

# **Floodplain Management Using the Advisory Base Flood Elevations (ABFEs): Questions and Answers**

**Prepared by FEMA Mitigation, Biloxi (MS) Field Office, February 2006**

## **1. What are the standards for floodproofing non-residential buildings that are not elevated?**

New construction or substantial improvement of non-residential buildings located in a Special Flood Hazard Area (SFHA) are required to have the lowest floor, including basement, elevated at or above the base flood elevation (BFE). However, non-residential buildings that are NOT located in a V or VE Zone, may be flood-proofed in lieu of being elevated provided that all areas of the building below the BFE (plus any community free board) elevation are water tight with walls substantially impermeable to the passage of water, and use structural components that have the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered professional engineer or architect must certify that designs and method of construction are in accordance with accepted standards provided in Code of Federal Regulations (CFR) 44, Section 60.3.

For additional information, please see Technical Bulletin 3-93 *Non-Residential Floodproofing-Requirements and Certification for Buildings Located in a Special Flood Hazard Area in accordance with the National Flood Insurance Program* located at:

<http://www.fema.gov/pdf/fima/job6.pdf>

## **2. Please explain exactly the red line (1.5-foot breaking wave) on the current Advisory Base Flood Elevation (ABFE) map.**

The red line on the Katrina Recovery Maps serves two purposes. First, it is an Advisory Base Flood Elevation (ABFE) contour, which provides a whole-foot advisory elevation for structures located seaward of this line and landward of the adjacent yellow line (ABFE contour line). Second, the line shows FEMA's estimate of the landward limit where the stillwater (surge-only) flooding would be deep enough to support a 1.5-foot wave. The reasons for showing this line, in addition to the 3-foot breaking wave line (orange line) currently being added to the maps (see Question 3), are explained below.

The National Flood Insurance Program regulations identify V or VE Zones as areas subject to flooding with high velocity wave action, usually mapped wherever the wave height component of flooding is 3 feet or greater. (Note that other factors are also used to identify VE zones, including wave run-up, wave overtopping, and Primary Frontal Dunes.) However, laboratory tests and field observations of building performance following numerous hurricanes (including Opal in 1995, Georges in 1998, Ivan in 2004, and Dennis in 2005) have shown that waves as small as 1.5 feet in height can cause structural damage to buildings with slab-on-grade or solid, perimeter-wall foundations.

FEMA's *Coastal Construction Manual* (FEMA 55) and other guidance documents advise property owners, design professionals, and local officials to consider mitigating against moderate but damaging waves and scour in these "coastal A Zones," where waves are 1.5 to 3 feet in height. The NFIP regulations and the official flood maps do not currently identify these zones as anything other than normal AE Zones or require any special design or construction considerations. As a result, FEMA chose to show the estimated 1.5-foot wave zone on the Katrina Recovery Maps to aid map users in identifying where damaging waves may be possible based on the depth of the surge flooding.

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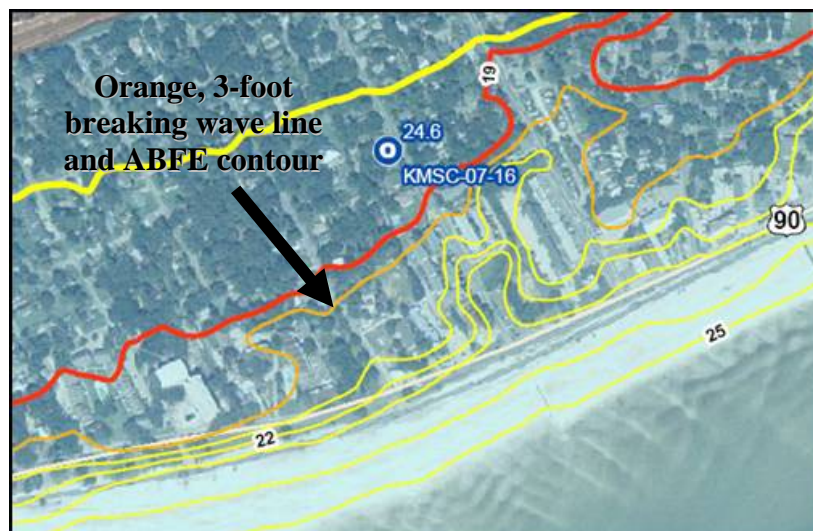
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Like the 3-foot-breaking wave zone described in Question 3 (below), this 1.5-foot wave zone does not take into account dense vegetation, buildings, or other features that may serve as obstructions to wave growth – this type of detailed engineering analysis is done when conducting a full Flood Insurance Study, which accompanies the Flood Insurance Rate Maps (FIRMs). For the ABFE maps, FEMA’s engineers were able to remove wave effects from ABFEs in a few restricted areas across the state where significant waves were highly unlikely to form; however, not all areas could be evaluated in detail. Therefore, **there may be areas where the 1.5-foot wave limit has been overestimated**; engineering judgment should be used to evaluate potential obstructions to wave growth and to adapt the wave zone delineation locally. The limitations of the wave-zone mapping method are, in part, why FEMA has not attached any regulatory requirement to this zone and chose to show the data for advisory purposes only.

### 3. Elaborate upon when the revised maps with the V Zone line will be published and graphically what the 3-foot breaking wave line will look like (orange line)?

In response to requests from state and local officials, FEMA has revised the Katrina Recovery Maps issued in November to add a 3-foot breaking wave line and to remedy offsets in ABFEs at county boundaries and open coast/back bay transitions. These changes required considerable engineering analysis and manual editing of map features, which took several weeks to complete. The revised maps and updated GIS data are currently available at [www.fema.gov](http://www.fema.gov).

The 3-foot breaking wave line is shown as an orange line on the Katrina Recovery Maps (see prototype below). Like the red 1.5-foot wave line, it will represent both an ABFE contour and the estimated landward limit where the depth of stillwater (surge-only) flooding is sufficient to support a 3-foot breaking wave. Areas seaward of the orange line are where waves 3 feet or greater in height are possible. *While this new zone on the Katrina Recovery Maps is based on one of the methods used to map V or VE Zones on official Flood Insurance Rate Maps (FIRMs), the advisory zone is not the same as a regulatory V or VE Zone.*



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In a Flood Insurance Study, detailed engineering analyses are performed to calculate wave effects along closely spaced coastal transects. In addition to using topographic data along the transects, these analyses take into account dense vegetation, buildings, or other features that may serve as obstructions to wave growth. To be mapped as a VE Zone, the wave heights calculated along the transect must be 3 feet or greater. FEMA's guidelines also require that, where applicable, wave run-up, wave overtopping of seawalls or other vertical structures, and Primary Frontal Dunes must also be considered when mapping V or VE Zones.

For the Katrina Recovery Maps, topography was the **only** factor used to calculate wave height. Because time limitations did not allow for detailed analyses to be performed, neither obstructions to wave growth nor other VE Zone-defining criteria were considered. Therefore, **there may be areas where the 3-foot breaking wave zone has been overestimated on the Katrina Recovery Maps.** For these same reasons, **this advisory zone may also appear more conservative in some areas than VE Zones that will be mapped on forthcoming FIRMs.** In the interim, engineering judgment should be used to evaluate potential obstructions to wave growth and to adopt the 3-foot breaking wave zone delineation locally. All of the factors that contribute to or restrict wave growth will be evaluated in detail in the revised Flood Insurance Studies being conducted for the Mississippi Gulf Coast and other areas impacted by Hurricanes Katrina and Rita.

## **4. What insurance ramifications will there be for municipalities that adopt the 1.5 foot wave action line vs. the 3 foot wave action lines?**

There are no insurance ramifications or NFIP eligibility issues that will result from non-adoption of the wave zones depicted on the Katrina Recovery Maps. Adopting the wave zones may help to reduce flood insurance premiums because the advisory risk is higher than the legislated (adopted) risk (including wave heights). Flood Insurance rating tables are based on the following: the higher above the BFE a building is protected, the lower the risk and the lower the rate.

Communities that participate in the Community Rating System (CRS) program may receive credit for adopting higher regulatory standards by adopting the wave zones. There also can be significant credit available for adoption of V Zone standards in areas subject to velocity wave action flooding that are beyond the limits of the adopted V or VE Zones and/or A Zones.

## **5. Please explain that non-structural fill may indeed be used in a V Zone, and what the process is to do so.**

Non-structural fill is allowed in a V or VE Zone for minor landscaping and site drainage as long as fill does not interfere with free passage of floodwaters and debris beneath building, or cause changes in flow direction during coastal storms that could result in damage to buildings on the subject property or to adjacent properties. Typically, placement of non-structural fill in V or VE Zones is addressed with appropriate engineering oversight and certification that the above conditions are maintained.

However, structural fill in V or VE Zones is prohibited. Structures located in a V or VE Zones must be elevated on pilings or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding pilings or columns) is elevated to or above the base flood level. In addition, the

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pile or column foundation and the attached structure must be anchored to resist flotation, collapse, and lateral movement due to the combined effects of wind and water loads acting simultaneously on all building components.

For additional information, please see Technical Bulletin 5-93 *Free-Of-Obstruction Requirements for Buildings Location in Coastal High Hazard Areas in accordance with the National Flood Insurance Program* located at <http://www.fema.gov/pdf/fima/job10.pdf>.

Also see Technical Fact Sheet No. 2 *Summary of Coastal Construction Requirements and Recommendations* located at [http://www.fema.gov/fima/mat/pdfs/fema499/hgcc\\_fact02.pdf](http://www.fema.gov/fima/mat/pdfs/fema499/hgcc_fact02.pdf).

## **6. Include an explanation regarding the ability to actually elevate an entire block, as long as it doesn't negatively affect neighbors. We're especially interested in this if it is a way to restore existing main streets that would otherwise be lost.**

As discussed in the previous item, elevating structures in a SFHA with the use of fill is limited to structures located in A Zones. If a structure is located in an A zone, then it would have to be elevated to meet A zone requirements. If a structure is located in a V or VE Zone, it has to be elevated to meet V or VE Zone requirements. For example, structures located in V or VE Zones are required to elevate on piles or columns. Whether elevating an entire neighborhood or one block, if it is located in a SFHA area, elevation requirements will have to be followed based on the flood zone of the location.

In addition, this process could occur under some very restrictive circumstances and could result in a letter of map change (LOMC). If a LOMC resulted in changing a structure from a V or VE Zone to an A Zone, then alternative types of foundations, such as fill, could be considered. If a LOMC results in changing a structure from a V Zone to an X Zone, then the requirements for development in a SFHA would not apply.