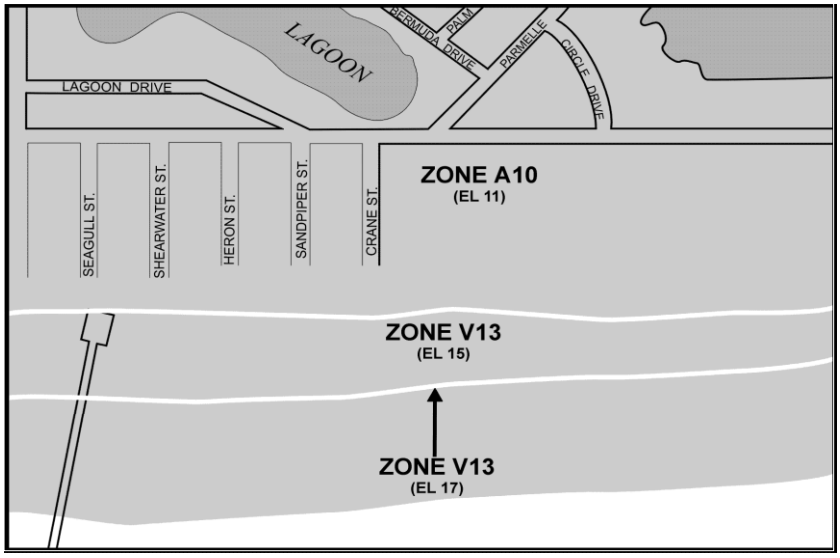
CRS Credit for Coastal A Zone Regulations

Background

Coastal FIRMs depict A Zones the same way as inland FIRMs do. There is no designation for a "Coastal A Zone". Likewise, NFIP regulations treat building standards for A Zones in riverine and coastal areas the same.

The V Zone is known also as the Coastal High Hazard Area (CHHA), and extends from offshore to an inland limit based on one or more mapping criteria. The mapping criteria relate to high velocity wave action effects (e.g., the 3-foot breaking wave height, the 3-foot wave runup depth, or a wave overtopping rate exceeding a threshold rate), and to the physical presence of a primary frontal dune (PFD).



Coastal floodplain on a FIRM

The A Zone is that portion of the SFHA that is not subject to high velocity wave action during the base flood and is not designated as Zone V due to primary frontal dune considerations. The source of flooding in an A Zone can be a stream or river that overflows its banks; a lake; or coastal storm surge accompanied by wave heights and wave runup depths less than 3 feet.

NFIP building standards in Coastal A Zones are identical to those in riverine A Zones. A coastal building in an area subject to a 2.9 ft breaking wave height during the base flood would be mapped today as an A Zone, and conformance with A Zone building standards only would be required – despite the fact that breaking waves of that size are capable of destroying or heavily damaging typical residential wood-frame walls which could be used as foundation walls in an A Zone.

In recognition of the problem, CRS encourages local governments to adopt regulations that require the foundation design in a Coastal A Zone comply with the more stringent requirements applied to V Zones.

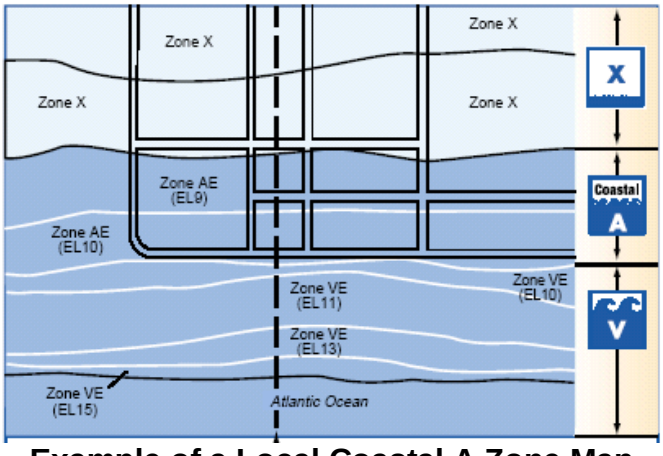
The "Coastal A Zone" is a term that is used to draw a distinction between coastal and inland A Zones, and to highlight similarities between V Zones and A Zones in coastal areas. The rationale for these efforts is based on post-storm field studies that have shown flood hazards in Coastal A Zones are more like those in V Zones than those in riverine A Zones, and that building damage in Coastal A Zones is consistent with those observed in V Zones, not riverine A Zones.

Post-storm field studies have shown that minimally compliant A Zone foundations in Coastal A Zones often fail. (Hurricane Fran)

Mapping the Coastal A Zone

Identifying the area of the Coastal A Zone is the first step toward regulating the hazard. For purposes of CRS credit the Coastal A Zone is the area landward of a V Zone, or landward of an open coast without mapped V Zones. In a coastal A Zone, the principal source of flooding will be astronomical tides, storm surges, seiches or tsunamis, not riverine flooding. During base flood conditions the potential for breaking wave heights between 1.5 feet and 3.0 ft will exist.

Following Hurricane Katrina FEMA prepared Recovery Maps for the Mississippi coastline. The maps included Advisory Base Flood Elevations (ABFEs). One of the ABFE lines represents the inland limit of wave action where the wave height is 1.5 feet. Katrina Recovery Maps are for advisory purposes only; they do not supersede effective Flood Insurance Rate Maps (FIRMs) for insurance rating purposes. However, some local governments in Mississippi



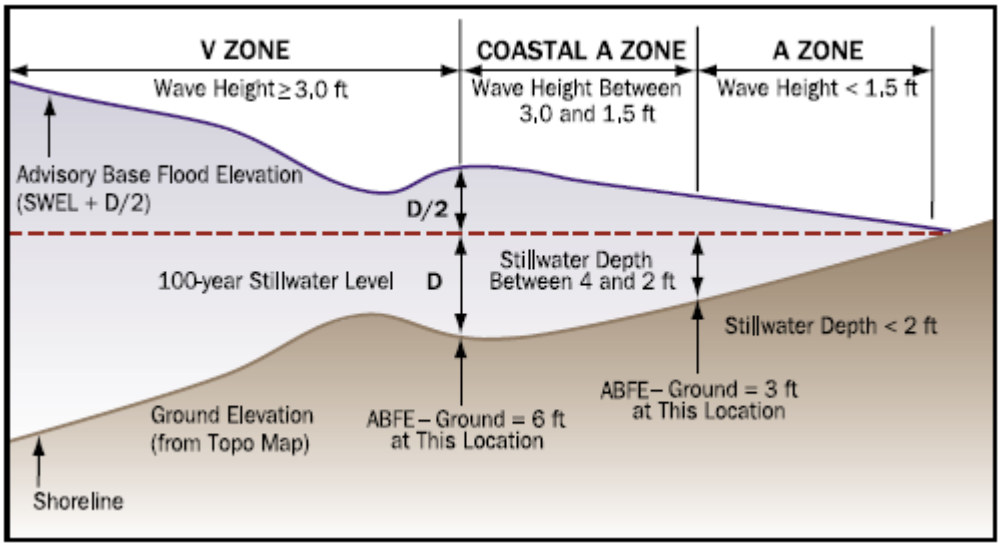
Example of a Local Coastal A Zone Map

designated Coastal A Zones and adopted V Zone standards for these areas.

While the Mississippi coastline is the only area where FEMA has mapped the inland limit of the 1.5 foot wave so far, local governments in other states have identified Coastal A Zone areas and adopted building regulations that traditionally applied only to V Zone construction. Local governments looking to designate a Coastal A Zone should make sure two conditions are met:

1) there should be a water depth sufficient to support waves between 1.5 and 3.0 feet high, and

2) there should be an expectation that wave heights between 1.5 and 3.0 feet will occur during the 1 percent chance storm.



Transect shows 1 percent annual chance stillwater elevation, stillwater depth and ABFE, and inland limit of V zone and Coastal A zone.

Condition 1 requires stillwater depths (vertical distance between the 100-year stillwater elevation and the ground elevation) of 2 to 4 feet at the site.

Condition 2 requires wave heights at the shoreline greater than 1.5 feet (under the 100-year flood conditions), sufficient water depth between the shoreline and the building site and few, if any obstructions (buildings, dense tree stands, etc.) that may block or dampen the waves, between the shoreline and the site.

The figure to the right illustrates the relationships between the stillwater flood elevation, ground elevations, the associated 1 percent annual chance (100-year) stillwater flood depths, ABFEs, and associated flood hazard zones (For more information see Hurricane Katrina Recovery Advisory Reconstruction Guidance Using Hurricane Katrina Surge Inundation and ABFE Maps).

Communities, designers, and owners can obtain the information necessary to make a Coastal A Zone determination by observing the site and its surroundings, knowing site ground elevations, and using 1 percent annual chance stillwater elevations from the Flood Insurance Study. Additionally, FEMA has recently advised its Regional Offices that the landward limit of waves 1.5 feet in height (called the Limit of Moderate Wave Action (LiMWA)) may be shown as an informational layer on the FIRM.

CRS Credit for Coastal A Zone Regulations

Coastal A Zone design and construction practices described herein are not mandated by the NFIP, but are recommended for communities that wish to adopt higher floodplain management standards. Community Rating System (CRS) credits are available for doing so. Note that some Coastal A Zone practices may be required by the International Building Code, through its reference to ASCE 24-98.

Coastal A Zone Regulation	Potential Points
Foundation Design	**225**
Engineers Certification	**125**
Reference Elevation	**100**
Landward of Mean High Tide	**25**
Protect Dunes and Mangroves	**25**
Prohibit Enclosures	**150**
CAZ Total	**650**

Up to 650 credit points are available for local governments that map Coastal A Zones and regulate these areas based on V Zone building standards. The 650 credit points are subject to an impact adjustment described on page 6. The credit points are allocated based on the following schedule:

a. Foundation Design

Post-storm damage assessments have documented that slab-on-grade foundations elevated over structural fill, various types of enclosed perimeter foundations, and masonry pier foundations have been prone to failure in Coastal A Zones. In contrast, open foundations free of obstruction and consisting of piles or columns with adequate embedment to resist scour, have proven to be less prone to failure.

Foundation Design - Up to 225 points with all of the following requirements:

1. Buildings on pile or column foundations.
2. Foundation and structure attached to resist wind and water loads
3. Areas below the lowest floor are free of obstruction.
4. Use of fill for structural support is prohibited

CRS credits Coastal A Zone regulations that prohibit the use of fill for structural support, require buildings located in Coastal A Zones to be elevated on pilings or columns and require enclosures below the BFE to be free-of-obstruction.

b. Engineers Certification

The building design must be certified by a licensed engineer or architect that it will resist flotation, collapse, and lateral movement resulting from combined wind and hydrostatic loads.

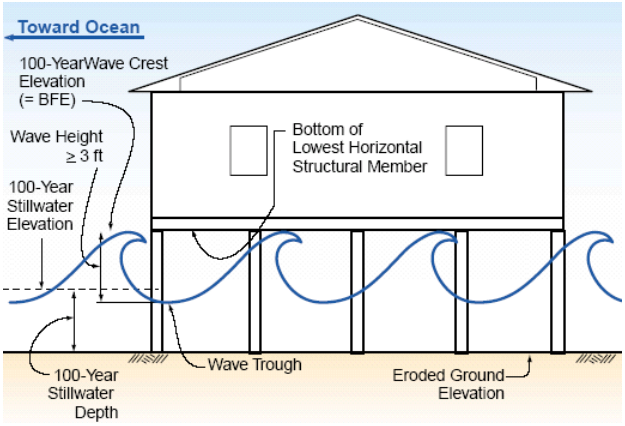
Structural Design, Specifications and Plans - 125 points

Engineer's Certification of structural designs and methods of construction.

c. Reference Elevation

In inland areas, experience has shown that floods damage areas of buildings not elevated above the flood level and destroy the contents of those areas. In coastal areas, wave action causes even more damage, often destroying enclosed building areas below the flood level (and any building areas above the flood level that depend on the lower area for structural support). Once waves rise above the lowest structural member in a V Zone or Coastal A Zone, the elevated portion of the building is likely to be severely damaged or destroyed.

The Community Rating System encourages local governments to adopt Coastal A Zone regulations that require all newly constructed, substantially damaged, and substantially improved buildings to be elevated on pilings, posts, piers, or columns so that the bottom of the lowest horizontal structural member of the lowest floor (excluding the vertical foundation members) is at or above the BFE.



Lowest Horizontal Structural Member Used as the Elevation Reference Point in the Coastal A Zone

The Community Rating System provides 100 points of credit when a local government uses the bottom of the lowest horizontal member as the elevation reference point within its Coastal A Zone.

d. Location landward of mean high tide

The single most common and costly siting mistake made by designers, builders, and owners is failing to consider future erosion and slope stability when an existing coastal home is purchased or when land is purchased and a new home is built. Purchase decisions—or siting, design, and construction decisions — based on present-day

Local governments that require Coastal A zone buildings along a shoreline to be located landward of the reach of mean high tide can receive up to 25 CRS credit points.

shoreline conditions often lead to future building failures.

Over a long period of time, owners of poorly sited coastal buildings may spend more money on erosion control and erosion-related building repairs than they spent on the building itself.

CRS credit is available when the local regulation requires all newly constructed buildings to be located landward of the reach of mean high tide (i.e., the mean high water line) along all shorelines within the Coastal A Zone.

e. Alteration of sand dunes or mangrove stands.

The vulnerability of a barrier island to storm overwash and inundation is determined, in part, by the elevation of the dune crest, the elevation of the base of the dune, and the volume of the dune. Where a dune is not present, the vulnerability of the barrier island to overwash is determined, in part, by the elevation and width of the beach berm.

Local governments that prohibit the alteration of sand dunes or mangrove stands within Coastal A zones may receive up to 25 CRS credit points.

CRS credit is available where local regulations prohibit the alteration of sand dunes and mangroves if those alterations would increase potential flood damage. Removing sand or vegetation from, or otherwise altering, a sand dune may increase potential flood damage; therefore, such actions must not be carried out without the prior approval of a local official.

f. Enclosures.

Floodborne debris produced by coastal flood events and storms typically includes decks, steps, ramps, breakaway wall panels, fuel tanks, vehicles, and a variety of smaller objects

Regulations to limit enclosures below the base flood elevation have three objectives. First, they minimize the damage from floodborne debris that may hit the building. Second, they minimize the potential for the building being a source of debris that may hit other buildings. Third, they discourage finishing the area below the base flood elevation and storing valuable or hazardous items in that area.

CRS Credit Points for Coastal A Zone Enclosure Limits

150 Prohibit all Enclosures

50 Limit enclosures to 299 Square feet or less.

These points are in addition to the 300 points provided for Enclosure Regulations in Section 430h of the *CRS Coordinator's Manual*.

Impact Adjustment

CRS credit points are adjusted to reflect the impact of the community's activity on floodplain development. The impact adjustment serves to adjust credits so that the dollar impact of premium discounts is spread over the community's entire premium base.

> **Example::** Gulf Beach floodplain regulations state that all lands seaward of the Coastal Highway shall be considered V Zones for building protection purposes. It also states that no new buildings or substantial improvements seaward of the Coastal Highway shall have enclosures below the level of the base flood elevation plus two feet.
>
> CAZ = 500 + 150 = 650.
>
> **Impact Adjustment:** The area regulated as a Coastal A zone is 30 percent of the SFHA in Gulf Beach.
>
> rCAZ = 0.30
>
> **Credit Calculation:**
>
> cCAZ = 650 x 0.30 = 195

For More Information

Additional guidance for design and construction in Coastal A Zones can be found in:

FEMA 499, *Home Builder's Guide to Coastal Construction* (http://www.fema.gov/fima/mat/fema499.shtm). The publication is a series of 31 fact sheets that provide recommended design and construction practices for foundations, connections, building envelope, etc. Fact Sheet 2 summarizes recommended practices for Coastal A Zones, and references other fact sheets that provide more details.

FEMA 55, *Coastal Construction Manual* (revised 2000)

FEMA 549, Hurricane Katrina in the Gulf Coast: Mitigation Assessment Team Report, Building Performance Observations, Recommendations, and Technical Guidance, July 2006.

FEMA. 2005a. "Design and Construction in Coastal A Zones." *Hurricane Katrina Recovery Advisory*. Available at http://www.fema.gov/pdf/rebuild/mat/coastal_a_zones.pdf