

## Flood Resilience Code Impacts: Case Studies of Recently Completed Projects in New York City

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## 1 Abstract

The New York City area has seen a tremendous amount of investment in retrofitting existing buildings and infrastructure to enhance flood resilience following Superstorm Sandy. At the same time revisions to the FEMA maps and to the New York City code, have captured ever more buildings within the flood zones, and required these buildings to be designed to higher elevations and more resilient standards.

This paper reviews some of the impacts the appendix G requirements are having on the design of new buildings in the NYC area. Case studies are presented for recently completed new construction in A zone, Coastal A, and V zones, illustrating some of the challenges that arise, and limitations that code requirement present in a dense urban environment.

**Keywords:** Flooding; Flood resilience

## 2 Introduction

Superstorm Sandy had devastating effects on the New York City region, causing tremendous damage to building stock and infrastructure in low lying areas. The city collectively has responded with extensive repair, reconstruction and hardening projects, together with a tightening of building standards and their enforcement. Much has been written about the effects of Sandy, and the difficulties encountered through the restoration and rebuilding projects. This is a study of new build projects only, unrelated to any storm damage, and discusses some of the challenges of building in the flood plain in the New York Area.

This study includes three new build projects, two in NYC, and one just outside, selected so that we have one each in A-zone, Coastal A-zone, and one in the V-zone. At the time of writing, the city has appealed the new preliminary flood insurance rating maps (PFIRM), and so has not formally adopted these, however the building code requires the design flood elevation from the PFIRM to be used where it exceeds the height in the adopted maps. This leads to an interesting situation where the DFE for some buildings in the flood zone, could be revised in the future maps, when adopted.

In the rebuilding efforts after sandy there was much discussion about implementing the FEMA guidelines in a dense urban environment like NYC, and how this may lead to challenges when the guidelines were developed in less dense