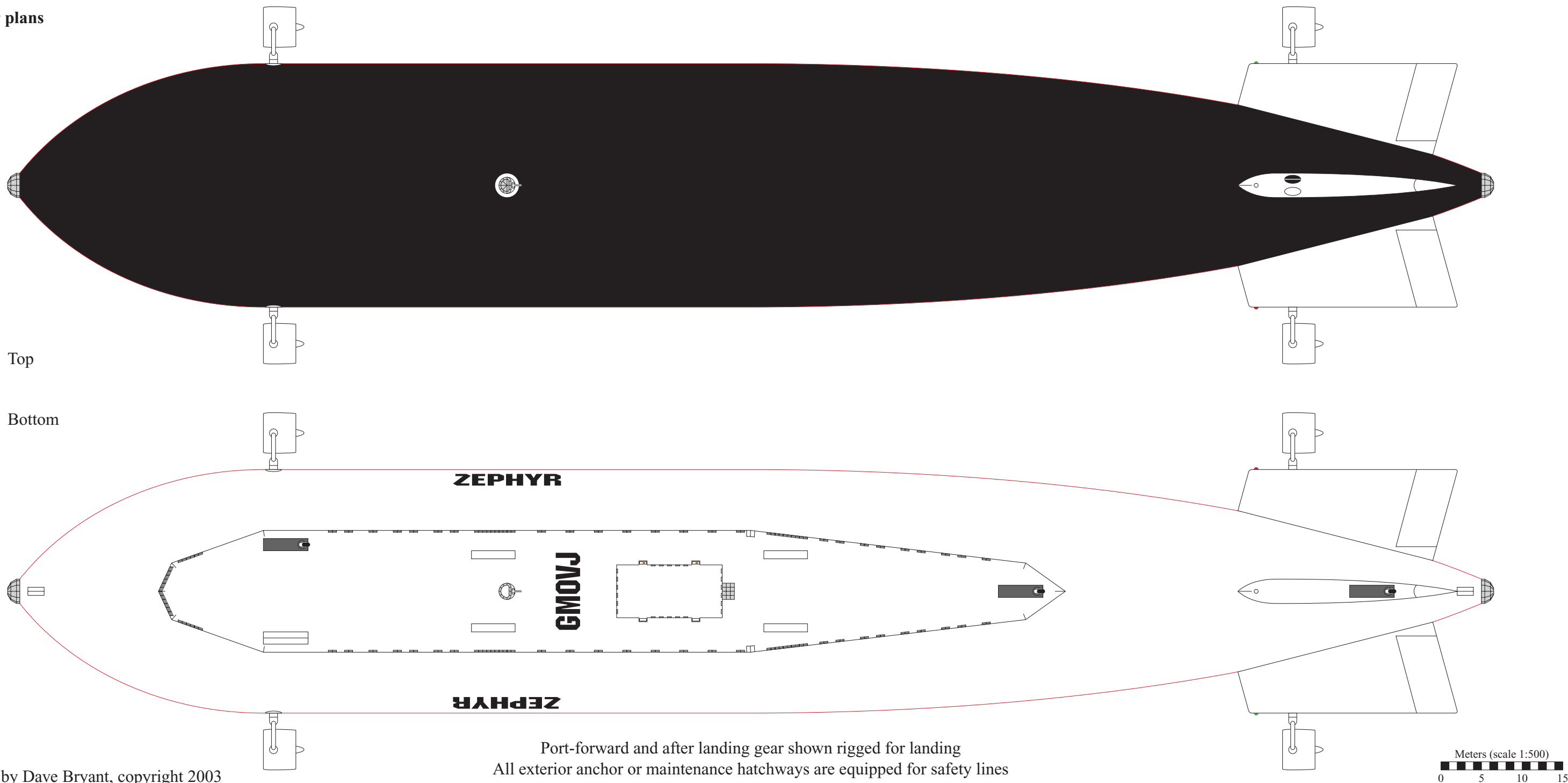
**Armament:** 2 breechloading low-velocity 180-mm smoothbore airguns in turrets at top and bottom of envelope, firing fin-stabilized discarding-sabot darts or fin-stabilized shot canisters

**Crew:** 20 (captain, first mate, second mate, three helmsman, three engineers, three gunners, three stewards, three cooks, loadmaster, physician) in 6 single and 7 double cabins

Meters (scale 1:500; 1 cm = 5 m)



## Exterior plans



Artwork by Dave Bryant, copyright 2003

**Engineering:** The ship's materials are light, strong, and flexible, and contain little or nothing in the way of metal or flammable substances. Tough-skinned modular cells of foamed aerogel provide flotation (in place of helium-filled ballonets). Because the honeycomb of flotation cells is self-supporting, the ship's structure is lighter and stronger than that of gas-filled vessels. Thin, stiff, aerodynamically slick composite plates sheathe the hull. Color is bonded into the material, as is any special property—such as the upper hull's heat-absorptive qualities. The plates snap onto the ship's skeleton using molded-in toggle-pegs, can be removed for access, and are tough enough to resist modern small-arms fire.

The floor of the rectangular cargo deck can be cranked up or down, so that, when the ship is grounded, the hold can be lowered and ramps kicked over to ease loading and off-loading. If the ship must act as a sky-crane, the hold floor can be cranked off the worm-gears and left temporarily. Lockable flip-out casters under the hold floor allow it to be lined up with the worm gears upon the ship's return. After the floor is back in place, it is secured by shooting a large number of huge bolts and padlocking them down. Simple block-and-tackle cranes and other cargo-handling gear are anchored to the ceiling of the hold, and the floor contains a gridwork of tie-down.

Mechanical power is provided primarily by a passive solar and steam-exchange system and secondarily by a compressed-air pneumatic system. The surface plating on the upper hull is satin-finish black, the better to absorb thermal radiation. Just underneath is a layer of cells containing eutectic salts, which absorb large amounts of heat and melt without rising significantly in temperature. When ambient temperatures drop, the salts re-freeze, releasing the stored heat. Water is piped through an elaborate network of lines to be heated past the boiling point. The resulting steam is forced into smaller pipes to raise the pressure, then sent to the ducted fans, air compressor, and various other ship systems to provide mechanical power, and recondensed water circulates back to the heat source. An auxiliary boiler is buried in the ship's interior for times when solar heat is lacking for long periods; smoke from it is ducted to flip-open chimneys in the top of the upper rudder and released.

**Control Systems:** Flight controls are driven by the passive-steam system or pneumatics, and speaking tubes and acoustic phones serve as an intercom. Instrumentation is entirely mechanical, some of it absurdly simple: the auxiliary airspeed indicator is a transparent L-shaped tube, the horizontal end of which is exposed to the airstream like a pitot tube. The vertical inboard end contains something like a Ping-Pong ball and is calibrated, in much the same fashion as a measuring cup or beaker, in kilometers per hour.

The only electronic devices are a radio transceiver able to reach satellites in synchronous orbit and an inertial navigation system. Both use ruggedized cold-cathode tubes and are powered by a small Tesla-turbine APU driven by a capillary line from the passive-solar system. A small array of batteries is also available. This suite fits in a magically warded cabinet at the front of the bridge, mounted to the overhead. Output is generated through a single large rectangular area on the face of the cabinet that is coated with vapor-deposited audiovisual film, though a pair of warded microphone-earphone headsets also hang on hooks nearby.

Under this cabinet is the helm, with flight instrumentation gauges and controls for the ducted fans and empennage. Each fan has three lever controls: vertical rotation, horizontal rotation, and throttle. Each control surface has one lever control, for rotation. To port is the engineering station, with gauges and controls for the steam and pneumatic systems. To starboard is the navigator's plotting table with transparent top, under which an unrolled navigation chart can be slid and secured. Storage compartments underneath hold grease pencils, dividers, and other navigation equipment, including sextant and mechanical chronometer.

The chartroom contains the ship's books, an atlas, and laminated paper navigation charts based on mapping orbits by the local naval detachment. It also serves as the ship's vault—only the senior officers and the loadmaster have keys—and armory. The latter includes four twenty-round air rifles that can be pumped by hand or filled by the compressor (they hit about as hard as a .44 Magnum), as well as four sets of riot armor, shields, and batons, four crossbows, and four rapiers or cutlasses. All but the swords are off the shelf from hunting or police suppliers.

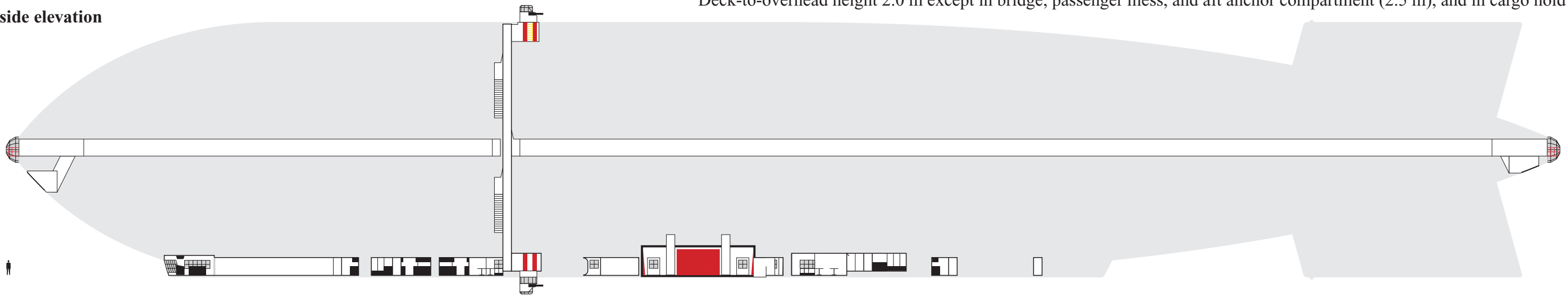
**Lighting:** Optical cables pipe light to inboard compartments during the day; carbide lamps provide night-time lighting throughout the ship. Interior lights use small fuel canisters in safety sconces; floods in the cargo hold, running lights on the empennage, and landing spots use larger fuel tanks. (This was considered safer than piping from a central source.) Replacements are stored in a fire-resistant vault near the cargo lift control area. Portable lamps using the same canisters are racked nearby, and can be hand-carried or clipped to helmets or headbands.

**Crew:** The ship's crew consists of three watches of six (helmsman, engineer, navigator/watch officer, gunner/lookout, cook, and steward), plus two (loadmaster and physician) on call, for a total of twenty. The bridge must be manned at all times, even when the ship is grounded, by a helmsman, an engineer, and a watch officer. The duty gunner stands watch in the upper turret as a lookout; when crews are called to the guns, one of the off-duty gunners acts as a loader, and another off-duty crewman loads the other gun. The loadmaster supervises loading and off-loading and is responsible for the ship's books. He makes sure the ship is secured for landing or lift-off, including landing gear, anchor cables, ballasting, and load distribution, and may conscript for these tasks any crewmen not required for other duties. Meals are "family style", even for passengers, though a small range of choices may be available, and snacks such as cold sandwiches can be requested, as supplies permit.

**Airguns:** Anchor compartments are inboard of and below the observation blisters and to port and starboard at the waist of the gondola; their hatches swing inward and can be latched open. Just inside each hatch is a small airgun designed to fling an anchor downward and assist in grounding the airship on an unimproved field. This anchor gun is mounted on a yoke pedestal (for traverse and elevation) that can be swung out of the way when ground crews are available to take hold of hand-thrown cables or ropes. Anchor-cable reels are mounted to major structural members overhead and are wound by the steam-exchange system or by hand; a pair of boltcutters is racked on a bulkhead in case of emergency. Each of the main or anchor airguns is elevated manually by means of a pivot and handgrip-controlled friction brake and aimed through simple iron sights.

**Interior side elevation**

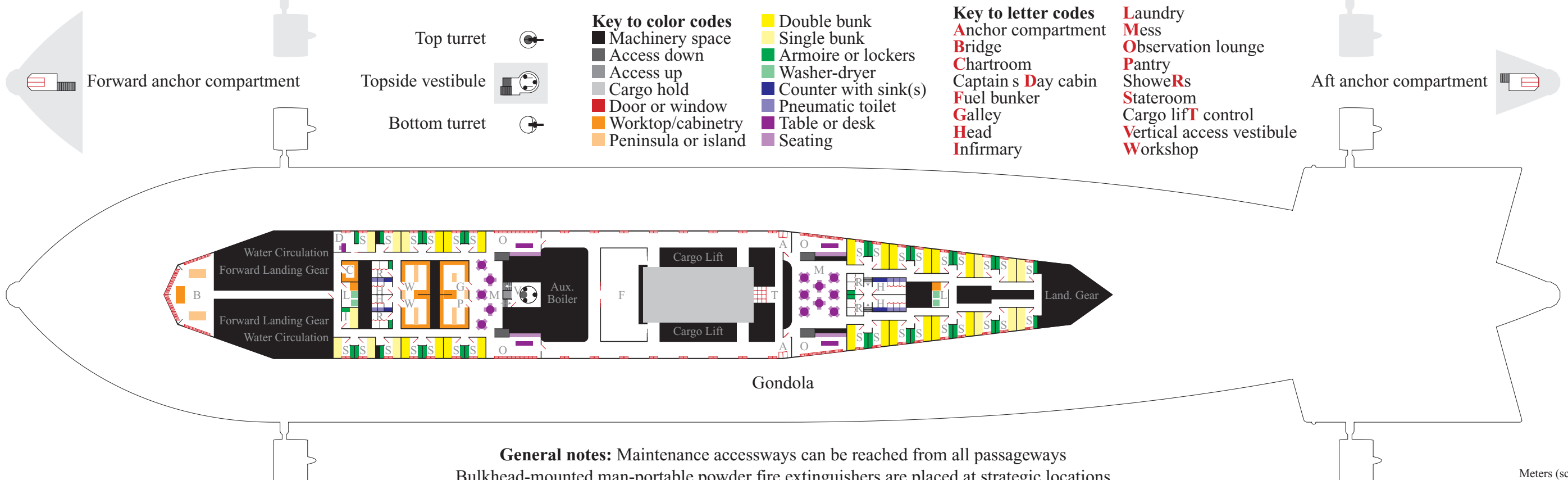
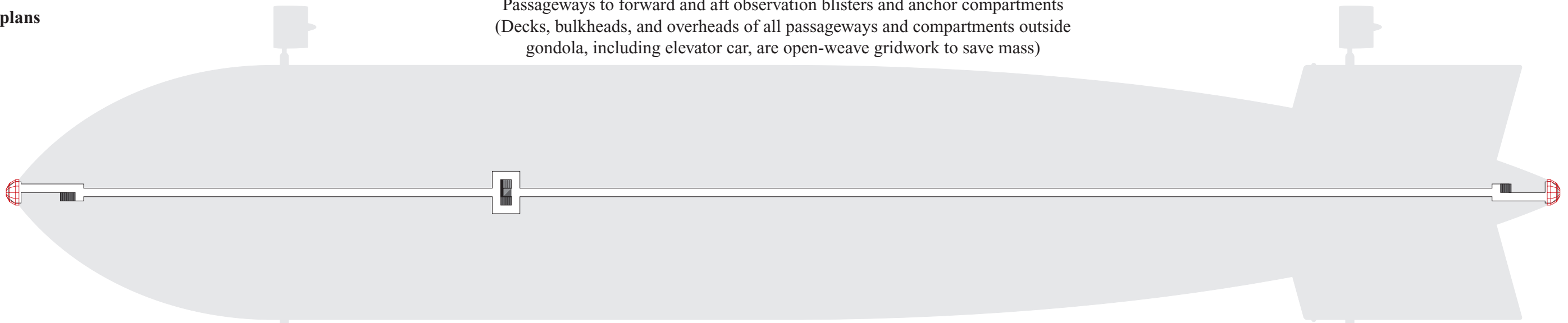
Deck-to-overhead height 2.0 m except in bridge, passenger mess, and aft anchor compartment (2.5 m), and in cargo hold (3.25 m)



Shaft at center of stairwell is mechanical cable-winch elevator

**Interior plans**

Passageways to forward and aft observation blisters and anchor compartments (Decks, bulkheads, and overheads of all passageways and compartments outside gondola, including elevator car, are open-weave gridwork to save mass)



**General notes:** Maintenance accessways can be reached from all passageways  
Bulkhead-mounted man-portable powder fire extinguishers are placed at strategic locations  
Static-cord bail-out parachutes and flotation suits are stored near each personnel gangway