

GG106-14

202, 402.2.3

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Add new definitions as follows:

SECTION 202 DEFINITIONS

FLOOD INSURANCE RATE MAP. An official map of a community on which the Federal Emergency Management Agency has delineated both the special flood hazard areas and the risk premium zones applicable to the community.

SPECIAL FLOOD HAZARD AREA. The land area subject to flood hazards and shown on a Flood Insurance Rate Map or other flood hazard map as Zone A, AE, A1-30, A99, AR, AO, AH, V, VO, VE, or V1-30.

Revise as follows:

402.2.3 Development in flood hazard areas. New buildings, structures and *substantial improvements* constructed in *flood hazard areas* shall be in compliance with Section 1612 of the *International Building Code* provided the lowest floors are elevated or dry floodproofed to not less than 1 foot (25 mm) above the elevation required by Section 1612 of the *International Building Code*, or the elevation established by the jurisdiction, whichever is higher and, if located in riverine flood hazard areas, it has been demonstrated through hydrologic and hydraulic analyses performed by a registered design professional in accordance with standard engineering practice that the proposed buildings and structures, including associated grading or fill, when combined with all other existing and potential future flood hazard area encroachments, will not result in any increase in flood levels during the occurrence of the design flood and will not increase the floodwater velocity at the project site.

Exception: New buildings, structures and substantial improvements in flood hazard areas designated on the Flood Insurance Rate Map as Zone AO or Zone AH.

Reason: The costs of recovering from floods are the highest of all natural disasters and even with substantial federal, state and local government risk management efforts damage costs are on a steady upward trend. One of the reasons that the costs associated with flood recovery are increasing is encroachments into the floodplain (Galloway, 2013). Current minimum standards of the National Flood Insurance Program and the International Code Series -- and the current *International green Construction Code* -- allow encroachments into riverine floodplains that can cause up to a foot of increased flooding (see figure 1 below). These encroachments on-average pinch in conveyance areas to half their normal width, increase flood velocities by one-third and cause the extent of the flood hazard area to increase by 10 percent (Luloff, 2013).

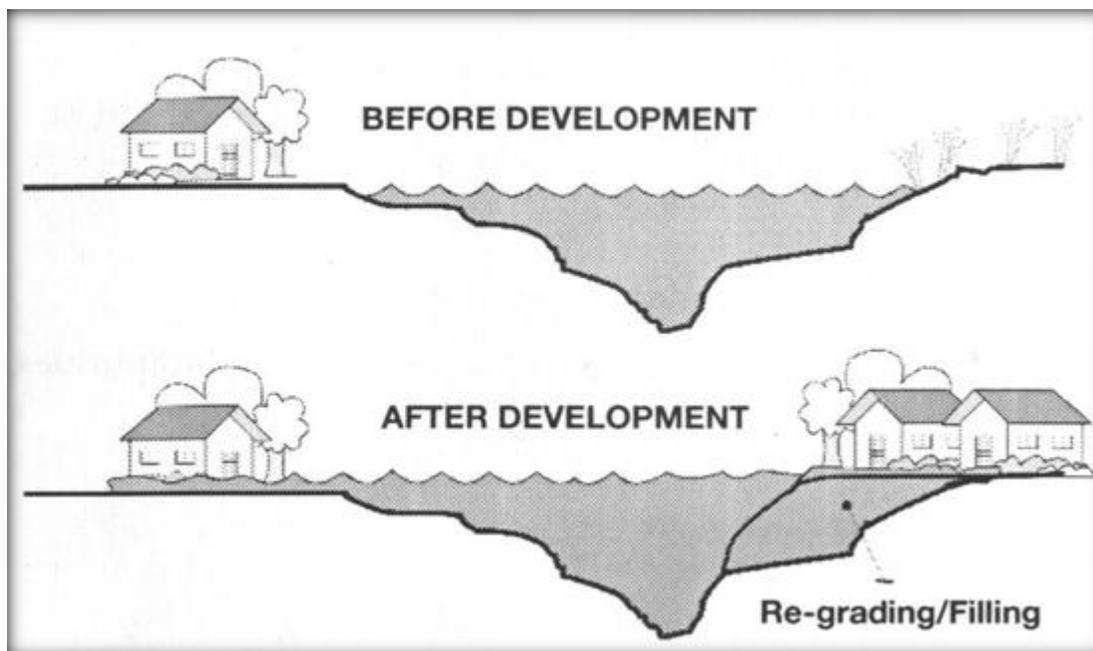


Figure 1- impact of encroachments into riverine flood hazard areas

It is important to note that this section, as written, only applies in riverine flood hazard areas, not in areas subject to coastal flooding where encroachments such as fill do not affect the base flood elevation in the same way they affect riverine floodplains.

The engineering analysis methods required by these revisions are routinely used by civil engineers and the engineering models used are available in the public domain. FEMA provides guidance on the use of these engineering models on their web site. The engineer conducting the analysis basically runs the analysis without the proposed encroachment (pre-development condition), and then uses the model to show the effect of the encroachment. The engineering model output shows the resulting differences in both flood elevations and flow velocities.

Construction that encroaches into the floodplain negatively impacts floodplain ecosystems and infringes upon the property rights of others by increasing flooding for existing development. A basic property legal principle that dates back to ancient Justinian (Roman) law is: "Sic utere tuo ut alienum non laedas", or "so use your own property that you do not injure others". Allowing new development that increases flood elevations and velocities on existing development injures others and therefore violates their property rights.(Kusler and Thomas, 2007; Thomas and Medlock, 2008) In addition, construction that encroaches into the floodplain is a public safety concern. Not only does it risk the health and safety of homeowners and their neighbors it puts at risk emergency response personnel that are called upon to rescue people trapped by flood water. More deaths are caused by flooding than any other natural disaster even though there is better knowledge about where flooding will occur than where tornados will strike, where forest fires will flare up and where the earth will quake.

Allowing new development to encroach into floodplains and increase flood elevations also impacts that long-term viability of the community. Allowing increased flooding increases costs for maintaining infrastructure (roads, bridges, sewer and water, pumping stations) and often results in blighted areas and commercial operations being closed for periods of time.

This revision is consistent with the National Flood Insurance Program which explicitly supports community standards that are higher than the federal minimum. One of the mechanisms FEMA uses to provide financial incentives to communities that adopt higher standards is the Community Rating System (CRS). Communities that adopt this component of the IgCC could be eligible for up to 110 points under the CRS program. Seven States and significant number of communities have restrictions on encroachments that go beyond the federal minimum.

These code revisions will help ensure that this "green" building code serves to prevent building construction that increases flooding on existing development or negatively impacts floodplain ecosystems. It should be noted that while these revisions minimize adverse impacts there are areas of the SFHA in which there is little or no velocity and therefore these revisions will not preclude any and all development in the SFHA.

The proposal in Section 402.2.3 closes an often exploited aspect of hydrologic and hydraulic analyses that allows an engineer to manipulate the roughness coefficient to obtain favorable results. For example, if an analysis shows that a proposed development with encroachment will increase flooding by a 0.3 of a foot trees could be removed to decrease friction to offset the increase. However, in doing so the flood water is sped up - in other words the velocity is increased (which in itself is a hazard because of increased scour, erosion, and hydrodynamic loads). Requiring no increase in flood velocity in addition to no increase in flood elevation closes this loop hole.

Bibliography:

Galloway, Gerald, 2013. Plenary presentation at Association of State Floodplain Managers Nation Flood Conference, June 13, 2013.

NOTE: This version of the code change proposal has been updated to include all reported errata.

Kusler, Jon, Thomas, Edward, 2007. No Adverse Impact and the Courts: Protecting the Property Rights of All.

Luloff, Alan, 2013. The Floodway Encroachment Standard: Minimizing Cumulative Adverse Impacts.

Thomas, Edward and Medlock, Samantha, 2008, Mitigating Misery: Land Use and Protection of Property Rights Before the Next Big Flood.

Cost Impact: Will increase the cost of construction. In floodplains where the NFIP and the I-Codes already require analysis of the effect of encroachments, there will be no additional cost associated with preparation of the analysis. There is an additional cost in the other areas. Long term cost savings to the homeowner and community could be substantial due to reduced flood damages recognizing that in some instances items damaged are irreplaceable (family heirlooms, photographs, etc.).

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