Chapter 9: Financial and Insurance Implications

Table of Contents

Figures

Tables

Financial and Insurance Implications

9.1 Introduction

Before undertaking a coastal construction project, property owners and design professionals should be aware of the financial and insurance implications of siting, design, and construction decisions. Site selection, building location, and design requirements will all influence the costs of construction and insurance.

It is easy for property owners to become complacent about the threat of a natural disaster affecting their buildings. Hurricanes and earthquakes are generally infrequent events. A particular geographic area may have escaped a major hazard event for 20 or more years. Or, because an area has recently been affected, its residents may believe the chances of a recurrence in the near future are remote. These attitudes are based on inaccurate assumptions and/or a lack of understanding of natural hazards and their associated risks.

The population and property values along the U.S. coast are rapidly increasing. The National Oceanic and Atmospheric Administration predicts that by the year 2010, more than 73 million people will be living in hurricane-prone areas (Ayscue 1996). While better warning systems have allowed us to reduce the number of fatalities and injuries associated with natural disasters, the increase in the numbers and values of structures along the coast leads to the potential for dramatic increases in property losses.

In 1986, the All-Industry Research Advisory Council (AIRAC), an advisory organization for the insurance industry, estimated that two $7-billion hurricanes could occur in the same year. However, in 1989, Hurricane Hugo struck South Carolina, causing approximately $9 billion in damage. In 1992, Hurricane Andrew caused $15.5 billion in damage to insured properties. Neither Hurricane Hugo nor Hurricane Andrew hit densely populated areas; if they had, losses would have been far greater. Following Hurricane Andrew, studies were conducted to determine whether the damage suffered was attributable to the intensity of the storm or to the location and type of development in South Florida. The Institute for Business and Home Safety (IBHS), found the following:

> A 40-year period of relatively benign weather left southern Florida with a false sense of security regarding its ability to withstand hurricanes. This

NOTE

Figure 5-5, in Chapter 5, shows the effects of multiple storms occurring in the same year. The photos were taken on the North Carolina coast after Hurricanes Bertha and Fran.

NOTE

In the period from 1986 to 1992, hurricanes and tropical storms accounted for the major share of all property insurance losses (Ayscue 1996). The total percent of all property damage (e.g., wind, flood, other) caused by various events during this period are as follows:

- hurricane/tropical storm: 53%
- tornado/other wind: 35%
- fire/explosion: 5%
- earthquake: 3%
- riot/civil disorder: 2%
- other: 2%

CROSS-REFERENCE

Compare the post-Andrew findings presented here with those following the 1926 Miami hurricane (see Section 2.2.2, in Chapter 2).

> led to a complacency about hurricane risk, leading to "helter-skelter' development, lackluster code enforcement, building code amendments, shortcuts in building practices, and violations that seriously undermined the integrity of the [building] code and the quality of the building stock. Conservative estimates from claim studies reveal that approximately 25 percent of Andrew-caused insurance losses (about $4 billion) were attributable to construction that failed to meet the code due to poor enforcement, as well as shoddy workmanship. At the same time, concentrations of population and of property exposed to hurricane winds in southern Florida grew many-fold (IBHS 1995).

Chapters 2, 3, and 7 of this manual present detailed information about hazards and risks associated with building in coastal areas. This chapter looks at general financial implications of siting, design, and construction of residential buildings in high-hazard areas and the benefit/cost of mitigation measures. Secondly, this chapter provides information about flood, wind, and earthquake insurance that may help offset potential financial losses to residential buildings.

9.2 Benefit and Cost Implications of Siting, Design, and Construction

This manual is designed to help property owners manage some of the risk associated with constructing a residential building in a coastal hazard area. As shown in Chapter 2, studies of past natural disasters have demonstrated that sound siting, design, engineering, construction, and maintenance practices are important factors in the ability of a building to survive a hazard event with little or no damage. Chapters 8, 11, 12, 13, and 14 provide detailed information about how to site, design, construct, and maintain a building in ways that will help manage risks.

Constructing to a model building code and complying with regulatory siting requirements will provide a building with a certain level of protection against damage from natural hazards. However, compliance with minimum code and regulatory requirements does not guarantee that a building will be free from danger. Exceeding code and regulation minimums will not only provide an added measure of safety, but also add to the cost of construction, and that cost must be weighed against the benefit gained.

The often minimal initial cost of additional mitigation measures offers long-term benefits that will provide a positive lifecycle cost. Incorporating mitigation measures can reduce a homeowner's insurance premiums and will better protect the building and its contents and occupants during a natural hazard event.

Table 9.1 lists examples of flood and wind mitigation measures that can be taken to help a structure better withstand a natural disaster.

Table 9.1 Examples of Flood and Wind Mitigation Measures

Mitigation Measure	Cross-Reference*	Benefits/Advantages	Costs/Disadvantages
Adding 1 to 2 feet to the required elevation of the lowest floor or lowest horizontal structural member of the building	2.3.3 6.5	Reduces the potential for the structure to be damaged by waves and/or floodwaters	May conflict with community building height restrictions; may require additional seismic design considerations; longer pilings may cost more
Increasing embedment depth of pile foundations	2.3.3 2.3.4	Adds protection against scour and erosion	Longer pilings may cost more
Improving flashing and weather-stripping around windows and doors	12.7.2.4 12.7.3.1 13.4	Reduces water and wind infiltration into building	Increases the number of important tasks for contractor to monitor
Installing fewer breakaway walls or installing more openings in continuous foundation walls	2.3.3	Decreases potential for damage to understory of structure; reduces amount of debris during storm event	Reduces the ability to use understory of structure for storage
Elevating a building in a coastal A zone on an open foundation or using only breakaway walls for enclosures below the lowest floor	2.3.3 6.5.2	Reduces the potential for the structure to be damaged by waves, erosion, and floodwaters	Reduces the ability to use understory of structure for storage
Adding shutters for glazing protection	2.3.3 12.7.4.5	Reduces the potential for damage from windborne debris impact during a storm event and reduces potential for wind-driven rain water infiltration	Shutters require installation or activation before a storm event
Using asphalt roof shingles with high bond strength	12.7.5.1	Reduces shingle blowoff during high winds	High-bond-strength shingles are slightly more expensive
Installing wood siding instead of vinyl siding	12.7.2.1	Wood siding reduces blowoff on walls during high winds	Wood siding may cost more than other materials and requires additional maintenance
Using metal connectors or fasteners with a thicker galvanized coating or connectors made of stainless steel	2.3.3 14.3.6 14.5 Appendix H (TB 8)	Reduces the potential for corrosion of connectors	Thicker coating and stainless steel are more costly
Install additional roof sheathing fasteners, install additional underlayments, or improve roof covering details as required	2.3.3 2.3.4 12.7.5 13.4 14.5	Reduces roof covering and interior wind and water damage from a severe event	Minimal increased cost when these tasks are done during reroofing project

* Sections in this manual.

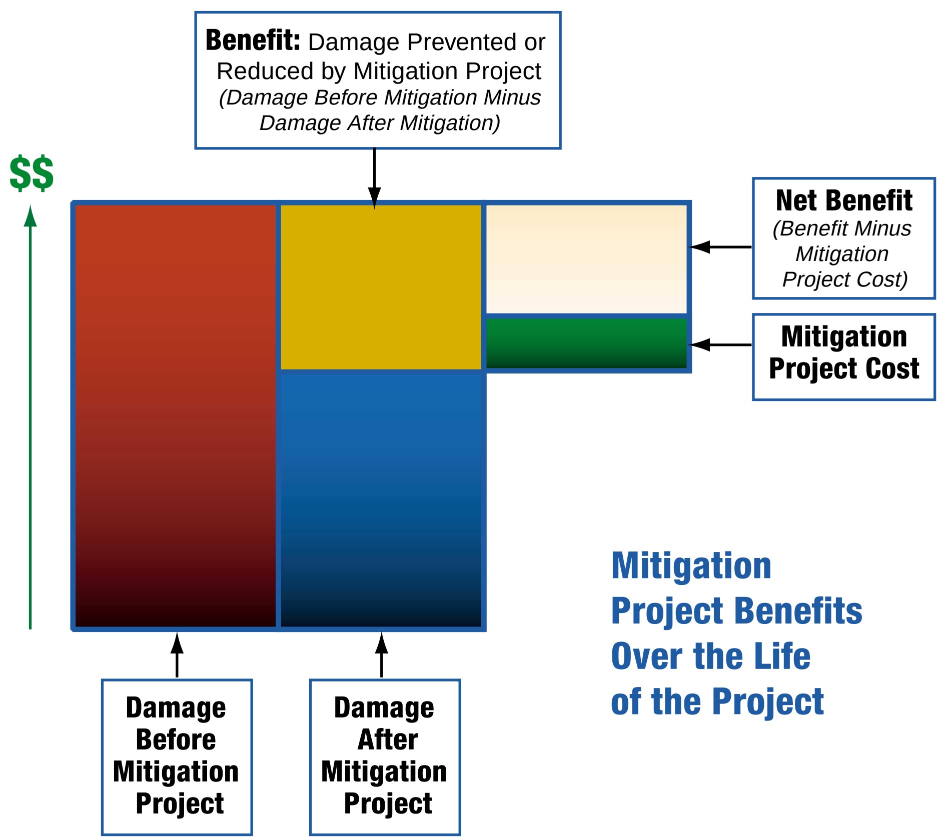
The need for and benefit of some measures may be difficult to predict. For example, elevating a building above the Design Flood Elevation (DFE) could add to the cost of the building. This additional cost must be weighed against the probability of a flood or storm surge exceeding the DFE. The chart shown in Figure 9-1 illustrates the comparative relationship between damage, project costs, and benefits associated with a hazard mitigation project. These comparisons are made on a present-value basis over the life of the project. A project-specific benefit/cost analysis will assist in the development of such comparisons (FEMA 1996).

WARNING

In general, benefit/cost models do not take into account human suffering (e.g., the emotional stress induced by the loss of irreplaceable items and the trauma of rebuilding after a devastating event).

Models are available to assist in the determination of the long-term benefit of various mitigation measures versus the short-term cost of implementing those measures. FEMA has developed benefit/cost models for flood, wind, and seismic hazard mitigation measures. The models measure benefit as the amount of future damage avoided as a result of the mitigation measure undertaken. They can be used to determine the value of measures intended to mitigate against different natural hazards. Although costs can be determined from detailed engineering studies, benefits are estimated, because the timing and severity of future hazard events can only be probabilistically estimated. Benefit/cost models are useful tools that provide a reasonable method for determining whether a project is or is not cost-effective (FEMA 1996).

Figure 9-1
Basic benefit/cost model.



The benefit/cost analysis method is basically the same for each type of hazard mitigation project. These models use the following types of data to determine the benefit/cost ratio of a given mitigation measure:

- building type
- building location
- number of stories, or elevation
- construction date
- building replacement value
- value of contents
- displacement costs incurred because of damage to the residence
- rental/business income
- useful life of mitigation project
- mitigation project cost
- annual maintenance costs
- relocation costs for mitigation project
- hazard data, including expected number of events at various intensities

NOTE

FEMA Benefit/Cost models include computer software that can be used to perform calculations.

The only differences among models are in the types of hazard data used in the calculations. For example, wind speed/storm class is used to estimate damage for wind mitigation projects; the depth of flooding is used to estimate damage for flood mitigation projects; and the severity of ground shaking is used to estimate damage for earthquake mitigation projects (FEMA 1996). Table 9.2 presents the computer model default estimates for damage to a building from high winds. The table indicates the percentage of the building that would be damaged by various storm classes (according to the Saffir-Simpson scale) for the five building (engineering) types used in FEMA's Hurricane Wind Mitigation Benefit/Cost Model (FEMA 1996).

Table 9.2 Default Wind Damage as a Percent of Building Value

Storm Class (Wind Speed in mph)*	Building Type			
	Non-Engineered Wood	Non-Engineered Masonry	Lightly Engineered	Fully Engineered
0 (60-73)	0	0	0	0
1 (74-95)	7.5	5	5	2.5
2 (96-110)	20	15	15	5
3 (111-130)	50	40	40	20
4 (131-155)	90	80	80	40
5 (>155)	100	100	100	60

* Wind speed is 1-minute sustained wind speed over land at 33 ft above the ground at a specific building site.

The definitions of the building types used in the Hurricane Wind Mitigation Benefit/Cost Model are as follows:

- Non-engineered wood – These buildings do not receive specific engineering attention. They include single- and multi-family residences, some one- or two-story apartment units, and some small commercial buildings.

- Non-engineered masonry – These buildings do not receive specific engineering attention. They include single- and multi-family residences, some one- or two-story apartment units, and some small commercial buildings.

- Lightly engineered – These buildings may combine masonry, light steel framing, open-web steel joists, wood framing, and wood rafters. Some parts of these building receive engineering attention while others do not. These buildings include motels, and commercial and light industrial buildings.

- Fully engineered – These buildings are usually designed for a specific site and therefore receive individualized design attention. They include high-rise office buildings, hotel buildings, hospitals, and most public buildings.

The default wind-damage information may need to be modified to account for the following:

- variations in building height
- differences in construction practices, age of the building, or general location in the country
- variation in wind exposure and topographic effects
- windborne debris

Tables 9.3 and 9.4 present FEMA's Federal Insurance Administration (FIA) damage estimates for various flood depths for site-built buildings in V zones and A zones. The depth-damage data presented in Table 9.4 are used in FEMA's Riverine and Coastal A-Zone Flood Mitigation Benefit/Cost Model (FEMA 1995). Flood depths in Table 9.3 are given in relation to the bottom of the lowest horizontal structural member; flood depths in Table 9.4 are given in relation to the top of the lowest floor.

Figure 9-2 compares the depth-damage relationships for two types of buildings: a V-zone building with no obstruction below the lowest floor and a two-story A-zone building without a basement. Note that the flood depths shown in Figure 9-2 for both V-zone and A-zone buildings are given in relation to the bottom of the lowest horizontal structural member. The conversion of A-zone depths shown in Table 9.4—which are in relation to the top of the lowest floor—is based on the assumption that the distance between the top of the lowest floor and the bottom of the lowest horizontal structural member is equal to 2 feet.

The flood damage percentages shown in Tables 9.3 and 9.4 were developed from flood insurance claims information, so they reflect actual loss history. The following are important considerations in the use of these loss data:

- All construction types are included in the building categories listed, so one-story houses may include any of several types (e.g., wood-frame, masonry).
- Differences in foundation types, construction practices, and the age of the buildings are not considered.
- Because the information comes from actual claims data, the damage percentage from large flood depths is less reliable, because there is less flood history at these depths.
- The loss data are for flood losses caused by any type of flood hazard—including high-velocity flow, debris flow, and ice flows—and for floods of any duration.

Table 9.3
FIA Depth-Structure Damage Data for V-Zone Buildings (Damage in Percent of Building Replacement Value)

	Building Condition	
Flood Depth[b]	No Obstruction[c]	With Obstruction
-2	10.0	20.0
-1	12.0	21.5
0	15.0	24.0
1	23.0	29.0
2	35.0	37.0
3	50.0	54.0
4	58.0	60.5
5	63.0	64.5
6	66.5	68.0
7	69.5	70.0
8	72.0	72.0
9	74.0	74.0
10	76.0	76.0
11	78.0	78.0
12	80.0	80.0
13	81.5	81.5
14	83.0	83.0
15	84.0	84.0
16	85.0	85.0
17	86.0	86.0
18	87.0	87.0

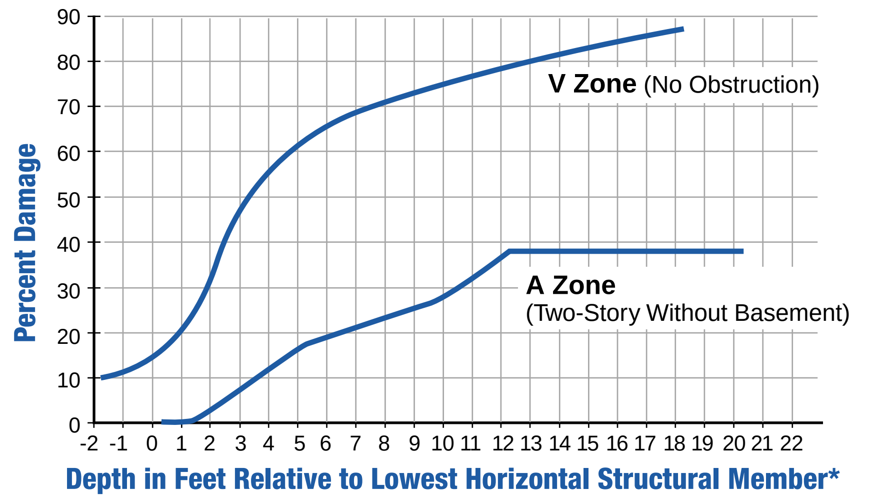
a 1987 FIA data.
b Relative to bottom of lowest horizontal structural member.
c Obstruction = machinery, equipment, or enclosure below the elevated floor.

Table 9.4
FIA Depth-Structure Damage Data for A-Zone Buildings (Damage in Percent of Building Replacement Value)

	Building Type				
Flood Depth*	One-Story w/o Basement	Two-Story w/o Basement	Split Level w/o Basement	One- or Two-Story w/Basement	Split Level w/ Basement
-2	0	0	0	4	3
-1	0	0	0	8	5
0	9	5	3	11	6
1	14	9	9	15	16
2	22	13	13	20	19
3	27	18	25	23	22
4	29	20	27	28	27
5	30	22	28	33	32
6	40	24	33	38	35
7	43	26	34	44	36
8	44	29	41	49	44
9	45	33	43	51	48
10	46	38	45	53	50
11	47	38	46	55	52
12	48	38	47	57	54
13	49	38	47	59	56
14	50	38	47	60	58
15	50	38	47	60	58
16	50	38	47	60	58
17	50	38	47	60	58
18	50	38	47	60	58

* Relative to top of lowest floor.

Figure 9-2
Comparison of FIA V-zone and A-zone depth-structure damage functions (no contents damage included).



* Assumes distance between top of floor and bottom of lowest horizontal structural member = 2 ft for A-zone building.

FEMA's Hurricane Wind Mitigation Benefit/Cost Model can help determine the benefit of implementing a mitigation measure to protect a building from wind damage. For example, the addition of storm shutters to a $250,000 house 2 miles from the North Carolina coast can reduce potential damage to a building from over $33,000 to $15,000 over a period of 30 years, adjusted to present value. After subtracting the project cost (approximately $15,000 for storm shutters), the present-value net benefit to the homeowner is over $17,000, for a benefit/cost ratio greater than 2.

COST CONSIDERATIONS

Note that the wind and flood mitigation measures discussed in these examples have financial benefits exceeding costs by a factor of 2.

According to FEMA's Flood Mitigation Benefit/Cost Model, elevating a new two-story house in South Carolina's coastal A zone 3 feet above the Base Flood Elevation (BFE) on longer piles would provide a benefit/cost ratio greater than 2, and result in significantly lower flood insurance premiums under the National Flood Insurance Program (NFIP).

9.3 Hazard Insurance

Insurance should never be viewed as an alternative to damage prevention. However, despite best efforts to manage risk, there is always the potential for structures in coastal areas to be damaged during a natural hazard event. Hazard insurance to offset potential losses is an important consideration for homeowners in coastal areas. The availability and cost of hazard insurance will vary depending on the location of the building and the quality of the design and construction techniques used. Insurance companies base hazard insurance rates on the potential for a building to be damaged by various hazards and the ability of the building to withstand those hazards. Among the things that affect hazard insurance rates are the following:

- type of building
- location of the building
- date of construction
- existence and effectiveness of a fire department and fire hydrants (or other dependable, year-round sources of water)
- effectiveness of the building code and building department in place at the time of construction

While designers and builders may not be able to control the rates and availability of insurance, they should understand the implications of siting and construction decisions on insurance costs, and they should make homeowners aware of the risk and potential expense associated with owning a house in a high-hazard area. Insurance considerations can and do affect the placement and height of coastal buildings and the materials used in their construction. Input from an insurance industry representative during the design process, rather than after the completion of the building, can positively influence important decisions in addition to potentially saving homeowners money on insurance premiums.

NOTE

Standard homeowner's insurance policies do not normally cover damage from flood or earth movement (e.g., earthquakes, mudslides).

Standard homeowner's insurance policies cover multiple perils, including fire, lightning, hail, explosion, riot, smoke, vandalism, theft, volcanic eruption, falling objects, weight of snow, and freezing. In addition, wind is usually, although not always, covered by homeowner's policies. Homeowner's insurance also includes liability coverage. Endorsements may often be added for earthquake coverage as well. A separate policy for flood is normally required.

NOTE

A single-family home is covered by homeowner's insurance and a multi-family building is covered by a dwelling policy. A "homeowner's policy" is different from a "dwelling policy." A homeowner's policy is a multi-peril package policy that automatically includes fire and allied lines, theft, and liability coverage. For a dwelling policy, peril coverages are purchased separately. This chapter focuses on homeowner's insurance.

9.3.1 Flood Insurance

As described in Chapter 6, flood insurance is offered through the NFIP in communities (e.g., incorporated cities, towns, villages; unincorporated areas of counties, tribes, and parishes) that participate in the program. The purchase of flood insurance is required as a condition of receiving federally backed, regulated, or insured financial assistance for the acquisition of buildings in the SFHA. This includes almost all mortgages secured by property in an SFHA. This insurance is not available in communities that do not participate in the NFIP. Most coastal communities participate in the program, because they recognize the flood hazard and the need for flood insurance.

The following sections summarize how coastal buildings are rated for flood insurance and how premiums are established.

9.3.1.1 Rating Factors

There are seven rating factors for flood insurance coverage for buildings (not including contents):

- building occupancy
- building type
- flood insurance zone
- date of construction
- elevation of lowest floor or bottom or the lowest horizontal structural member of the lowest floor
- enclosures below the lowest floor
- location of utilities and service equipment

These factors are discussed below.

Building Occupancy – The NFIP bases its rates on four types of building occupancy:

- single-family
- two- to four-family
- other residential
- non-residential

Only slight differences exist among the rates for the three types of residential buildings.

NOTE

The NFIP regulations define **basement** as any area of a building having its floor subgrade (i.e., below ground level) on all sides.

Building Type – The NFIP bases its rates on the following building-type factors:

- whether there is one floor or more than one floor
- whether there is a **basement**
- whether the building is elevated (with or without an enclosure below the lowest elevated floor)
- whether the building is a manufactured home on a permanent foundation

NFIP flood insurance is generally more expensive for buildings with basements and for buildings with enclosures below the BFE.

Flood Insurance Zone – The zones are grouped for rating purposes:

- V zones (V, VE, and V1-V30) – the zones closest to the water, subject to "coastal high hazard flooding" (i.e., flooding with wave heights greater than 3 feet). Insurance is most expensive in V zones because of the severity of the hazard. However, the zones are often not very wide, and most coastal buildings are located in A or X zones. (Zones V1-V30 were used on Flood Insurance Rate Maps (FIRMs) until 1986. FIRMs published since then show VE zones.)
- A zones (A, AE, AR, AO, and A1-A30) – in coastal flood hazard areas where the wave heights are less than 3 feet. (Zones A1-A30 were used on FIRMs until 1986. FIRMs published since then show AE zones.)
- B, C, and X zones – the zones outside the 100-year floodplain, or Special Flood Hazard Area. (Zones B and C were used on FIRMs until 1986. FIRMs published since then show X zones.) Insurance is least expensive in these zones and generally not required by mortgage lenders.

NOTE

Because B, C, and X zones designate areas outside the Special Flood Hazard Area, construction in these zones is not subject to NFIP floodplain regulations; this summary does not discuss the flood insurance rating of buildings in B, C, and X zones for flood insurance.

FIRMs show areas designated as being within the Coastal Barrier Resources System or "otherwise protected areas." These areas (known as "CBRA zones") were identified by the Coastal Barrier Resources Act and subsequent amendments. Flood insurance is available for buildings in these zones only if the buildings were walled and roofed before the CBRA designation date shown in the FIRM legend, and only if the community participates in the NFIP.

CROSS-REFERENCE

Section 6.6, in Chapter 6, discusses the Coastal Barrier Resources Act and Coastal Barrier Resources System.

Date of Construction – In each community participating in the NFIP, buildings constructed on or before the date of the first FIRM for that community (or December 31, 1974, whichever is later) have flood insurance rates that are "grandfathered" or "subsidized." These buildings are referred to as ***pre-FIRM***. They are charged a flat rate based on the previously listed rating factors – building occupancy, building type, and flood insurance zone.

The rates for buildings constructed after the date of the first FIRM (***post-FIRM*** buildings) are based on the previously listed rating factors and on two additional rating factors: (1) elevation of the top of the lowest floor (in an A zone) or bottom of the lowest horizontal structural member of the lowest floor (in a V zone) and (2) enclosed areas below the lowest floor in an elevated building.

NOTE

For additional information about substantial damage, refer to *Answers to Questions About Substantially Damaged Buildings*, FEMA 213 (FEMA 1991),

If a pre-FIRM building is substantially improved (i.e., the value of the improvement exceeds 50 percent of the market value of the building before the improvement was made), it is rated as a post-FIRM building. If a pre-FIRM building is substantially damaged for any reason (i.e., the true cost of repairing the building to its pre-damaged condition exceeds 50 percent of the value of the building before it was damaged), it too is rated as a post-FIRM building, regardless of the amount of repairs actually undertaken. The local building official or floodplain administrator, not the insurance agent, determines whether a building is substantially improved or substantially damaged.

An additional insurance rate table is applied to buildings constructed in V zones on or after October 1, 1981. The table differentiates between buildings with an obstruction below the elevated lowest floor and those without such an obstruction.

Elevation of Lowest Floor – In A zones, the rating for post-FIRM buildings is based on the elevation of the lowest floor in relation to the BFE. In V zones, the rating for post-FIRM buildings is based on the elevation of the bottom of the lowest horizontal member in relation to the BFE. The flood insurance rates decrease for buildings elevated above the BFE. The premiums increase significantly for a building rated at 1 foot or more below the BFE (see Tables 9.5 and 9.6 in Section 9.3.1.3).

In A zones, a building on a crawlspace must have openings in the crawlspace walls that will allow for the unimpeded flow of floodwaters more than 1 foot deep. If the crawlspace walls do not have enough properly sized openings, the crawlspace will be considered an enclosed floor and the building may be rated as having its lowest floor at the elevation of the grade inside the crawlspace. Similarly, if furnaces and other equipment serving the building are below the BFE, the insurance agent must submit more information on the structure to the NFIP underwriting department before the policy's premium can be determined.

NOTE

Flood insurance is available through the NFIP for the following types of buildings: single-family, 2–4 family, other residential, and non residential. Condominium policies are also available. Designers may wish to consult knowledgeable insurance agents and the *Flood Insurance Manual* for policy details and exclusions that will affect building design and use. Additional information is available in *Answers to Questions about the National Flood Insurance Program*, FIA-2, (FEMA 1990).

Enclosures Below the Lowest Floor – In V zones, buildings built on or after October 31, 1981, are rated in one of three ways:

1. A building is rated as "free of obstruction" if there is no enclosure below the lowest floor other than insect screening or open wood latticework—"open" means at least 50 percent of the lattice construction is open.
2. A building is subject to a more expensive "with obstruction" rate if service equipment or utilities are located below the lowest floor or if "breakaway" walls enclose an area of less than 300 ft^2 below the lowest floor.
3. If the area below the lowest floor has more than 300 ft^2 enclosed by breakaway walls, has non-breakaway walls, or is finished, then the floor of the enclosed area is the building's lowest floor and the insurance agent must submit more information on the structure to the NFIP before the policy's premium can be determined.

The Standard Flood Insurance Policy (SFIP) provides coverage for walled and roofed structures, including certain building components and contents in areas below the elevated floors of elevated buildings. This coverage can even include some items *prohibited* by FEMA/local floodplain management regulations where the NFIP deems the items essential to the habitability of the building. **Designers and building owners should not confuse insurability with proper design and construction. Moreover, significant financial penalties (e.g., increased flood insurance premiums, increased uninsured losses) may result from improper design or use of enclosed areas below the BFE.**

WARNING

There are some differences between what is permitted under floodplain management regulations and what is covered by NFIP flood insurance. Building designs should be guided by floodplain management requirements, not by flood insurance policy provisions.

With the above caveats in mind, buildings insured under the SFIP will include coverage (up to specified policy limits) for the following items below the BFE:

- required utility connections
- footings, foundation, posts, pilings, piers, or other foundation walls and anchorage system as required for the support of the building
- stairways and staircases attached to the building that are not separated from the building by an elevated walkway
- elevators, dumbwaiters, and relevant equipment, except for such relevant equipment installed below the BFE on or after October 1, 1987
- building and personal property items—necessary for the habitability of the building—connected to a power source and installed in their functioning location, as long as the building and personal property coverage has been purchased (e.g., air conditioners, fuel tanks, furnaces, hot water heaters, clothes washers and dryers.)
- debris removal, where such debris was generated during a flood

COST CONSIDERATION

There may be significant financial penalties associated with the improper design, construction, conversion, or use of areas below the lowest floor.

The SFIP does **not** provide coverage for the following building components and contents in areas below the elevated floors of elevated residential buildings.

- breakaway walls and enclosures that do not provide support to the building
- non-structural slabs beneath an elevated building
- walks, decks, driveways, and patios located outside the perimeter of the exterior walls of the building
- underground structures and equipment, including wells, septic tanks, and septic systems

- equipment, machinery, appliances, and fixtures not deemed necessary for the habitability of the building
- fences, retaining walls, seawalls, and revetments
- indoor and outdoor swimming pools
- structures over water, including piers, docks, and boat houses
- personal property
- loss of land and landscaping

9.3.1.2 Coverage

To be insurable under the NFIP, a "building" must be walled and roofed with two or more rigid exterior walls and must be more than 50 percent above grade. Examples of structures that are **not** insurable because they do not meet this definition are gazebos, pavilions, docks, campers, underground storage tanks, swimming pools, fences, retaining walls, seawalls, bulkheads, septic tanks, and tents. Buildings constructed entirely over water or seaward of mean high tide after October 1, 1982, are not eligible for flood insurance coverage. Certain parts of boathouses located partially over water (e.g., the ceiling and roof over the area where boats are floated) are not eligible for coverage.

9.3.1.3 Premiums

The premium paid is based on the seven rating factors previously discussed, plus the following:

- an expense constant
- a Federal policy fee
- the cost of Increased Cost of Compliance (ICC) Coverage
- the amount of deductible the insured chooses

If a community elects to exceed the minimum NFIP requirements, it may apply for a classification under the NFIP Community Rating System (CRS). Based on its floodplain management program, the community could receive a CRS classification that provides up to a 45-percent premium discount for property owners within the community. At the time this manual was prepared, nearly 900 communities were participating in the CRS, representing over 65 percent of all flood insurance policies.

Tables 9.5 and 9.6 list sample NFIP premiums for a post-FIRM, one-story, single-family residence without a basement in various flood zones. Note: For buildings in V zones, premiums rise somewhat for structures with breakaway obstructions, and premiums rise dramatically for structures with obstructions (service equipment, utilities, or non-breakaway walls) below the lowest floor.

For buildings in A zones, premiums rise when proper flood openings are not provided in enclosed areas or when service equipment or utilities are located below the BFE.

Table 9.5 Sample NFIP Flood Insurance Premiums for Buildings in A Zones
(Coverage: $200,000 Building / $100,000 Contents)

Flood Zone	Elevation of the Lowest Floor Above or Below the BFE (ft)	Annual Premium[a]	Savings
AE	-1	$3,093	-$2,376
AE	0	$717	0
AE	+1	$531	$186
AE	+2	$440	$277
AE	+3	$420	$297

[a] Rates as of May 1998.

COST CONSIDERATIONS

Note from Tables 9.5 and 9.6:

In an A zone (see Table 9.5), insurance premiums cost $2,023/ year less when house is at BFE vs. 1 foot below BFE.

In a V zone with no obstructions (see Table 9.6), insurance costs $910 less when house is at BFE vs. 1 foot below BFE.

Table 9.6 Sample NFIP Flood Insurance Premiums for Buildings in V Zones – With and Without Obstructions Below the Lowest Floor[a] *(Coverage: $200,000 Building / $100,00 Contents)*

Flood Zone	Elevation of the Lowest Floor Above or Below the BFE (ft)	Annual Premium[b] w/ No Obstruction	Savings	Annual Premium[b] w/ <300ft^2 Obstruction	Savings
VE	-2	$4,850	-$2,150	$5,430	-$2,010
VE	-1	$3,610	-$910	$4,250	-$830
VE	0	$2,700	0	$3,420	0
VE	+1	$2,010	$690	$2,810	$610
VE	+2	$1,430	$1,270	$2,290	$1,130
VE	+3	$1,110	$1,590	$2,050	$1,370
VE	+4	$990	$1,710	$1,950	$1,470

[a] For buildings with > 300 ft^2 obstruction, premium to be determined by NFIP underwriting department from information provided by insurance agent (see page 9-14).

[b] Rates as of May 1998.

9.3.2 Wind Insurance

Wind insurance coverage is generally part of a homeowner's insurance policy. At the time this manual was published, underwriting associations (or "pools") provided last resort insurance to homeowners in coastal areas who could not obtain coverage from private companies. Eight states had beach and windstorm insurance plans at the time this manual was prepared: Alabama, Florida, Louisiana, Mississippi, New York, North Carolina, South Carolina, and Texas. In addition, New Jersey operates the Windstorm Market Assistance Program (Wind-MAP) to help residents in coastal communities find homeowner's insurance on the voluntary market. When Wind-MAP does not identify an insurance carrier for a homeowner, the New Jersey FAIR Plan may provide a policy for windstorm, hail, fire, and other perils; it does not cover liability.

Wind is only one part of the rating system for multi-peril insurance policies such as a homeowner's insurance policy. Most companies rely on the Homeowner's Multistate General Rules and state-specific exceptions manual of the Insurance Services Office (ISO) as the benchmark for developing their own manuals. ISO stresses that its manual's rules are advisory only and that it is up to each company to decide what to use and charge. The ISO publishes a Homeowner's manual in every state except Hawaii, North Carolina, and Washington State (where state-mandated insurance bureaus operate), and in Texas, where, at the time this manual was prepared, the ISO Homeowner's Program was pending before the Department of Insurance.

The six basic factors considered in rating a homeowner's (HO) insurance policy are as follows:

- form (e.g., HO2, HO3, which determines the type of coverage)
- territory
- fire protection class
- building code effectiveness
- construction type
- protective devices

The last five of these factors are discussed below. Premiums can vary because of other factors as well, such as amount of coverage and deductible, but these additional factors are not related to building construction. Some companies, however, adjust their higher optional deductible credit according to construction type, giving more credit to more fire-resistant concrete and masonry buildings.

Territory – Wind coverage credit varies by "territory." An entire state may be one territory. However, some states, such as Florida, are broken down into county and sub-county territories. In Florida, the Intracoastal Waterway is frequently used as the boundary line.

Fire Protection Class – ISO publishes a public protection classification for each municipality or fire district based on an analysis of the local fire department, water system, and fire alarm system. This classification does not affect wind coverage, but is an important part of the rate setting.

Building Code Effectiveness Grading Schedule – ISO also publishes a Building Code Effectiveness Grading Schedule (BCEGS) that rates communities on factors such as the adopted building codes and enforcement of these codes. The schedule focuses on natural hazard mitigation and is used only in the determination of wind, hail, and earthquake coverage. Credit is based on the building code adopted and the relative degree of commitment the community has to code enforcement. In Florida, the BCEGS grading can provide a credit of as much as 11 percent.

BCEGS is still being implemented and has not been completed for some communities; however, all areas subject to coastal storms have been graded. The program is being implemented with a goal of having all states graded by the end of the year 2000. The schedule applies only to buildings constructed during the year of ISO's grading or later. BCEGS is a voluntary program, and not all insurance companies have adjusted their premiums to reflect the community's BCEGS class.

Construction Type – To simplify insurance underwriting procedures, buildings are identified as being in only one of four categories:

- frame: exterior walls of wood or other combustible construction, including stucco and aluminum siding
- masonry veneer: exterior walls of combustible material, veneered with brick or stone
- masonry: exterior walls of masonry materials, floor and roof of combustible materials
- superior: "non-combustible," "masonry non-combustible," or "fire resistive"

(Because it is hard to differentiate masonry veneer from masonry, they are often given the same rating.)

Not many single-family homes qualify as "superior," which qualifies for a 15-percent credit off the masonry rates. A home of this type may also qualify for a wind credit because some insurers believe that buildings with walls, floors, and roofs made of concrete products offer good resistance to windstorms and Category 1 hurricanes. Therefore, a fire-resistive home may get a wind-resistive credit.

ISO's dwelling insurance program allows companies to collect data from the owner, the local building department, or their own inspectors to determine whether a house can be classified as "wind-resistive" or "semi-wind-resistive" for premium credit purposes.

Protective Devices – Protective devices are not considered basic factors, but items that may deserve some credits. This approach is more common for fire and theft coverages, which, for example, credits sprinklers and fire and/or burglar alarms tied to the local fire or police stations. ISO's rules do not address wind protective devices, except in Florida. In Florida, a premium credit is given if "… exterior wall and roof openings [other than roof ridge and soffit vents] are fully protected with storm shutters of any style and material that are designed and properly installed…" to (1) meet the latest ASCE 7 engineering standard adopted by Dade County and (2) withstand impact from windborne debris in accordance with standards set by (a) the municipality or (b) if there are no local standards, by Dade County. The rules also provide specifications for alternatives to storm shutters, such as windstorm protective glazing material.

9.3.3 Earthquake Insurance

Earthquake insurance is an addition to a regular homeowner's insurance policy. Earthquake insurance carries a very high deductible – usually 10 or 15 percent of the value of the house. In most states, ISO has developed advisory earthquake loss costs based on a seismic model used to estimate potential damage to individual properties in the event of an earthquake. The model is based on seismic data, soil types, damage information from previous earthquakes, and structural analysis of various types of buildings. Based on this model, postal ZIP codes have been assigned to rating bands and loss costs developed for each band. The number of bands varies within each state and, at times, within a county.

In California, the California Earthquake Authority (CEA), a state-chartered insurance company, writes most earthquake policies for homeowners. These policies cover the dwelling and its contents and are subject to a 15-percent deductible. CEA rates are also based on a seismic model used to estimate potential damage to individual properties in the event of an earthquake.

9.4 References

Ayscue, J. K. 1996. The Johns Hopkins University. *Hurricane Damage to Residential Structures: Risk and Mitigation*. Natural Hazards Research and Applications Information Center, Institute of Behavioral Science, University of Colorado Natural Hazards Research Working Paper #94. November.

Federal Emergency Management Agency. 1990. *Answers to Questions About the National Flood Insurance Program*. FIA-2. February.

Federal Emergency Management Agency. 1991. *Answers to Questions About Substantially Damaged Buildings.* FEMA 213. May.

Federal Emergency Management Agency. 1995. *Engineering Principles and Practices for Retrofitting Flood Prone Residential Buildings*. FEMA 259. January.

Federal Emergency Management Agency. 1996. *How to Determine Cost-Effectiveness of Hazard Mitigation Projects (Interim Edition).* December.

Institute for Business and Home Safety (IBHS) and Insurance Research Council. 1995. *Coastal Exposure and Community Protection: Hurricane Andrew's Legacy*. Boston, Massachusetts.