

Summary of Coastal Construction Requirements and Recommendations



FEMA



HOME BUILDER'S GUIDE TO COASTAL CONSTRUCTION FEMA 499/August 2005 Technical Fact Sheet No. 2

Purpose: To summarize National Flood Insurance Program (NFIP) regulatory requirements concerning coastal construction and provide recommendations for exceeding those requirements in some instances.




Key Issues

- **New construction*** in coastal flood hazard areas (V zones and A zones) must meet minimum NFIP and community requirements. **Repairs, remodeling, and additions** must meet community requirements and may also be subject to NFIP requirements.
- NFIP design and construction requirements are more **stringent in V zones than in A zones**, in keeping with the increased flood, wave, floodborne debris and erosion hazards in V zones.
- Some coastal areas mapped as A zones may be subject to damaging waves and erosion (these areas are often referred to as Coastal A Zones). Buildings in these areas constructed to minimum NFIP A-zone requirements may sustain major damage or be destroyed during the Base Flood. **It is strongly recommended that buildings in A zones subject to breaking waves and erosion be designed and constructed to V-zone standards.**
- Buildings constructed to minimum NFIP A-zone standards and subject solely to shallow flooding without the threat from breaking waves and erosion will generally sustain only minor damage during the Base Flood.
- Following the recommendations in the table below will result in lower damage to the building and reduced flood insurance premiums (see the V-Zone Risk Factor Rating Form in FEMA's *Flood Insurance Manual* (<http://www.fema.gov/nfip/manual.shtm>)).

* For floodplain management purposes, new construction means structures for which the start of construction began on or after the effective date of a floodplain management regulation adopted by a community. Substantial improvements, repairs of substantial damage, and some enclosures must meet most of the same requirements as new construction.

The following tables summarize NFIP regulatory requirements and recommendations for exceeding those requirements for both (1) new construction and (2) repairs, remodeling, and additions.

Requirements and Recommendations for New Construction^a

See page 8 for notes.	 V Zone	A Zones in Coastal Areas	
		 Coastal A	 A
		Areas With Potential for Breaking Waves and Erosion During Base Flood ^b	Areas With Shallow Flooding Only, Where Potential for Breaking Waves and Erosion Is Low ^c
General Requirements			
Design (Also see Certification)	Requirement: building and its foundation must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement due to simultaneous wind and water loads [see Fact Sheet No. 5]	Requirement: building must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy Recommendation: follow V-zone requirement	Requirement: building must be designed, constructed, and anchored to prevent flotation, collapse, and lateral movement resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy

See page 8
for notes.



V Zone

A Zones in Coastal Areas



Areas With Potential for
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During Base Flood^b



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General Requirements (cont.)

Free of Obstructions	Requirement: the space below the lowest floor must be free of obstructions (e.g., free of any building element, equipment, or other fixed objects that can transfer flood loads to the foundation, or that can cause floodwaters or waves to be deflected into the building), or must be constructed with non-supporting breakaway walls, open lattice, or insect screening. [see Fact Sheet Nos. 5, 27]	Requirement: none Recommendation: follow V-zone requirement	Requirement: none
Materials [see Fact Sheet Nos. 1, 8]	Requirement: structural and nonstructural building materials at or below Base Flood Elevation (BFE) must be flood-resistant	Requirement: structural and nonstructural building materials at or below BFE must be flood-resistant	Requirement: structural and nonstructural building materials at or below BFE must be flood-resistant
Construction [see Fact Sheet No. 1] (Also see Certification)	Requirement: building must be constructed with methods and practices that minimize flood damage	Requirement: building must be constructed with methods and practices that minimize flood damage	Requirement: building must be constructed with methods and practices that minimize flood damage
Siting [see Fact Sheet Nos. 6, 7]	Requirement: all new construction shall be landward of mean high tide; alteration of sand dunes and mangrove stands that increases potential flood damage is prohibited Recommendation: site new construction landward of long-term erosion setback and landward of area subject to erosion during 100-year coastal flood event	Requirement: encroachments into floodways designated along rivers and streams are prohibited unless they will cause no increase in flood stage; where floodways have not been designated, encroachments into the Special Flood Hazard Area cannot increase the BFE by more than 1 foot Recommendation: follow V-zone requirement	Requirement: encroachments into floodways designated along rivers and streams are prohibited unless they will cause no increase in flood stage; where floodways have not been designated, encroachments into the Special Flood Hazard Area cannot increase the BFE by more than 1 foot

Foundation

Structural Fill	Prohibited [see Fact Sheet No. 11]	Allowed, but not recommended ; compaction required where used; protect against scour and erosion ^d [see Fact Sheet No. 11]	Allowed ; compaction required where used; protect against scour and erosion ^d
Solid Foundation [see Fact Sheet Nos. 11, 15]	Prohibited	Allowed, but not recommended ^d	Allowed ^d
Open Foundation [see Fact Sheet No. 11]	Required	Recommended ^d	Allowed ^d
Lowest Floor Elevation [see Fact Sheet No. 4] (Also see Certification)	See Bottom of Lowest Horizontal Structural Member (below) [see Fact Sheet No. 5]	Requirement: top of floor must be at or above BFE ^e Recommendation: elevate bottom of lowest horizontal structural member to or above BFE ^e	Requirement: top of floor must be at or above BFE ^e Recommendation: elevate bottom of lowest horizontal structural member to or above BFE ^e

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Foundation (cont.)

Bottom of Lowest Horizontal Structural Member [see Fact Sheet No. 4]	must be at or above BFE ^e [see Fact Sheet No. 5]	Allowed below BFE ^e , but not recommended^d Recommendation: follow V-zone requirement	Allowed below BFE ^e , but not recommended^d Recommendation: follow V-zone requirement
Orientation of Lowest Horizontal Structural Member	Requirement: none Recommendation: orient perpendicular to wave crest	Requirement: none Recommendation: follow V-zone requirement	Requirement: none
Freeboard [see Fact Sheet Nos. 1, 4]	Not required ^e , but recommended	Not required ^e , but recommended	Not required ^e , but recommended

Enclosures Below BFE

(Also see Certification) [see Fact Sheet No. 27]	Prohibited , except for breakaway walls, open lattice, and screening ^f Recommendation: if constructed, use open lattice or screening instead of breakaway walls	Allowed, but not recommended Requirement: if area is fully enclosed, enclosure walls must be equipped with openings to equalize hydrostatic pressure; size, location, and covering of openings governed by regulatory requirements Recommendation: elevate on open foundation; if enclosure is constructed, use breakaway walls (with flood openings), open lattice, or screening, as required in V zone ^{f,g}	Allowed Requirement: if area is fully enclosed, enclosure walls must be equipped with openings to equalize hydrostatic pressure; size, location, and covering of openings governed by regulatory requirements ^{f,g}
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Nonstructural Fill

	Allowed for minor landscaping and site drainage as long as fill does not interfere with free passage of flood waters and debris beneath building, or cause changes in flow direction during coastal storms that could result in damage to buildings	Allowed^h Recommendation: follow V-zone requirement	Allowed Recommendation: follow V-zone requirement
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Use of Space Below BFEⁱ (see Fact Sheet No. 27)

	Allowed only for parking, building access, and storage	Allowed only for parking, building access, and storage	Allowed only for parking, building access, and storage
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Utilitiesⁱ

	Requirement: utilities, including ductwork and equipment, must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding; utility lines must not be installed or stubbed out in enclosures below BFE	Requirement: utilities, including ductwork and equipment, must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding; utility lines must not be installed or stubbed out in enclosures below BFE	Requirement: utilities, including ductwork and equipment, must be designed, located, and elevated to prevent flood waters from entering and accumulating in components during flooding; utility lines must not be installed or stubbed out in enclosures below BFE
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Certification

Elevation	Requirement: bottom of lowest horizontal structural member must be at or above BFE ^e ; electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork) must be designed and/or located so as to prevent water from entering or accumulating within the components during flooding [see Fact Sheet Nos. 4, 5, 29]	Requirement: top of lowest floor must be at or above BFE ^e ; electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork) must be designed and/or located so as to prevent water from entering or accumulating within the components during flooding [see Fact Sheet Nos. 4, 29] Recommendation: follow V zone requirement	Requirement: top of lowest floor must be at or above BFE ^e ; electrical, heating, ventilation, plumbing, and air conditioning equipment and other service facilities (including ductwork) must be designed and/or located so as to prevent water from entering or accumulating within the components during flooding [see Fact Sheet Nos. 4, 29] Recommendation: follow V zone requirement
Structure	Requirement: registered engineer or architect must certify that design and methods of construction are in accordance with accepted standards of practice for meeting design requirements described under General Requirements [see Fact Sheet No. 5]	Requirement: none Recommendation: follow V zone requirement	Requirement: none Recommendation: follow V zone requirement
Breakaway Walls [see Fact Sheet Nos. 5, 27] (Also see Enclosures Below BFE)	Requirement: walls must be designed to break free under larger of (1) design wind load, (2) design seismic load, or (3) 10 psf, acting perpendicular to the plane of the wall; if loading at which breakaway wall is intended to collapse exceeds 20 psf, breakaway wall design shall be certified; when certification is required, registered engineer or architect must certify that walls will collapse under a water load associated with the Base Flood and that elevated portion of building and its foundation will not be subject to collapse, displacement, or lateral movement under simultaneous wind and water loads ^f	Not required, but recommended^{f,g} with open foundation in lieu of solid walls; if breakaway walls are used and enclose an area, flood openings are required. [see Fact Sheet Nos. 11, 15]	Requirement: none ^{f,g}
Openings In Below-BFE Walls [see Fact Sheet Nos. 11, 15] (Also see Enclosures Below BFE)	Not Applicable ^j	Requirement: unless number and size of openings meet regulatory requirements, registered engineer or architect must certify that openings are designed to automatically equalize hydrostatic forces on walls by allowing automatic entry and exit of flood waters	Requirement: unless number and size of openings meet regulatory requirements, registered engineer or architect must certify that openings are designed to automatically equalize hydrostatic forces on walls by allowing automatic entry and exit of flood waters

Requirements and Recommendations for Repairs, Remodeling, and Additions

See page 8
for notes.



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Repairs, Remodeling, and Additions

(see Fact Sheet No. 30 and consult AHJ^k for building code requirements)

Substantial Improvements and Repairs of Substantial Damage	Requirement: must meet current NFIP requirements concerning new construction in V zones ^{k,l} except for siting landward of mean high tide [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29]	Requirement: must meet current NFIP requirements concerning new construction in A zones ^{k,m} [see Fact Sheet Nos. 4, 11, 15, 27, 29] Recommendation: follow V-zone requirement	Requirement: must meet current NFIP requirements concerning new construction in A zones ^{k,m} [see Fact Sheet Nos. 4, 11, 15, 27, 29] Recommendation: elevate bottom of lowest horizontal structural member to or above BFE
Lateral Additions That Constitute Substantial Improvement	Requirement: both addition and existing building must meet current NFIP requirements concerning new construction in V zones ^{k,l,n} [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29]	Requirement: only addition must meet current NFIP requirements concerning new construction in A zones ^{k,m,o} (See Fact Sheet Nos. 4, 7, 11, 15, 27, 29), <i>provided</i> existing building is not subject to any work other than cutting entrance in common wall and connecting existing building to addition; if any other work is done to existing building, it too must meet current NFIP requirements for new construction in A zones Recommendation: follow V-zone requirement	Requirement: only addition must meet current NFIP requirements concerning new construction in A zones ^{k,m,o} (See Fact Sheet Nos. 4, 7, 11, 15, 27, 29), <i>provided</i> the existing building is not subject to any work other than cutting an entrance in a common wall and connecting the existing building to the addition; if any other work is done to existing building, it too must meet current NFIP requirements for new construction in A zones Recommendation: elevate bottom of lowest horizontal structural member of addition to or above BFE (same for existing building if it is elevated)
Lateral Additions That Do Not Constitute Substantial Improvement	Requirement: <i>post-FIRM</i> existing building – addition must meet NFIP requirements in effect at time building was originally constructed ^{k,l,n} <i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered ^k [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29] Recommendation: make addition compliant with current NFIP requirements for V-zone construction	Requirement: <i>post-FIRM</i> existing building – addition must meet NFIP requirements in effect at time building was originally constructed ^{k,m,o} [see Fact Sheet Nos. 4, 7, 11, 15, 27, 29] <i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered ^k Recommendation: follow V-zone requirement	Requirement: <i>post-FIRM</i> existing building – addition must meet NFIP requirements in effect at time building was originally constructed ^{k,m,o} [see Fact Sheet Nos. 4, 7, 11, 15, 27, 29] <i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered ^k Recommendation: elevate bottom of lowest horizontal structural member of addition to or above BFE (same for existing building if it is elevated) [see Fact Sheet No. 4]

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Repairs, Remodeling, and Additions (cont.)

(see Fact Sheet No. 30 and consult AHJ^k for building code requirements)

Vertical Additions That Constitute Substantial Improvement	Requirement: entire building must meet current NFIP requirements concerning new construction in V zones ^{k,l,n} [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29]	Requirement: entire building must meet current NFIP requirements concerning new construction in A zones ^{k,m,o} [see Fact Sheet Nos. 4, 7, 11, 15, 27, 29] Recommendation: follow V-zone requirement	Requirement: entire building must meet current NFIP requirements concerning new construction in A zones ^{k,m,o} [see Fact Sheet Nos. 4, 7, 11, 15, 27, 29] Recommendation: elevate bottom of lowest horizontal structural member to or above BFE [see Fact Sheet No. 4]
Vertical Additions That Do Not Constitute Substantial Improvement	Requirement: <i>post-FIRM</i> existing building – addition must meet NFIP requirements in effect at time building was originally constructed ^{k,l,n} <i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered ^k [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29] Recommendation: make addition compliant with current NFIP requirements for V-zone construction	Requirement: <i>post-FIRM</i> existing building – addition must meet NFIP requirements in effect at time building was originally constructed ^{k,m,o} <i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered ^k [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29] Recommendation: follow V-zone requirement	Requirement: <i>post-FIRM</i> existing building – addition must meet NFIP requirements in effect at time building was originally constructed ^{k,m,o} <i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered ^k [see Fact Sheet Nos. 4, 5, 7, 11, 15, 27, 29] Recommendation: elevate bottom of lowest horizontal structural member to or above BFE [see Fact Sheet No. 4]
Elevating on New Foundation	Requirement: new foundation must meet current NFIP requirements concerning new construction in V zones ^{k,l} ; building must be properly connected and anchored to new foundation	Requirement: new foundation must meet current NFIP requirements concerning new construction in A zones ^{k,m} ; building must be properly connected and anchored to new foundation Recommendation: follow V-zone requirement	Requirement: new foundation must meet current NFIP requirements concerning new construction in A zones ^{k,m} ; building must be properly connected and anchored to new foundation Recommendation: elevate bottom of lowest horizontal structural member to or above BFE [see Fact Sheet No. 4]
Enclosures Below Buildings – When enclosure constitutes a substantial improvement	Requirement: both enclosure and existing building must meet current NFIP requirements for new construction in V zones ^{k,l,n} [see Fact Sheet Nos. 4, 5, 7, 11, 27, 29]	Requirement: both enclosure and existing building must meet current NFIP requirements for new construction in A zones ^{k,m,o} [see Fact Sheet Nos. 4, 7, 11, 15, 27, 29] Recommendation: follow V-zone requirement	Requirement: both enclosure and existing building must meet current NFIP requirements for new construction in A zones ^{k,m,o} [see Fact Sheet Nos. 4, 7, 11, 15, 27, 29] Recommendation: elevate bottom of lowest horizontal structural member to or above BFE [see Fact Sheet No. 4]

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Repairs, Remodeling, and Additions (cont.)

(see Fact Sheet No. 30 and consult AHJ^k for building code requirements)

<p>Enclosures Below Buildings – When enclosure does not constitute a substantial improvement</p>	<p>Requirement: <i>post-FIRM</i> existing building – enclosure must meet NFIP requirements in effect at time building was originally constructed^{k,l,n}</p> <p><i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered^k [see Fact Sheet No. 27]</p> <p>Recommendation: make enclosure compliant with current NFIP requirements for new V-zone construction</p>	<p>Requirement: <i>post-FIRM</i> existing building – enclosure must meet NFIP requirements in effect at time building was originally constructed^{k,m,o}</p> <p><i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered^k [see Fact Sheet Nos. 15, 27]</p> <p>Recommendation: construct only breakaway enclosures; install flood openings in enclosure; do not convert enclosed space to habitable use</p>	<p>Requirement: <i>post-FIRM</i> existing building – enclosure must meet NFIP requirements in effect at time building was originally constructed^{k,m,o}</p> <p><i>pre-FIRM</i> existing building – NFIP requirements concerning new construction not triggered^k [see Fact Sheet Nos. 15, 27]</p> <p>Recommendation: install flood openings in enclosure; do not convert enclosed space to habitable use</p>
<p>Reconstruction of Destroyed or Razed Building</p>	<p>Requirement: where entire building is destroyed, damaged, or purposefully demolished or razed, replacement building must meet current NFIP requirements concerning new construction in V zones^{k,l}, even if built on foundation from original building [see Fact Sheet Nos. 4, 5, 30]</p>	<p>Requirement: where entire building is destroyed, damaged, or purposefully demolished or razed, replacement building must meet current NFIP requirements concerning new construction in A zones^{k,m}, even if built on foundation from original building [see Fact Sheet Nos. 4, 30]</p> <p>Recommendation: follow V-zone requirement</p>	<p>Requirement: where entire building is destroyed, damaged, or purposefully demolished or razed, replacement building must meet current NFIP requirements concerning new construction in A zones^{k,m}, even if built on foundation from original building [see Fact Sheet Nos. 4, 30]</p>
<p>Moving Existing Building</p>	<p>Requirement: where existing building is moved to new location or site, relocated building must meet current NFIP requirements concerning new construction in V zones^{k,l} [see Fact Sheet Nos. 4, 5, 30]</p>	<p>Requirement: where existing building is moved to new location or site, relocated building must meet current NFIP requirements concerning new construction in A zones^{k,m} [see Fact Sheet Nos. 4, 30]</p> <p>Recommendation: follow V-zone requirement</p>	<p>Requirement: where existing building is moved to new location or site, relocated building must meet current NFIP requirements concerning new construction in A zones^{k,m} [see Fact Sheet Nos. 4, 30]</p> <p>Recommendation: elevate bottom of lowest horizontal structural member to or above BFE [see Fact Sheet No. 4]</p>

Notes

- a **"Prohibited"** and **"Allowed"** refer to the minimum NFIP regulatory requirements; individual states and communities may enforce more stringent requirements that supersede those summarized here. **Exceeding minimum NFIP requirements will provide increased flood protection and may result in lower flood insurance premiums.**
- b In these areas, buildings are subject to flooding conditions similar to, but less severe than, those in V zones. These areas can be subject to breaking waves ≥ 1.5 feet high (which can destroy conventional wood-frame and unreinforced masonry wall construction) and erosion (which can undermine shallow foundations).
- c In these areas, buildings are subject to flooding conditions similar to those in riverine A zones.
- d Some coastal communities require **open foundations in A zones.**
- e State or community may require **freeboard** or regulate to a higher elevation (e.g., Design Flood Elevation (DFE)).
- f Some coastal communities **prohibit breakaway walls** and allow only open lattice or screening.
- g If an area below the BFE in an A-zone building is fully enclosed by breakaway walls, the walls must meet the requirement for **openings** that allow equalization of hydrostatic pressure.
- h Placement of **nonstructural fill** adjacent to buildings in coastal AO zones is not recommended.
- i There are some **differences between** what is permitted under **floodplain management regulations** and what is covered by **NFIP flood insurance**. Building designers should be guided by floodplain management requirements, not by flood insurance policy provisions. For more information, see Section 9.3.1.1 in Chapter 9 of FEMA's Coastal Construction Manual (FEMA 55).
- j **Walls below BFE** must be designed and constructed as breakaway walls that meet the minimum requirements of the NFIP regulations. For more information, see Section 6.4.3.3 in Chapter 6 of FEMA's Coastal Construction Manual (FEMA 55).
- k Consult with authority having jurisdiction (AHJ) regarding **more restrictive requirements for repairs, remodeling, and additions.**
- l **NFIP requirements for new construction in V zones** include those pertaining to Design and Construction, Flood-Resistant Materials, Siting, Foundations, Lowest Floor Elevation, Enclosures Below the BFE, Free of Obstructions, Utilities, and Certifications.
- m **NFIP requirements for new construction in A zones** include those pertaining to Design and Construction, Flood-Resistant Materials, Siting, Foundations, Foundation Openings, Lowest Floor Elevation, Enclosures Below the BFE, Utilities, and Certifications.
- n An addition in the form of an **attached garage** would not have to be elevated to or above the BFE, because its use (parking) would be allowed below the BFE; however, it would have to meet other NFIP requirements for new construction in V zones.
- o An addition in the form of an **attached garage** would not have to be elevated to or above the BFE, because its use (parking) would be allowed below the BFE; however, it would have to meet other NFIP requirements for new construction in A zones.