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FLOATING CONCRETE PLATFORM

An Option For Land Saving

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Abstract— *Many small countries are in need of additional territory. They build landfills and expensive artificial islands. The ocean covers 70% of the Earth's surface. Those countries (or person of wealth) starting the early colonization of the ocean may obtain advantages through additional territory or creating their own independent state. An old idea is building a big ship. The best solution to this problem, however, is the provision of floating concrete platforms or structures, floating cities, islands, and states. The various author's had given a idea to use for floating structures, cities, islands and states a concrete structure.*

Numerous coastal areas of the world are over-populated and suffer from industrial pollution. Floating concrete platform appears to be an answer to these, and a wide range of other issues. Floating concrete platform technology now makes it possible to live and work on the surface of water body. Floating cities, electrical power generation stations and mid-ocean basing for the military are just a few of the possibilities for floating concrete platforms. By virtue of their great size, stability, storage capacity, and long endurance station keeping capability, floating structures will be a mid-ocean facility of great military, commercial, and scientific significance.

Keywords- *Floating Concrete, Structure, Lightweight Aggregate, submersible structure, semisubmersible structure.*

I. INTRODUCTION

A floating concrete structure is a solid body made of reinforced concrete and an inner chain of chambers filled with a lightweight impermeable material, typically polystyrene. The core of the technology of design and manufacturing of floating concrete structures is the calculation and design of the structure to produce a heavy structure, sometimes 200 tons, that meet all below requirements:

- To stay afloat, loaded or unloaded.
- To remain in the service for 20+ years.
- To stay in designated inclination for its service life no matter how load distribution, current loads, impact loads, wind loads, or tidal fluctuation are applied to the structure.
- To be reconfigurable; i.e. the owner can reconfigure the structure or even move the structure to another location.

II. FLOATING CONCRETE PLATFORMS

Many developed island countries and countries with long coastlines in need of land have for some time now been successfully reclaiming land from the sea to create new space and, correspondingly, to ease the pressure on their heavily-used land space. The Netherlands, Japan, Singapore and other countries have expanded their areas significantly through the land reclamation works. Floating concrete platforms or floating structures can be constructed to create floating airports, bridges, breakwaters, piers and docks, storage facilities, wind and solar power plant, military purposes, to create industrial space, emergency bases, entertainment facilities recreation parks, mobile offshore structures and even for habitation.

2.1 Types Of Floating Concrete Structures

a) Semi-submersible Structures
b) Pontoon Type Floating Structure

2.2 Contents Of Floating Concrete

a) Concrete Materials
b) Different admixtures used in preparation of floating concrete :Air-entraining admixtures
c) Lightweight aggregates
d) Foaming agents

2.3 Properties Of Floating Concrete

a) Light weight:
b) Compressive strength

c) Excellent acoustic performance
d) Earthquake resistant
e) Insulation
f) Workability
g) Water absorption
h) Skim coating

2.4 Different Floating Concrete Structures

a) Wind turbines
b) Floating airports
c) Floating bridges
d) Floating Breakwaters
e) Piers and Docks
f) Storage facilities
g) Wind and Solar power plants
h) Military stations
i) Industrial space
j) Emergency bases
k) Entertainment facilities
l) Recreation parts
m) Mobile offshore structures

III. SEA ENVIRONMENT

The 3 types of ocean environments include:

a) Open sea- Over 12 nautical miles from the shoreline.
b) Coastal water- Within 12 nautical miles from the shoreline.
c) Protected Water- Rivers, lakes, ponds, small water bodies, artificial water bodies, etc.

The floating structure must be far away from the shoreline, the higher the cost of construction, the increase in travel expenses of its inhabitants and the more isolated its inhabitants may feel from the rest of the country's population. The most suitable case for the site selection is coastal waters. There may not arouse the opposition and it is more enough to built the any kind of floating structure.

IV. ADVANTAGES

a) Reduced mass and improved thermal and sound insulation properties while maintaining adequate strength.
b) They are cost effective when the water depth is large and the seabed is soft.
c) Environmental friendly as they do not damage the marine ecosystem or silt-up deep harbors or disrupt the tidal/ocean currents.
d) They are easy and fast to construct (components may be made at different shipyards and then brought to the site for assembling).
e) They can be easily removed (if the sea space is needed in future) or expanded (since they are of modular form).
f) The facilities and structures on Mega-Float are protected from seismic shocks since they are inherently base isolated.
g) They do not suffer from differential settlement due to reclaimed soil consolidation.
h) Their positions with respect to the water surface are constant and thus facilitate small boats and ship to come alongside when used as piers and berths.
i) Their location in coastal water provide scenic body of water all around, making them suitable for developments associated with leisure and water sport activities.
j) Their interior spaces may be used for car parks, offices, etc.
k) There is no problem with rising sea level due to global warming.
l) The marginally higher cost of the floating concrete is offset by size reduction of structural elements, less reinforcing steel and reduced volume of concrete; resulting in overall cost reduction.
m) Reduced weight has numerous advantages; one of them is reduced demand of energy during construction.
n) Floating structure cities does not suffer from soil subsidence.

V. LIMITATIONS

a) For Columnar Platforms: Since its stability is depended on long-buoyant vertical legs, the platform has an average draft of 300-400 feet. These places a restriction on columnar platform in that must be located at sites having a water depth greater than 300-400 feet.
b) For Barge Ships: Shallow draft, in addition to being an advantage is also a disadvantage. With the expectation of the flipable barge, all other configurations have their buoyant support at or near the water surface.
c) For Tension leg Platforms: Construction and maintenance costs are extremely high. It is inherently complex and capital intensive. In addition, a requirement for periodic maintenance and inspection of the anchoring system increases the overall operating cost. It has to be buoyant under all weather conditions.
d) As structure in floating in water body the mechanism of travelling is different than land. .Large ships or boats are required for travelling. There is one option for travelling mechanism i.e. constructing floating Pontoon Type Bridges.
e) Also at the time of construction special care is taken of the structure members.
f) This type of structure requires more human power or machine power during construction in comparison with construction on land.
g) As it is difficult to built the structure on the site, the members are precast in industries, and they requires supplying mechanism to reach the construction site.
h) The well-skilled labors having proper knowledge are required.

VI. USES OF FLOATING STRUCTURE

a) Act as an option for land saving.
b) No land taxes are applicable in case on floating structures.
c) It is eco-friendly construction.
d) Sea areas can be utilized regardless of their depth or subsoil condition.
e) Existing facilities can be easily extended and it is feasible to move a floating structure to another site.
f) This kind of concept is very useful in low lying areas and flood facing areas.
g) It can overcome the problem of flood

VII. CONCLUSION

From this study we can conclude that:
a) As the land requirement for residential, commercial, industrial and rehabilitation purposes in the entire world is rapidly increasing, hence the VLFS concept is the one alternative to be adopted.
b) Also it will be helpful to the countries which have water masses spread to its land mass. As some countries have already been adopted this concept and have been tested in extreme conditions like Tsunami and Earthquakes.
c) It can be adopted in all the countries in war footing for the purpose of land reclamation.
d) Lots of researches yet have to be done in designing the VLFSs so that they can cater to the requirements even if in the adverse conditions.
e) We have an option for the residence of the increasing population all over the world.
f) We can save the land space for other purposes like agriculture.
g) As floating structure construction is not so expensive, we can build commercial buildings like water parks, entertainment facilities, etc.
h) Also, it is not so costly to build. The difference e is that it requires more advance construction techniques like precast.

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