

A Just-in Time Mechanically Elevated Building System

Philip DeStefano^a, William L. Coulbourne, P.E.^{b*}

^a*High Tide Homes, Verona, NJ, 07044, USA*

^b*Coulbourne Consulting, Rehoboth Beach, DE, 19971, USA*

Abstract

The idea of amphibious buildings has been around a long time and has been implemented in several parts of the world for buildings with a variety of uses. The idea is rooted in Archimedes' principle which is a fundamental principle of fluid mechanics and which has a magnitude of buoyancy force based on the weight of the fluid being displaced times the volume of the fluid displaced. During a flood, when the water rises above the building floor, the buoyancy principle lifts the building toward the water surface when the water depth times the water weight becomes greater than the weight of the building. Of course, the building exterior and interior can be partially damaged by the flood water when this principle is employed.

To the author's knowledge, there are no buildings being elevated above a potential flood just before the flood arrives. This abstract presents an idea of how to eliminate any flood damage yet allow the building to be sited at or near grade in the middle of a floodplain. When a flood is anticipated, the buoyancy principle is replaced with a series of jackscrews that lift the building above the foundation as much as 8 feet when the lifting system is activated. The lifting is triggered by a smartphone or an activation device located at the building. The screws are attached to the foundation and use the foundation to push the building up using a jackscrew technology that utilizes low torque and low revolutions per minute of a small motor to turn a screw that in turn pushes the building up. The elevation process can be stopped at any point along its vertical travel using the same smartphone or triggering device used to start the process.

The elevation system is equipped with emergency power, remote cameras to provide visual access to the foundation and the surrounding site, and extensions for building connected utilities. The building structure is supported on a steel frame that is connected to the screws and it is the steel frame that is lifted. The connection of the building frame to the steel frame and the connection of the screw system to the foundation must be carefully executed so that the frame lifts easily when required, the gap created between the steel frame and the foundation is protected such that minimum flood debris can accumulate under the building while it is lifted, and the return travel is smooth so that the steel frame rests easily on the foundation once fully returned to the foundation.

The expected presentation of this idea will include an animation professionally prepared to illustrate the concept of this mechanically elevated building system. This idea is currently being presented to the International Code Council in the United States where approval for construction is being sought, and the status of this approval will be discussed.

Keywords: flood elevation; mechanically lifting; buoyancy; jackscrew

* Corresponding author

E-mail address: bill@coulbourneconsulting.com