CHAPTER 4. REGULATIONS AND DEVELOPMENT STANDARDS

Regulations and development standards, which can be used by communities to reduce damage from natural hazards, work best when using an effective planning process. Proper planning helps ensure a community’s rules and standards are properly tailored to fit the coastal landscape, a community’s ability and authority, and mitigation of existing problems.

BASIC: NFIP REGULATIONS

The National Flood Insurance Program (NFIP) establishes minimum floodplain management requirements for participating communities. Communities can incorporate these requirements into their subdivision, zoning, and other land use ordinances and building codes or can adopt a separate floodplain management ordinance. NFIP regulations components:

- All development in the Special Flood Hazard Area (the A and V Zones on a FIRM) must have a permit from the community. Development means “any manmade change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials” (44 CFR 59).
- Development and human habitation in V Zones are discouraged, although not prohibited. Construction in V Zones must be certified by a registered professional engineer or architect. The bottom of the lowest horizontal structural member must be above the BFE and the structure must be built on piles or columns or otherwise properly anchored to resist erosion. Areas below the BFE must have break away walls.

BETTER: HIGHER REGULATORY STANDARDS

The National Flood Insurance Program recognizes that while it helps reduce the risks to development from flood related hazards, it does not make development “safe” from flooding. Regulations that go beyond the minimum requirements of the NFIP are encouraged and higher State and local regulations take precedence over the minimum national NFIP requirements. Most higher community standards receive Community Rating System (CRS) credit (see ASFPM, 2003, pp. 83-87 and available at www.floods.org or see www.fema.gov/business/nfip/crs.shtm).

Precedence of Higher Standards in NFIP Regulations

Community officials may have access to information or knowledge of conditions that require, particularly for human safety, higher standards than the minimum criteria set forth in … this part. Therefore, any flood plain management regulations adopted by a State or a community, which are more restrictive than the criteria set forth in this part are encouraged and shall take precedence. [Emphasis added]

44 CFR 60.1(d)
Coastal A Zones

The *Coastal Construction Manual* (FEMA, 2000a) defines an additional hazard zone – Coastal A Zone – which is not established by the NFIP regulation or shown on FEMA’s Flood Insurance Rate Maps. Although the NFIP regulations do not differentiate between coastal and non-coastal A Zones, the *Coastal Construction Manual* recommends that buildings in the Coastal A Zones be designed and constructed to be more resistant to coastal flood forces. The *Manual* describes the Coastal A Zone as that portion of the special flood hazard area of a V Zone, or landward of an open coast without mapped V Zones (e.g., the shorelines of the Great Lakes), in which the principal sources of flooding are highly correlated with coastal winds or coastal seismic activity. Coastal A Zones where the expected wave height exceeds 1.5 feet may therefore be subject to wave effects, velocity flows, erosion, scour, or combinations of these forces. The forces in Coastal A Zones with 1.5 to 3.0 waves are not as severe as those in V Zones but are still capable of damaging or destroying buildings on inadequate foundations. It is advisable to use pile or column foundations (open construction) in any coastal area subject to waves of any size. One of the benefits of building to V-Zone standards is that the reflection and channelization of flow is reduced, thus minimizing erosion and scour around the structure as well as reducing impacts to adjacent properties.

Adopting and Enforcing a Disaster Resistant Building Code

A building code is the minimum acceptable standard used to regulate the design, construction, and maintenance of buildings for the purpose of protecting the health, safety, and general welfare of the building’s users.

The purpose of building codes is to build safe buildings, thereby reducing deaths, injuries and property damage. This preserves the built environment, both residential and commercial, reduces public and private disaster aid, and maintains employment in businesses and institutions that otherwise might be forced to close following a catastrophe.

Use Future Conditions for Siting New Development

FEMA’s Flood Insurance Rate Maps (FIRMs) show the BFEs and area in the “100 year” floodplain as of when an engineer or coastal scientist analyzed and mapped the hazards. The Flood Insurance Study Report that goes with the FIRM will include the date that the engineering study was conducted. FIRMs newly published often show flooding hazards based on a much older (e.g. 1980s) engineering study.

FIRMs are designed for insuring flood prone property and for siting new development. However, FIRMs have some limitations when used to determine appropriate locations for new development. FIRMs do not show the hazard for the life of the structures being built or even for when the development is occurring. The FIRMs show what the flood hazard was at some time in the past (when the elevations were developed for the FIRM).

People often say “floods were never this big” or “floods never came this often before.” They may be right. Things do change, and unless the community and its people take charge, flooding will get worse.
When new BFEs are being established in your community, request that BFEs and floodplain boundaries based on future conditions be included on the FIRMs. For example, sea level rise, subsidence and increased development in the watershed should be accounted for when developing BFEs and floodplain maps that will be used for land use management.

**Coastal Erosion**

FIRMs also do not show coastal erosion hazards. Standards that can be placed in local regulatory programs for addressing erosion along shorelines include relocation of threatened buildings, building setbacks, beach nourishment and bio-engineering/stabilization of eroded shorelines. See Appendix C for information on coastal hazards.

**Freeboard**

The NFIP allows development in the flood fringe if it is elevated above the BFE. In addition, the NFIP allows flood fringe development to constrict flood flows allowing it to raise the BFE a foot. However, the BFE published in the Flood Insurance Study and represented on the FIRM does not reflect that increase. Therefore, even if constructed to NFIP standards, buildings can still suffer damage. In addition, floods can be higher than the base flood elevation for various reasons, including larger storms, ice or debris jams, the cyclic pattern of more intense storms, and sea level rise. Setting higher standards helps address these issues.

Freeboard is an additional height requirement above the base flood elevation. Requiring additional freeboard above the BFE for new development and for existing structures that are being elevated helps offset some of the limitations of the minimal national standards. When constructing a new, elevated building, the additional cost of elevating another foot or two is usually minimal and can result in significant annual savings on flood insurance. Freeboard is the most common higher regulatory standard adopted by States and communities (over half of the communities participating in the CRS receive freeboard credit). Advantages to building with a freeboard include:

- Reduced risk of flood damage;
- Accounting for uncertainties inherent in flood hazard scenarios, modeling, topography, and mapping imitations;
- Significantly lower flood insurance rates due to the lower flood risk for an elevated structure.

**Foundation Certification**

Without a safe and solid foundation, elevated buildings can suffer damage from erosion, scour, or settling that results from a flood. To prevent this, communities should require property owners to obtain the services of an engineer or architect to certify the adequacy of elevated building foundations or adopt standards for foundation protection.

**Inspection of Lower-area Enclosures**

Structures that have performed best during coastal storms were those with no or only minimal lower area enclosures. Often owners of coastal-area buildings that are elevated eight feet above grade will enclose the lower area, ostensibly to improve the appearance of the building or to provide a protected area for parking, building access, or storage. The problem is
that, later, this space may be finished to make it suitable for human habitation, greatly increasing the potential for flood damage and interfering with stormwater flow. In addition, stored materials and items can float away in the storm surge, causing damage to adjacent properties. Regulations that limit enclosures below the base flood elevation discourage finishing this space and storing valuable or hazardous items inside.

In a coastal V Zone, the area below all elevated buildings should either be free of obstructions or enclosed only by non-supporting, break-away walls. These walls should be made of open wood lattice or insect screening that will collapse under water loads without causing structural damage to the elevated portion of the building. Structures with no lower area enclosures are more likely to survive a coastal storm. However, coastal property owners often enclose the lower areas to provide additional area for storage.

To ensure owners of coastal-area buildings do not enclose lower areas to create additional living area and/or storage communities should conduct routine inspections. To make this minimum requirement better (or even effective), active local inspections and enforcement are needed. Although yearly inspections may be expensive and politically unpopular, they may be the only realistic way to make sure that program requirements are met. As an alternative, communities can consider placing a non-conversion agreement on the property deed.

Cumulative Substantial Improvement Definition

The NFIP substantial improvement regulations allow each project valued at up to 50% of the building’s pre-flood value to be permitted without meeting the NFIP protection requirements. Over the years, a community may issue a succession of permits for different repairs or upgrades to the same structure. This can greatly increase the overall damage potential. To counter this, some communities measure improvements cumulatively, so that when the total value of all improvements or repairs permitted over the years (life of the structure or 10–20 years) reaches 50%, the original building must be protected from flood damage according to the requirements for new buildings. A variation is to have a lower threshold for substantial improvements, that is, less than 50%.

An option to regulating for cumulative substantial improvements is requiring that all additions meet the building protection standards. Additions outside the footprint of the original structure would be elevated (or, for non-residential structures, floodproofed) above the base flood elevation.

Barrier Island Protection

Barrier islands absorb the energy from the open ocean and thereby reduce the wave fetch and protect mainland development and wetlands from wave attack. The submerged aquatic vegetation and mangroves found in association with barrier islands trap sediment, serve as habitat for marine life, add oxygen to the water, and help reduce pollution. In addition, barrier islands are critical habitat for migratory birds and resident species such as pelicans. Based on the premise that flood insurance and other federal benefits may encourage development on these valuable coastal barrier islands, Congress enacted the Coastal Barrier Resources Act (CBRA) (P.L. 97-348). The CBRA designates a Coastal Barrier Resource System (CBRS) within whose boundaries federal incentives for new development are prohibited. The CBRS comprises nearly 200 coastal barrier segments that are neither developed nor in preserved status. Within these areas, the Act prohibits the issuance of new flood insurance coverage and also suspends other
federal assistance for public infrastructure such as bridges, highways, causeways, sewer and water systems, and shore protection projects. Communities should consider not permitting new development and not providing infrastructure in these already designated sensitive areas or in similar areas not protected by CBRA.

NAI LEVEL: RESOURCE PROTECTION & PUBLIC SAFETY

Land Use Management

Most communities adopt master plans and zoning ordinances to guide decisions about land use, density, setbacks, and other development related elements. These ordinances can designate and regulate areas subject to flooding and other coastal hazards and thus incorporate coastal storm hazard mitigation. Among the measures that could be incorporated into regulations are requirements for:

- preserving/conserving areas;
- setting maximum densities for development;
- mapping waterfront setbacks;
- restricting structures between the shoreline and the setback line;
- regulating the type/placement/use of shoreline stabilization structures;
- mandating vegetative coastal buffers rather than bulkheads, seawalls or groins;
- minimizing impervious cover;
- preserving stream corridor and wetland buffers; and
- regulating the size/type of development allowed in erosion/flood-prone areas, e.g., only permit small buildings that can be moved - no schools, hospitals, nursing homes, etc..

Planned Development

One alternative to the usual method of subdividing land into similar parcels is the planned development approach. Under this approach, developers are allowed more flexibility in their design, as long as they meet certain requirements for the zoning district. Communities may provide incentives, such as allowing higher-density development on a portion of the land, in return for setting aside critical habitat or parts of A and V Zones as open space.

Subdivision and similar regulations could allow developers the same or larger number of building sites while preserving the floodway, floodplain, erosion zone, storm surge zone, wetlands, critical habitat, or natural stormwater storage areas for open space. In addition, communities should mandate minimizing impervious cover to reduce runoff (and help mitigate nonpoint pollution).

Planned developments offer an opportunity to include mitigation measures early in their design. Communities can advise developers about the advantages of buffers from coastal hazards and encourage them to evaluate, augment, or take advantage of these protective options.
Protecting Natural Resources in Coastal Landscapes

Coastal zones require management in part because of their economic importance to the nation. However, within coastal watersheds there are conflicting land uses, i.e., intensive development in contrast to the richness, diversity, and sometimes scarcity of resources, such as wetlands, beaches, dunes, barrier islands, estuaries, and coastal waters. Barrier islands, beaches and dunes, wetlands, reefs, and shoals are the “first line of defense” against storms, storm surge, coastal erosion, and flooding. They deserve special attention because of the important, free function they perform. Communities should map these coastal features and protect them from degradation or over-exploitation.

The coastal and estuarine inter-tidal zones provide important habitat. Setback standards establish minimum distances that structures or construction work must be positioned (set back) from lot lines, channels, wetland, or shorelines. Setbacks help prevent development from impinging on fragile areas, protect investments in buildings and structures, may keep buildings from obstructing views, reduce the potential for polluting public waters, prevent disruption to the shoreline, and preserve riparian habitat. The depth of an effective setback would vary from place to place, depending on the characteristics of the shoreline. For example, in erosion-prone areas, it should be deep enough to protect a structure for its expected useful life; in areas of sensitive habitat, it should be enough to allow sufficient vegetation, area, and other resources to sustain the species that need protection.

Vegetated buffer strips protect the banks of the water body from erosion, filter stormwater, provide habitat, protect against storm surge, and trap sediment that in turn may create wetlands. Buffers can be used in conjunction with setbacks. The community regulations can also specify the preservation of natural vegetation within the buffer and prohibit bulkheads, seawalls, and groins in the intertidal zone.

Coastal vegetative buffers can be established and preserved through regulation (wetlands permits, compensatory mitigation, setbacks, or buffers), planning (mitigation banking, a local land use plan, special area management plans) and land and water management (land acquisition, restoration, and enhancement).

Efforts should be made to reduce the erosion rate by building dunes and stabilizing them with native vegetation. Designating walkover paths to the beach and setting aside the dunes for bird nesting areas and wildlife habitat help protect the dunes and vegetation from erosion and trampling.

Under an NAI approach, communities enact stronger standards to protect the coastal landscape. One action a community can take is prohibiting public infrastructure in coastal high-hazard areas, shorelines, or wetlands.

Regulating Fill in the Coastal Zone

A common mitigation action is the use of fill to elevate structures above the Base Flood Elevation (BFE). Use of improper material (e.g. demolition debris) and the filling of valuable coastal resources can occur if the placement of fill is not properly managed.

Communities should require permits for projects where fill is proposed. Community regulations related to fill should clearly define the types of fill covered by their regulations. One
option is to distinguish between fill in the high energy zones of the “open coast” and fill in coastal estuaries and streams that traverse coastal communities to reach the coast. It is important for a community to understand the extent of the public trust lands in their community (see public trust discussion in Chapter 1) and their State’s rules regarding fill and/or construction on public trust lands.

Beach fill and beach nourishment can be useful as a coastal erosion response or flood protection measure, as opposed to fill for the sake of replacing eroded material or “extending dry land into the sea” - which would be a violation of the Public Trust Doctrine. The NFIP prohibits the use of fill for structural support of building in V Zones. The NFIP allows the use of fill for landscaping and site grading as long as the fill:

- does not interfere with the passage of floodwaters and debris underneath the building or
- change the flow direction of floodwaters during coastal storms such that adjacent buildings have increased damages.

Coastal barrier islands, beaches and coastal dunes absorb wave energy and thereby could help protect the coastline and wetlands from wave attack. Beach fill and beach nourishment can be used to enhance these natural features provided: 1) proper materials and construction methods are used and 2) other properties or coastal resources are not negatively impacted.


Coastal estuaries make up 80% of the U.S. coastline. Extreme care must be taken in the placement of fill in these coastal areas outside the high energy zone. Communities should regulate the use of bulkheads often used to enable the placement of fill into environmentally sensitive areas.

By requiring permits for placement of fill and the construction of bulkheads in the coastal zone, communities can:

- provide opportunities for community resident input,
- monitor fill placement to ensure adverse impacts are not occurring, and
- establish regulations that meet community needs to ensure coastal resources are not compromised and other properties are not negatively impacted.