



The economic argument for amphibious retrofit construction

Elizabeth C. English ^{a,b*}, Michelle Li ^a, Rebecca Zarins ^a, Tobias H. H. Feltham ^a

^a *University of Waterloo, Canada*

^b *Buoyant Foundation Project, USA*

Abstract

Smart economic frameworks and policies to inform investments in resilience and disaster risk reduction are receiving increasing attention. In an era of accelerating risk, communities need expanded sets of economically viable options to reduce risk and promote adaptation. Amphibious architecture utilizes low-cost buoyant foundations to provide existing structures with the ability to “float when it floods,” rather than suffer repetitive loss or be required to implement an approach such as permanent static elevation that may be both culturally and economically objectionable. Amphibious construction also offers significant economic benefits in comparison to permanent static elevation. This paper will discuss the potential for measurable cost savings that accompanies the implementation of amphibious retrofit construction, by describing 1) the installation process and why it can be so inexpensive, 2) two loss avoidance studies that were performed for amphibious retrofit installations and the range of high loss avoidance ratios that resulted, and 3) analysis of the wind vulnerability of permanent static elevation and consequent increases in expected annual loss, compared to amphibious retrofit construction.

Keywords: buoyant foundation, amphibious architecture, flood risk reduction, loss avoidance study, expected annual loss, climate change adaptation