



CITY OF BELVEDERE

Memorandum

August 7, 2015

TO: City Council

FROM: Eric Banvard, Building Official/Flood Plain Administrator

SUBJECT: Information regarding benefits of floodplain freeboard requirements

Freeboard Information

The City of Belvedere's Floodplain Management regulations are found in the Belvedere Municipal Code (BMC), Chapter 16.20 of Title 16. Belvedere participates in the National Flood Insurance Program (NFIP) and therefore these regulations must conform to minimum standards established at the Federal level that are administered by the Federal Emergency Management Agency (FEMA). Local agencies are allowed and encouraged to provide a higher level of protection from flood related damage than the minimum Federal standards.

A common example of this is what is referred to as freeboard, which for purposes of floodplain management is a factor of safety usually expressed in feet above a given flood level.

Neither FEMA nor the CA Department of Water Resources (DWR) requires freeboard, however both strongly encourage that it be included by local jurisdictions in their regulations. FEMA encourages a minimum of 1' of freeboard while the CA DWR encourages 2' of freeboard. Belvedere's Floodplain Management regulations currently require 1' of freeboard, an extra elevation requirement above the Base Flood Elevation (BFE).

Reasons why providing some amount of freeboard makes good sense:

- Freeboard provides an increased level of protection. Those who have seen the damage even one inch of water inside a home will do to possessions and the building itself can appreciate why being further above the BFE would be an advantage.
- Storms can and do rise higher than shown on Flood Insurance Rate Maps (FIRMs). Freeboard gives a margin of error that helps protect buildings and their contents from floods that exceed the BFE of the statistical flood modeling.

- Freeboard gives a cushion of protection today that will allow increases in flood heights due to potential climate change and sea level rise to be mitigated, keeping the finish floor and dwelling's possessions out of harm's way for more years to come in the long term.
- Freeboard greatly reduces the cost of a properties flood insurance premium. See the following example from a State of Maryland handout:



Examples of savings on NFIP1 with freeboard

		Annual savings in NFIP premiums	Savings over 30-year mortgage		Annual savings in NFIP premiums	Savings over 30-year mortgage
Zone V ²	1' freeboard	\$2,565 (33%)	\$76,950	Zone A ³	\$725 (46%)	\$21,750
	2' freeboard	\$4,310 (56%)	\$129,300		\$984 (63%)	\$29,520
	3' freeboard	\$5,160 (67%)	\$154,800		\$1,074 (68%)	\$32,220

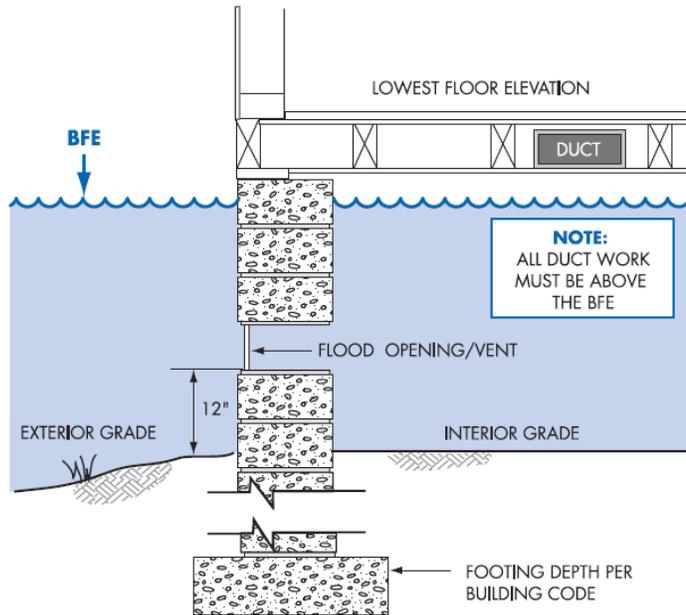
¹ NFIP premiums based on October 2010 rates for a one-floor residential structure with no basement built after a FIRM was issued for the community (post-FIRM rates differ from pre-FIRM rates). \$500 deductible/\$250,000 coverage for the building/\$100,000 for contents.

² Zone V: This Flood Insurance Rate Map (FIRM) designation refers to coastal areas that are subject to the highest levels of wave energy and flooding.

³ Zone A: Also a FIRM designation, these areas are subject to flooding but with less wave energy than Zone V (i.e., wave heights less than 3 feet).

- The extra construction expense of incorporating freeboard into a new structure is generally 0.25% to 1.5% of the total construction costs for each foot of added freeboard (per a 2006 FEMA-commissioned study). The minor resulting increase in monthly mortgage payments is generally more than offset by savings in NFIP premiums. The study indicates that the straight line payback for the freeboard costs is typically not more than 3 years in a VE Zone or 10 years in an AE Zone.
- Freeboard is a rating factor in the NFIP's Community Rating System (CRS) rankings. Jurisdictions that participate in the CRS get points toward better rankings when they mandate at least 1' of freeboard in their Floodplain Management regulations. Better rankings reduce flood insurance rates for the community as a whole, for all rate-payers, whether their home is elevated or not. Belvedere is currently working toward participation in the CRS.
- Lastly, freeboard in an AE Zone makes it easier to construct floor systems and their components with common construction methods and materials by elevating the floor system materials above the BFE. Without freeboard one can build the lowest habitable floor with the top of the finish floor at the BFE. In other words

the entire floor assembly would be under water during a flood event where the water reaches the BFE level. A top-at-BFE floor system requires that the entire floor system and everything within it must be built of materials that are on FEMA's approved list of flood resistant materials. These are materials that can be submerged in flood waters for up to 72 hours without sustaining significant damage, i.e. damage that requires more than minor cosmetic repair. While it is technically possible to achieve a flood damage resistant floor system, it is difficult and costly to design and build when compared to conventional materials and methods. See the accompanying illustration showing a floor system completely above the BFE:



Such a design allows the floor framing, insulation, wiring, ductwork, etc. to be constructed of conventional materials. This is more straight forward, and less costly to design and construct than with flood resistant materials.