Design for floods

WORDS

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The usual approach to house design in flood-prone land is for the planning authorities to stipulate a minimum floor level for all habitable spaces. Some even require car spaces to be above this level. The difference between the minimum floor level and natural ground is often 70 centimetres, but it can be up to 1.5 metres or more. In smaller flood basins with defined banks, the subfloor is usually required to be open, to prevent extra displacement that would cause the flood level to increase.

GROUNDED

In warmer climate zones, the loss of ground connection can compromise thermal performance and, if the elevated floor is not well-insulated, can be a big problem in almost all climate zones. While we have developed a solution to the thermal performance problem (insulated elevated slabs with draught-proof but water-

The floating house in dry times, sitting on terra firma. Another useful feature of floating houses is that the constraints enforce a tight design discipline, resulting in smaller, more efficient floor areas. Style need not be lost either–blending marine or aquatic themes into the building design the house can celebrate its adaptive character.

The floating house in flood, rising up the wharf piles, leaving the steps to ground below water, and with transport tethered to the deck.

Flexible service connections (sewer is white, water is black, power is orange) shown extended from ground through the floodwater up to the floor pontoon structure.

permeable perimeter walls), the disconnection from gardens and outdoor spaces does not aid a good functional connection to site.

On the other hand, we have been building floating structures since time immemorial. Boats are the obvious example of floating habitation, but these are principally designed for transportation. What's needed is flood-proof housing that metaphorically goes with the flow of nature, rather than fighting it. I say metaphorically, because it is essential that such houses are actually tethered to terra firma. This is the essential difference between a floating house, and a barge.

MATERIALS

The house floor structure can be made from lightweight concrete (like a ferry wharf pontoon), or lightweight materials (such as high density polyethylene cylinders under a rigid floor frame), but whichever system is used, it must be rigid (and insulated if not in a tropical climate zone). In contrast to the typical, elevated response, this house is close to ground level, adjoining outdoor spaces, and connecting directly to the street and garden.

Structurally, the tethering is not difficult. Conventional marina piles could be used at each corner – sized and embedded according to geotechnical information and the known floodwater velocity for the site.

SERVICES

Service connections are critical, particularly for wastewater. Electrical and potable water connections can easily be made with commercial components. If the property is on a centralised sewer service, a minimum 100-millimetre-diameter flexible connection is required. If the house relies on an on-site system, the system itself must be above flood level, whether attached to the house or not.

A NOTE ON THIS APPROACH

A sustainable future for our cities depends upon most people living at higher densities than detached housing can provide, and good planning dictates that higher density development should not be located in flood prone areas. My design proposition is therefore limited to low density areas; those already zoned and developed for housing, but which are now being inundated on a semi-regular basis, or to land currently zoned for residential, but which may be rezoned with revised flood zonings. S

Section through floating house showing the relatively shallow depth at which it floats, since lightweight houses are not heavy. The structure of the floor pontoon would use existing marina technology.