Spar buoys, ClubStead, Semi-submersible oil platforms, and Seadrome

Several things they have
in common and why

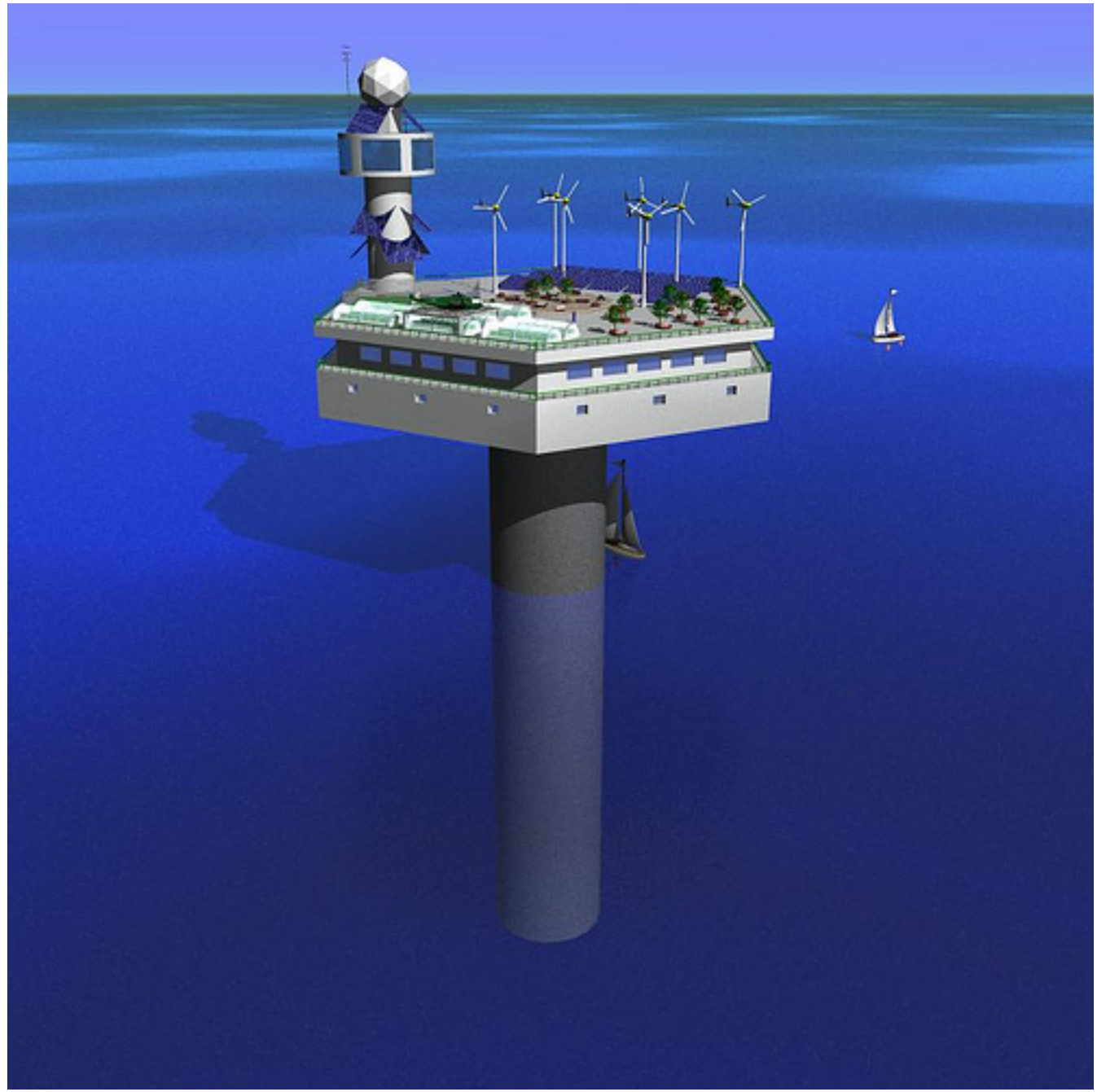
Jeff Chan
Seasteading Conference 2009

Overview

- **Spar buoy** - Marc de Piolenc, nation-builders, 2004
- **Semi-submersible oil platform** - Shell Oil, 1961
- **ClubStead** - MI&T for Seasteading Institute, 2008
- **Seadrome** - Edward R. Armstrong, 1927, U.S.

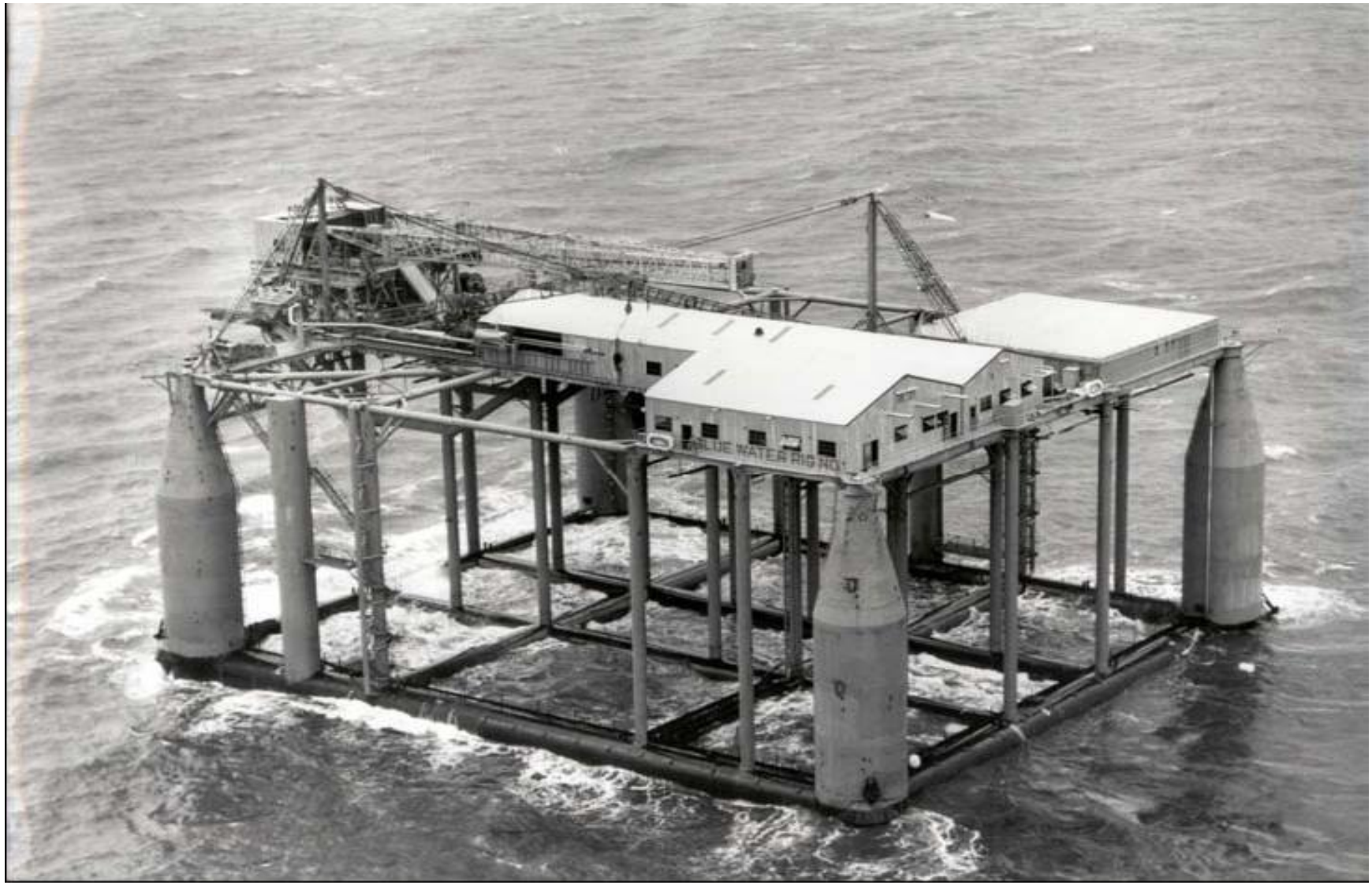
- Common design elements and reasons for them
- Differences

Spar buoy



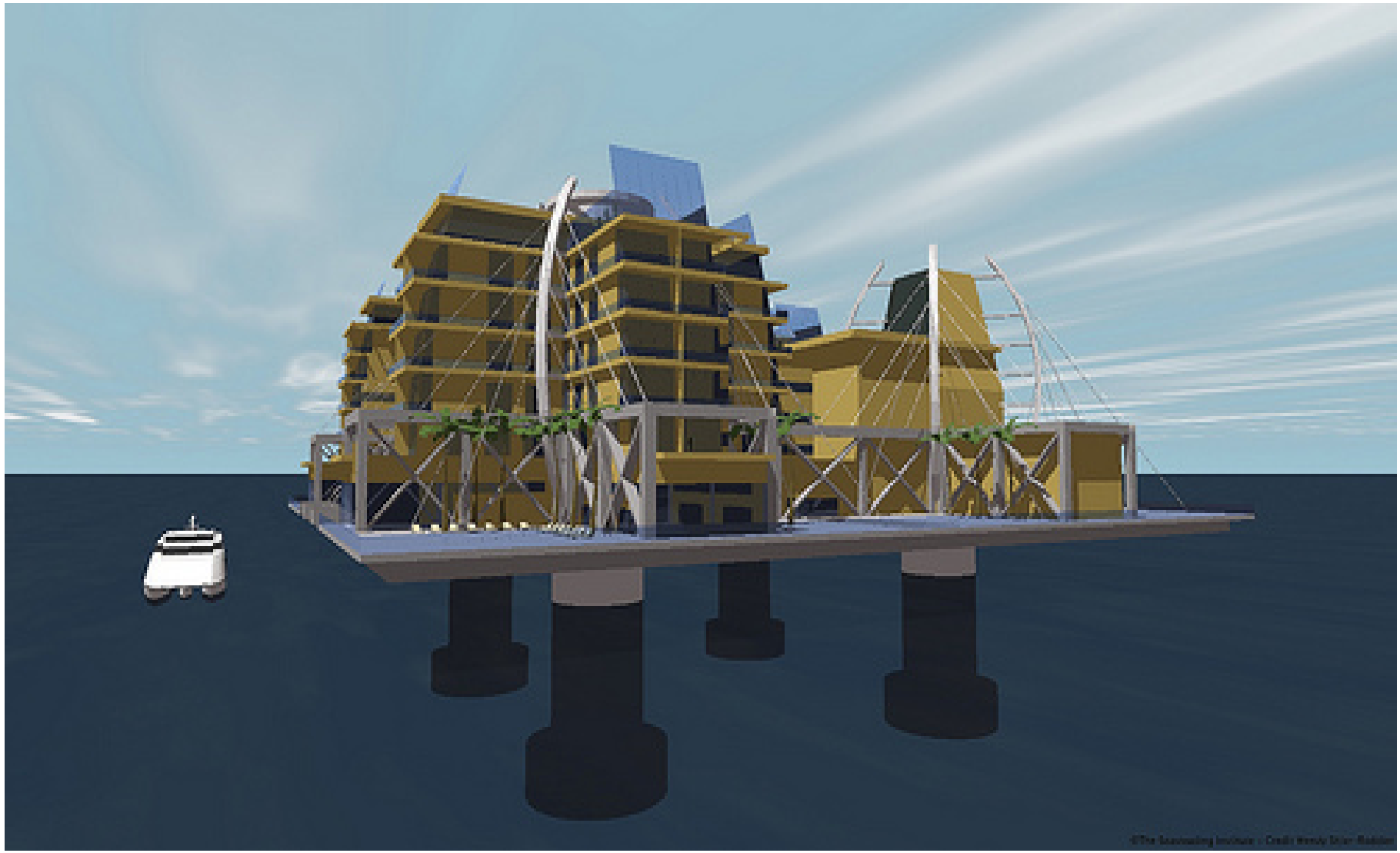
Spar Buoy
The Seasteading Institute 2008

Semi-submersible oil platform



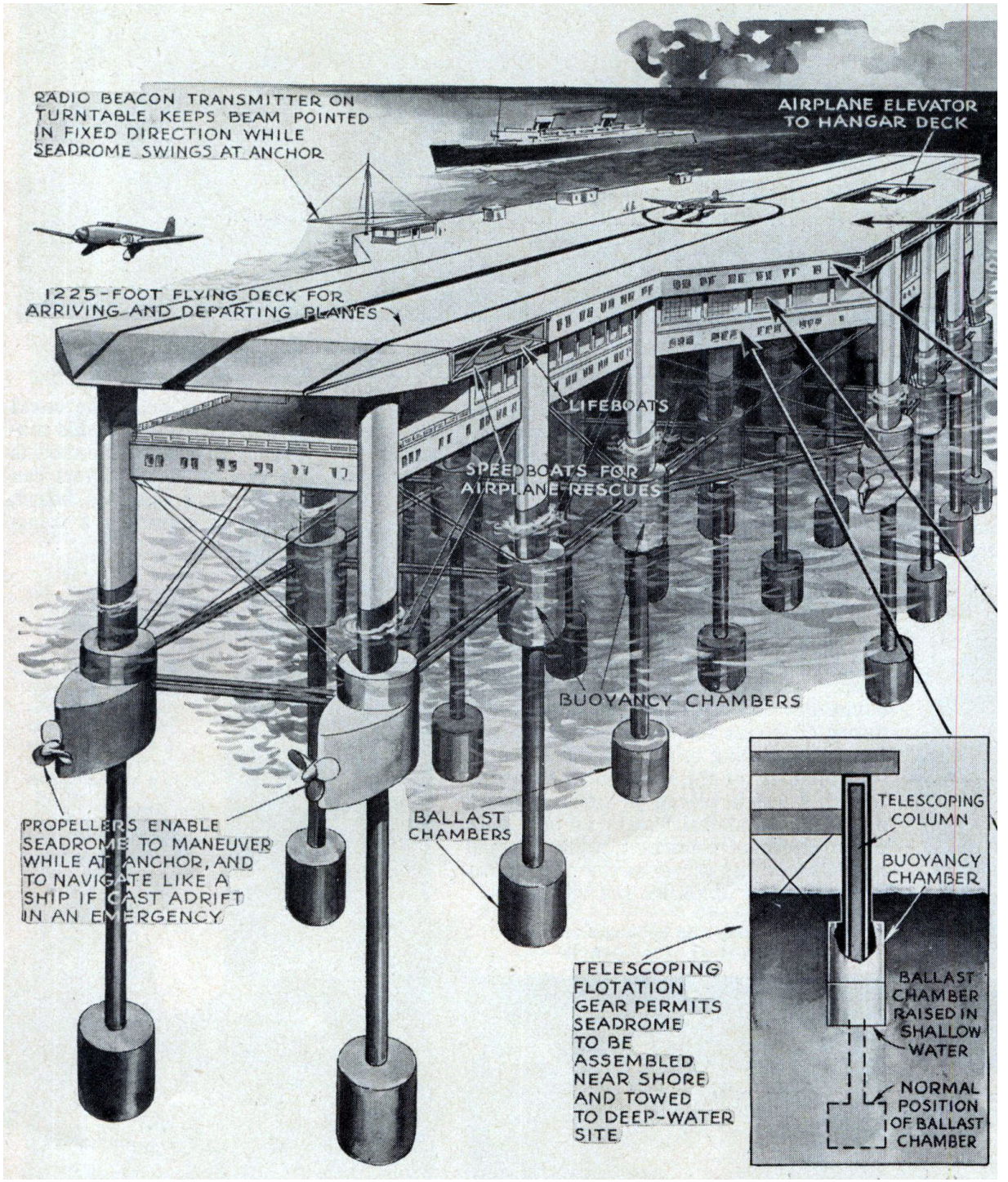
Blue Water Rig No. 1, Friede & Goldman, LTD, via Wikimedia Commons

ClubStead



ClubStead, The Seasteading Institute, 2009

Seadrome



Seadrome
Popular Science
February 1934

Seadrome

- Proposed 1927, pre-dates oil platforms and ClubStead
- Was to be a series of aircraft runways at sea before long-range aircraft existed, like a string of artificial islands between U.S. and Europe
- Similar flight deck shape, dimensions, height as modern aircraft carrier, but about 10% larger. Perhaps inspired the latter
- 1,200 feet long, 400 feet wide middle, 200 at ends

Seadrome (continued)

- Obsoleted by long-range aircraft
- Cost estimated at $10 million 1930's post-Gold, pre-crash dollars.
- Proposed just before the great depression dried up funding, but pursued until 1946
- 64,000 ton displacement
- 70 foot air gap, 160 foot draft

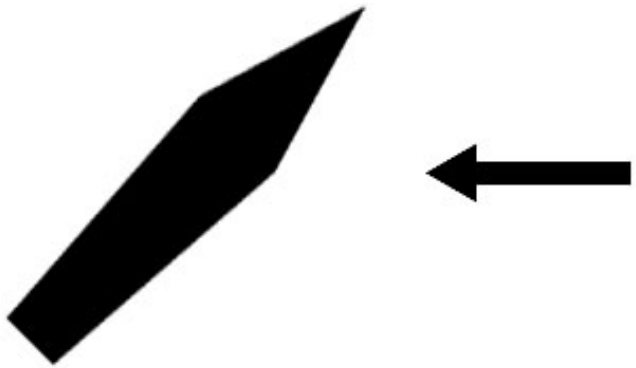
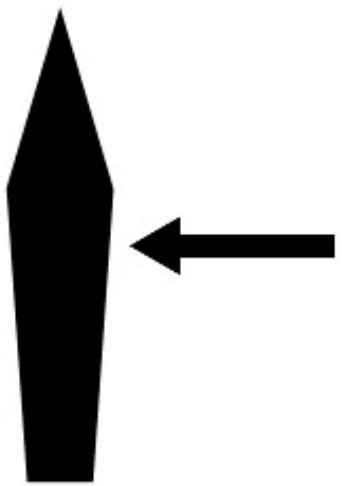
Common elements

- Vertical cylindrical floats
- Horizontal decks
- Trusses
- Heave plates

Why use vertical cylindrical floats?

- Minimize waterplane area (cross-sectional area at waterline)
- Maximize volume for buoyancy
- Minimize drag to omnidirectional waves
- Simple, strong shape
- Minimize wave response

Directional drag of shapes

Incidence angle	Cylinder	Drag	Hull	Drag
0		Medium		Low
45		Medium		High
90		Medium		High

What are trusses?

- Thin straight elements
- Connected at ends
- Usually triangular units, which resolve forces into pure compression or tension
- Can be two or three dimensional, that is planar or spatial

Why use trusses?

- Lower mass
- More efficient use of materials
- Lower displacement for floating structures
- Weight begets weight; heavier structure requires more strength to support itself, etc., etc.
- Lower weight makes some structures possible such as suspension bridges, towers, tall buildings

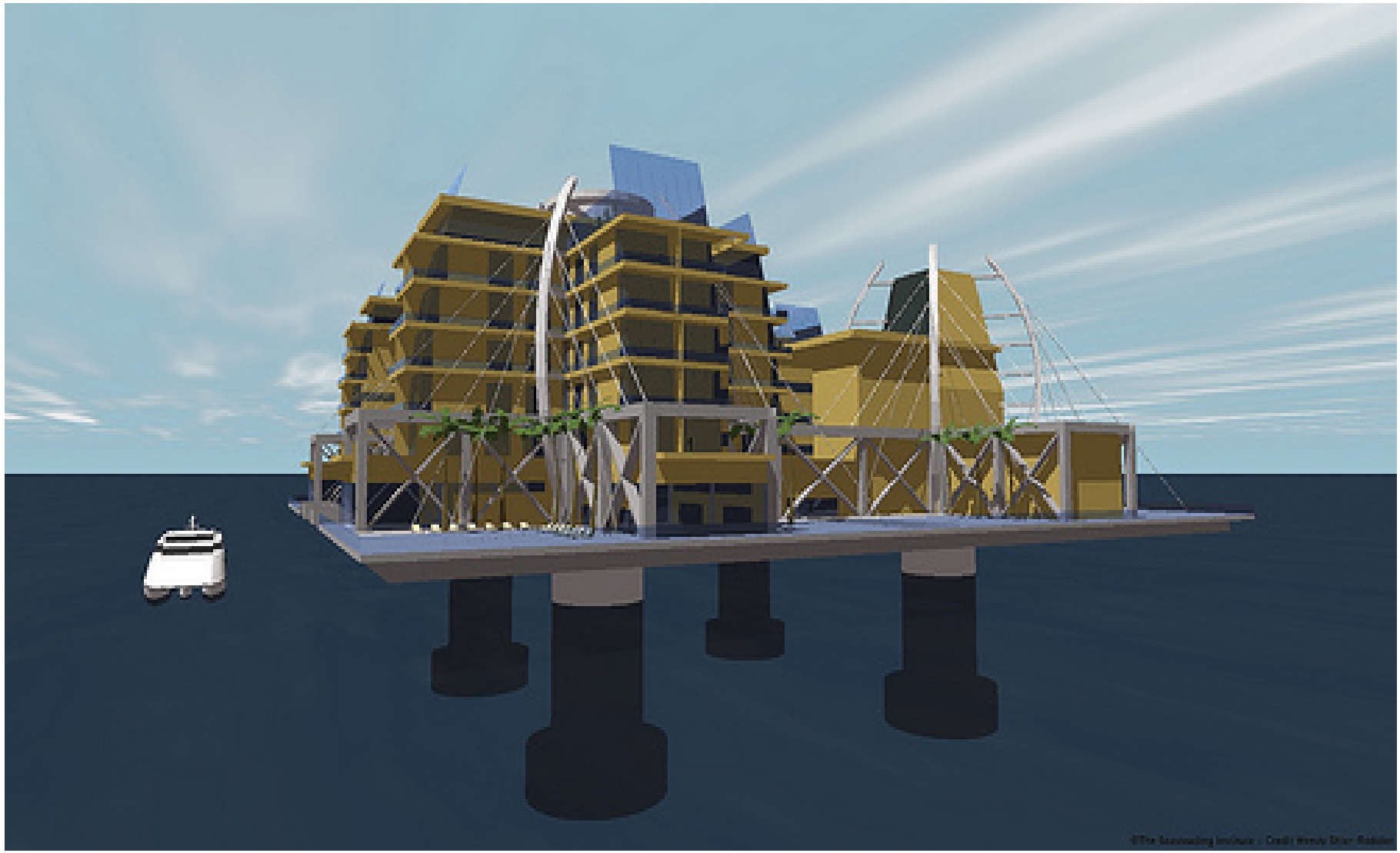
Heave plates

- Horizontal plates or shapes
- Resist movement in the heave direction (up and down)
- In other words, have high drag along the vertical axis
- Pontoon hulls on semi-submersibles probably have some anti-heave and anti-sway, but are low drag fore-aft for towing

Semi-submersible oil platform

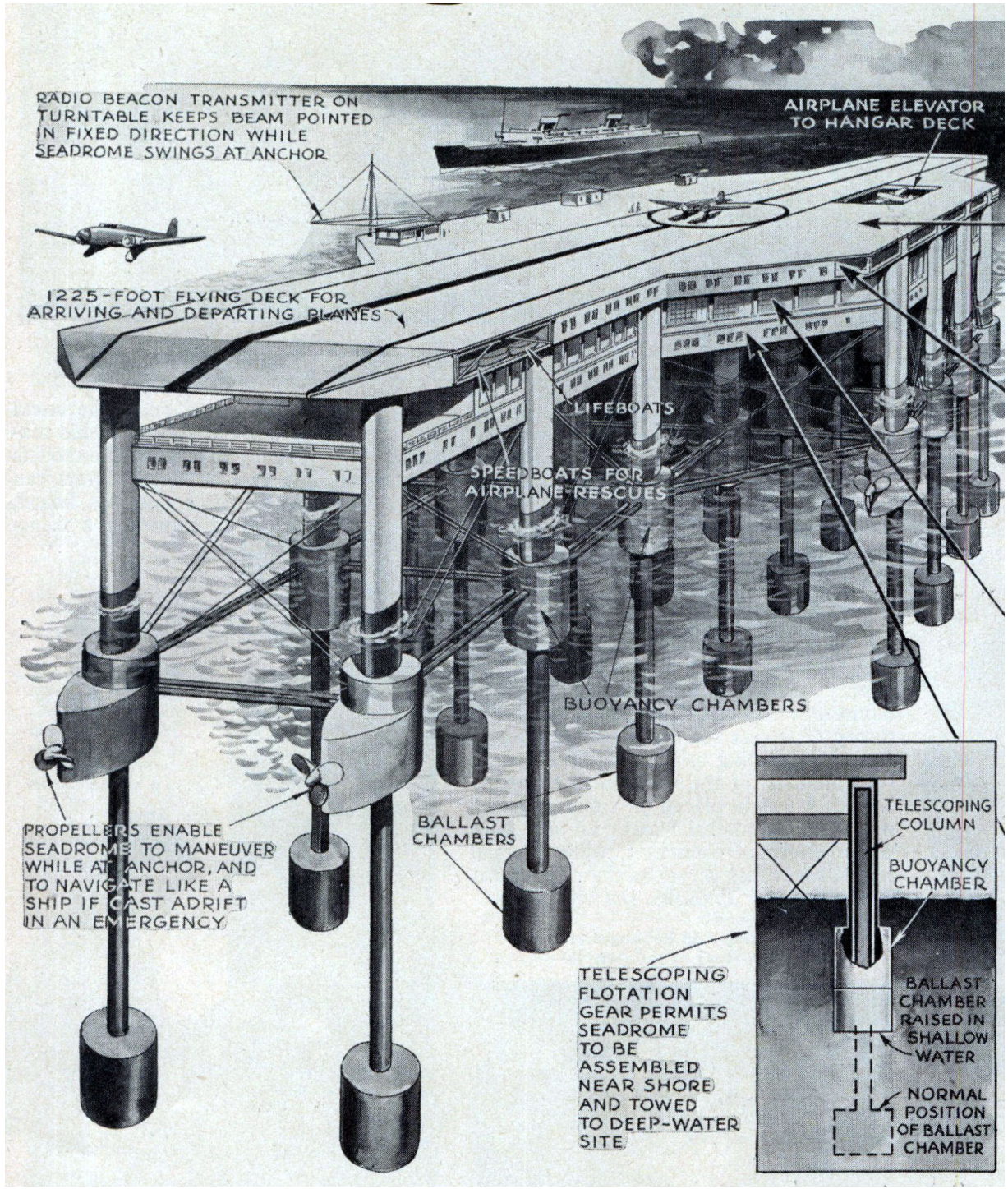
Blue Water Rig No. 1, Friede & Goldman, LTD, via Wikimedia Commons

ClubStead



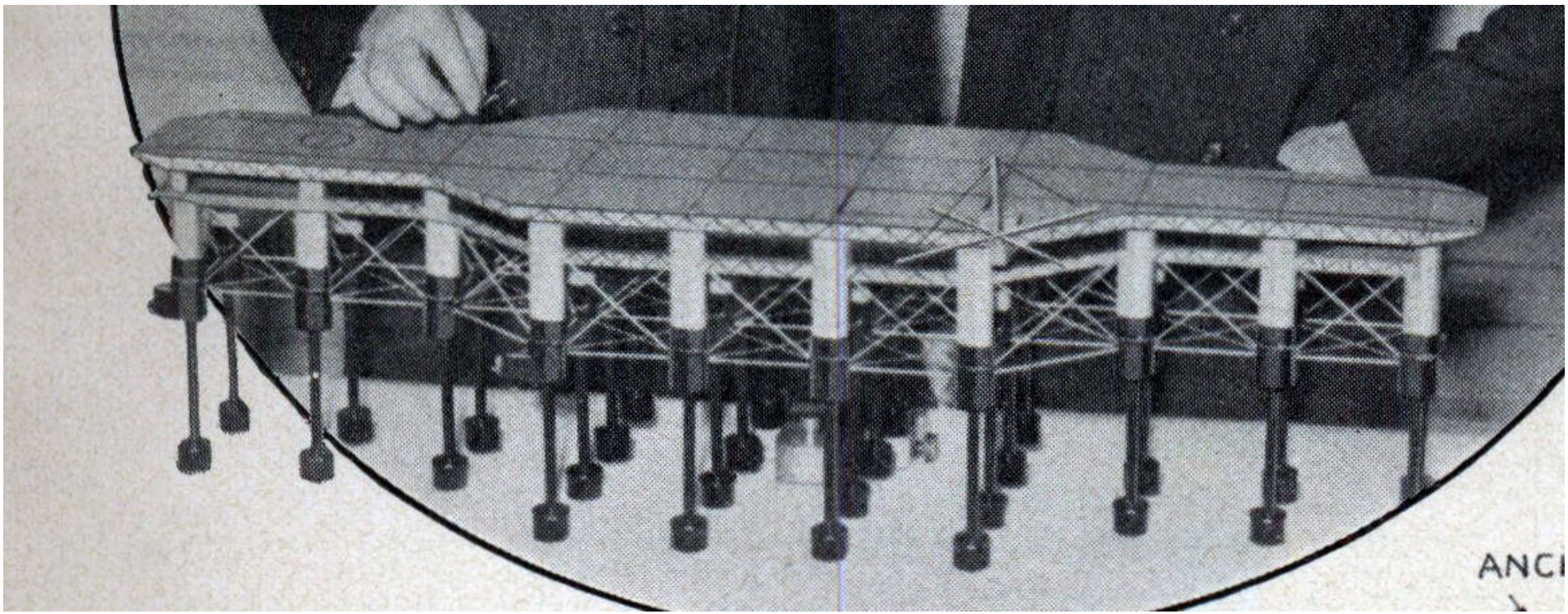
ClubStead, The Seasteading Institute, 2009

Seadrome



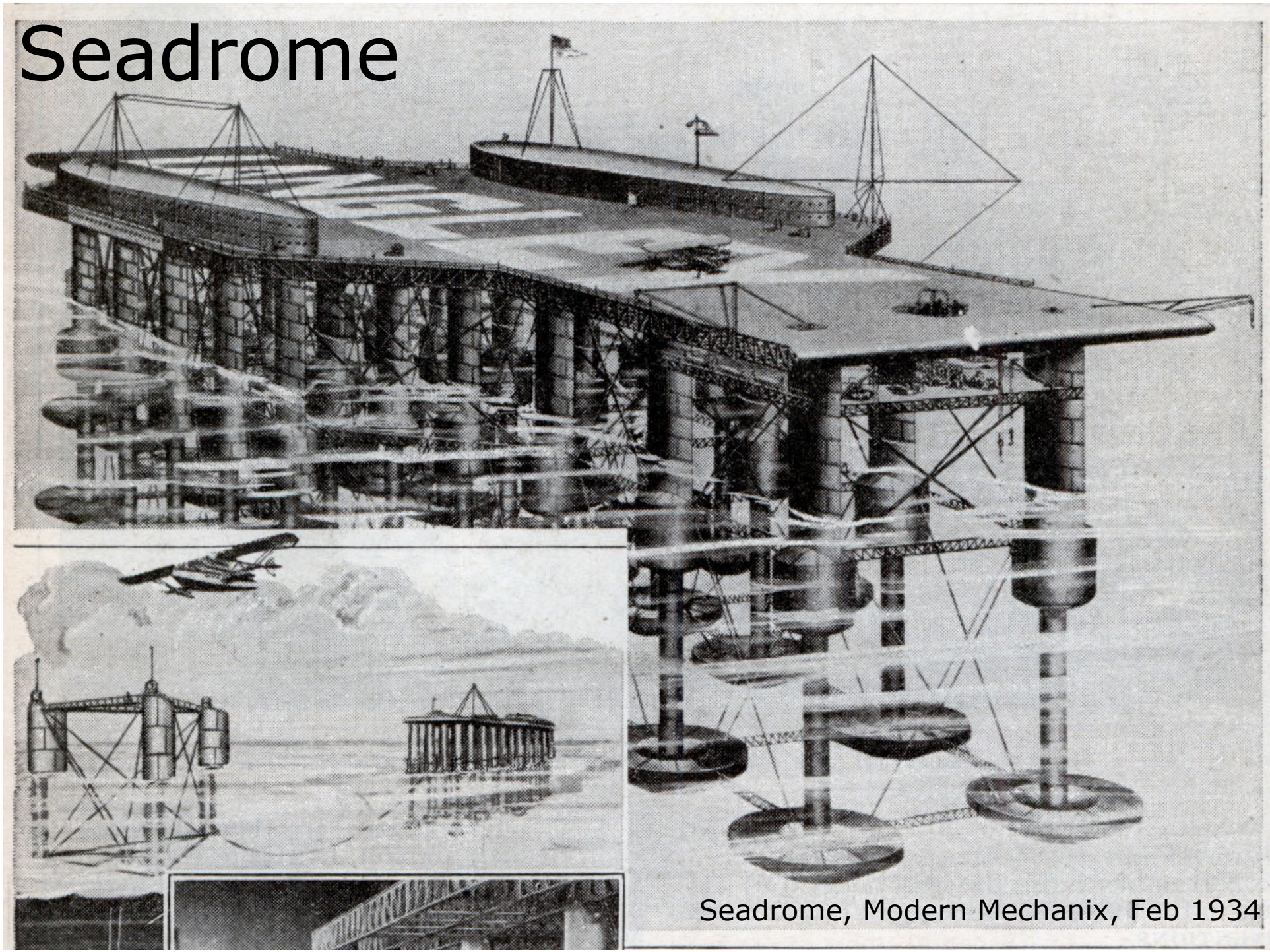
Seadrome
Popular Science
February 1934

Seadrome, side view



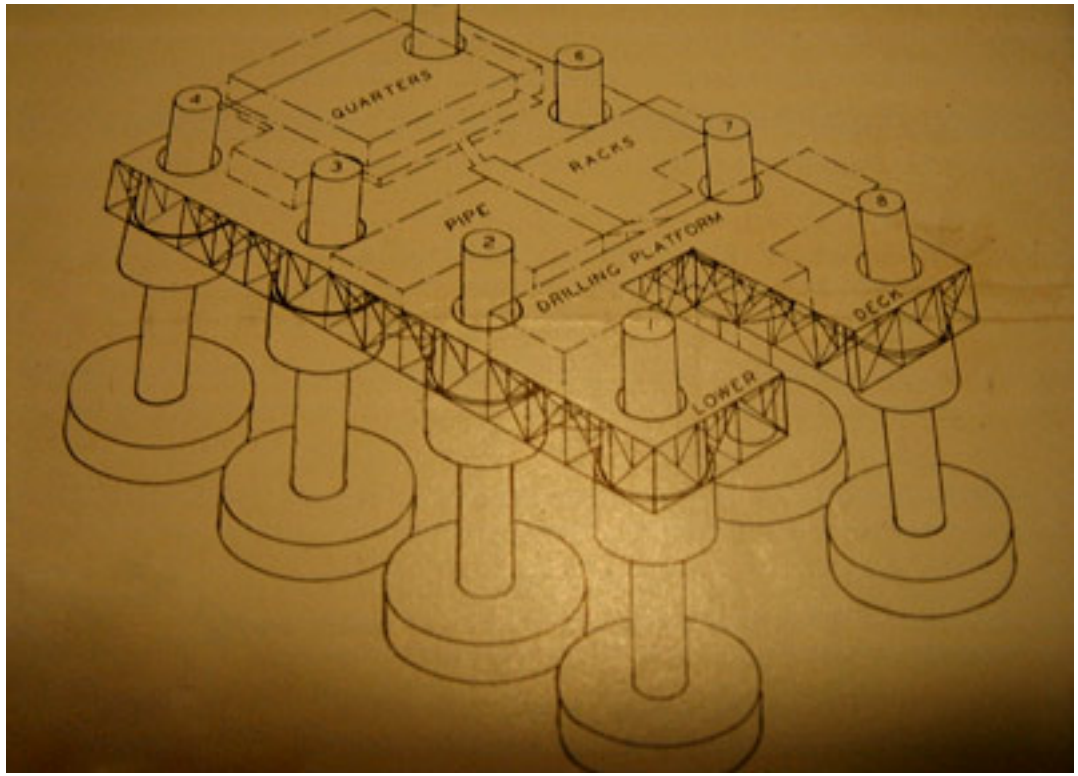
Seadrome
Popular Science
February 1934

Seadrome



Seadrome, Modern Mechanix, Feb 1934

Edward R. Armstrong, Floating oil rig



Edward R. Armstrong papers from Bruce Figarsky via History Detectives, 2009

Summary - What do these designs have in common?

- Vertical float columns - minimize wave response, simple and strong
- Horizontal decks - "land" for housing
- Trusses - lighter, stronger structures
- Heave plates - reduce uncomfortable and destructive heave motion
- Synergy - whole works better than sum of parts