National Flood Insurance Program

V-Zone Risk Factor Rating Form and Instructions

2010 Edition

FEMA

National Flood Insurance Program

V-Zone Risk Factor Rating Form

FEMA FORM 086-0-4

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PURPOSE OF V-ZONE RISK FACTOR RATING FORM

The severe economic losses due to flood damage led to the establishment of the NFIP to fulfill the essential purposes of community flood hazard mitigation and provide flood hazard insurance protection. This certification form can be used to (1) guide designers, owners, local officials, agents, and others as they consider those types of siting, design, and construction activities that exceed minimum NFIP requirements, and (2) rate buildings and provide insurance premium discounts to those structures that exceed minimum NFIP siting, design, and construction requirements.

This form provides a basis for the actuarial rating of buildings and their contents on an individual risk basis that allows a rate discount for prudent building designs. This approach will serve to further the NFIP goals of providing incentives for hazard mitigation in coastal high hazard flood risk zones while permitting adequate insurance protection under premium rates that ensure that the risk of flood losses related to building placement and construction is borne by the owners of the properties at risk.

Thus, construction in coastal high hazard areas should follow certain construction guidelines. Those construction guidelines, explanations, data, and examples for residences are set forth in the third edition of the FEMA *Coastal Construction Manual* (CCM), which was published in June 2000.

To obtain a copy of the *Coastal Construction Manual*, you may submit a written request to:

FEMA Distribution Center
P.O. Box 2012
Jessup, MD 20794

or call toll-free 1-800-480-2520 and ask for the FEMA *Coastal Construction Manual*, either the print publication (FEMA 55) or the interactive CD-ROM (FEMA 55CD).

U.S. DEPARTMENT OF HOMELAND SECURITY
FEDERAL EMERGENCY MANAGEMENT AGENCY
National Flood Insurance Program

O.M.B. No. 1660-0006
Expires August 31, 2013

V-Zone Risk Factor Rating Form

Important: Read the instructions that begin immediately after page 5 of 5 of this form.

SECTION A — PROPERTY INFORMATION

			FLOOD PROGRAM USE ONLY	
POST-CONSTRUCTION PROPERTY ADDRESS (address of building being rated, if known)			V.R.N. NO.	
CITY	STATE	ZIP CODE	DATE REC.	INIT.
PROPERTY DESCRIPTION (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.)				
BUILDING USE (e.g., Residential, Non-residential, Addition, Accessory, etc.)				
LATITUDE/LONGITUDE (Optional) (## °– ## '– ##.## " or ##.##### °)	HORIZONTAL DATUM ☐ NAD 1927 ☐ NAD 1983	SOURCE: ☐ GPS (Type) ☐ USGS Quad Map ☐ OTHER		
ESTIMATED COST OF CONSTRUCTION (excluding cost of land)				

Owner			
NAME			
ADDRESS (NOT NECESSARILY THE PROPERTY BEING RATED)	CITY	STATE	ZIP CODE
TELEPHONE AREA CODE AND EXCHANGE NUMBER			

Elevation certification may be determined by a registered professional surveyor, engineer, or architect (attach certification). The elevation data and Flood Insurance Rate Map (FIRM) information may be obtained from the Elevation Certificate. If this certificate is not available, the professional certifying this document must determine the required information, if authorized by law.

NFIP Community No. _____ Base Flood Elevation (BFE)* _____ Datum _____

FIRM Panel No. _____ 100-year stillwater elevation* _____ Datum _____

FIRM Effective Date _____ Average grade elevation* _____ Datum _____

FIRM Zone _____ Bottom of lowest horizontal supporting member elevation* _____ Datum _____

* All elevations must be referenced to the datum on which the FIRM is based (e.g., NGVD, NAVD).

SECTION B — COASTAL V-ZONE FLOOD RISK BUILDING POINT CALCULATION SHEET

Enter your File or Identification Number here and on the top of pages 2 of 5 through 5 of 5 _____

The submitting registered professional engineer or architect should complete the calculation sheet using the building points shown.

You may use this form only if:

1. The bottom of the lowest horizontal supporting member of the lowest floor is at or above 0.1 foot below the BFE. ☐ Yes (continue) ☐ No (**STOP**)
2. Only flood-damage-resistant materials are used below the BFE (see NFIP Technical Bulletin 2-93 in CCM Appendix H). ☐ Yes (continue) ☐ No (**STOP**)
3. Shear walls and/or other solid obstructions below the BFE are installed such that less than 25% of the building width measured parallel to the shoreline is obstructed. ☐ Yes (continue) ☐ No*

* This form may be used in situations where ≥ 25% of the building width is obstructed, only if the submit-for-rate process is used and engineering calculations and plans are attached to this form; otherwise, stop. **See page 2.**

I. LOWEST FLOOR ELEVATION

CIRCLE APPROPRIATE POINTS AND ENTER BUILDING POINTS IN APPROPRIATE BOX BELOW

A. Bottom of lowest horizontal supporting member of lowest floor, relative to effective BFE at the time of project construction. (Round all measurements to the nearest 0.1 foot. Do not consider equipment and breakaway enclosures below the elevated floor for this calculation.)

1. 0.1 foot below the BFE to 0.4 foot above BFE ..... 0 pts.
2. 0.5 foot above the BFE to 1.4 feet above BFE ..... 60 pts.
3. 1.5 feet above the BFE to 2.4 feet above BFE ..... 160 pts.
4. 2.5 feet above the BFE to 3.4 feet above BFE ..... 240 pts.
5. 3.5 feet or more above BFE ..... 300 pts.

POST-CONSTRUCTION

II. SITE AND ENVIRONMENTAL CONSIDERATIONS

A. Distance from shoreline (Complete either item 1 or item 2)

1. Ratio of horizontal distance from dune crest or bluff edge or crest of erosion control device (e.g., seawall or revetment) to seaward side of building foundation, divided by long-term average annual erosion rate (AAER) used in calculation shown in Section C, item 2. (If no dune or bluff, use seaward line of stable vegetation; for stable, accreting, or rocky shorelines, use erosion rate = 1.0 foot/year; for shoreline with erosion control device or beach nourishment project, use pre-project AAER.)
   a. If minimum horizontal distance from crest of erosion control device to seaward side of building foundation < 30 ft (see Figure 4a in Instructions)..... 0 pts.
   b. If no erosion control device, or crest of device ≥ 30 feet from seaward side of building foundation (see Figures 1, 2, 3, and 4b in Instructions) and:
      0 < ratio ≤ 10 ..... 0 pts.
      10 < ratio ≤ 30 ..... pts. = ratio
      30 < ratio ≤ 60 ..... pts. = 1.5 × ratio
      60 < ratio ..... pts. = 2.0 × ratio, not to exceed 150 pts.
      Unknown ..... 0 pts.
2. For shoreline without an erosion control device, subject to periodic large-scale fluctuations, location of seaward side of building foundation relative to most landward historical vegetation line (see Figure 5 in Instructions)
   a. Foundation at or landward of most landward vegetation line in past 20 years ..... 0 pts.
   b. Foundation at or landward of most landward vegetation line in past 40 years ..... 75 pts.
   c. Foundation at or landward of most landward vegetation line in past 60 years ..... 150 pts.
   d. Unknown ..... 0 pts.

B. Dune, structural, or beach nourishment protection (Complete item 1, item 2, and/or item 3, as applicable)

1. Dune reservoir above 100-year stillwater elevation (see Figure 6 in Instructions)
   a. < 540 square feet..... 0 pts.
   b. 540 square feet ≤ reservoir < 1,100 square feet ..... 30 pts.
   c. 1,100 square feet ≤ reservoir ..... 50 pts.
   d. Unknown..... 0 pts.
2. For upland property fronted by erosion control device (e.g., seawall, revetment)
   a. Seaward side of building foundation < 30 feet from crest of wall or revetment (see Figure 4a in Instructions) ..... 0 pts.
   b. Seaward side of building foundation ≥ 30 feet from crest of wall or revetment — enter points for only one of the following three conditions:
      (1) Crest elevation of wall or revetment at or below 100-year stillwater elevation (see Figure 7 in Instructions) ..... 0 pts.
      (2) Crest elevation of wall or revetment above 100-year stillwater elevation (see Figure 8 in Instructions)..... pts. = D/2, not to exceed 15 pts.
      (3) Wall or revetment adequate to protect upland property during 100-year event (satisfies criteria set forth in Part VII of CERC TR 89-15)..... 50 pts.

3. For upland property with an ongoing beach nourishment project undertaken within the last 5 years
   a. Constructed project with a Federal, state, or local government sponsor, with all necessary permits and a long-term funding mechanism in place, and with ongoing renourishment (project maintenance)..... 50 pts.
   b. Less than 3.a..... 0 pts.

POST-CONSTRUCTION

III. BUILDING SUPPORT SYSTEM AND DESIGN DETAILS

A. Foundation design (Complete item 1, item 2, and item 3)

1. Foundation design based on lowest expected ground elevation and highest expected BFE over 50-year life of structure (accounts for lowering of soil due to long-term erosion, shoreline fluctuations, and storm erosion — see Figure 9 in Instructions) ..... 40 pts.
2. Foundation design accounts for local scour during 100-year flood event (see Figure 10 in Instructions and CCM Section 7.5.2.5)..... 20 pts.
3. Foundation design based on loads and load combinations computed in accordance with ASCE 7-98 (or later editions) and CCM Chapter 11 ..... 40 pts.

B. Foundation type (Complete either item 1 or item 2)

1. Pile foundation (complete items a, b, and c for driven piles; complete items a, b, c, and d for jetted piles; complete items a, b, c, and e for piles set in augered or pre-dug holes)
   a. Pile embedment
      (1) All pile tips are to –10 feet MWL or deeper* ..... 75 pts.
      (2) Any pile embedment is less than –10 feet MWL, but no pile is less than –5 feet MWL* ..... 0 pts.
      (3) Any pile embedment is less than –5 feet MWL* ..... –75 pts.
      * If refusal is reached before the specified depth, consult a professional engineer to determine whether foundation anchoring is adequate and whether scour will undermine the foundation. These judgments should determine the appropriate point value.
   b. Pile size and type
      (1) Wood piles at least 10” × 10” or 8” tip round ..... 75 pts.
      (2) Wood piles smaller than dimensions in (1) but no smaller than 8” × 8” or 6” tip round ..... 30 pts.
      (3) Wood piles less than dimensions in (2) ..... –75 pts.
      (4) Reinforced or prestressed concrete piles at least 8” × 8” ..... 75 pts.
      (5) Steel piles with corrosion protection or engineered to take predicted corrosion into account ..... 75 pts.
   c. Bracing
      (1) Bracing (including grade beams) is required to resist lateral loads, and bracing conforms to CCM Sections 12.4.5, 13.2.3.1, 13.2.3.2, and 13.2.3.3 ..... 25 pts.
      (2) Designed to resist lateral loads without bracing or grade beams ..... 50 pts.
   d. Jetted pile foundation
      (1) After initial jetting, design embedment and capacity attained by driving ..... 0 pts.
      (2) Jetting only ..... –50 pts.
   e. Pile set in augered or pre-dug hole (post foundation)
      (1) After initial set and backfill, design embedment attained by driving..... 0 pts.
      (2) After initial set and backfill, design embedment attained by jetting ..... –25 pts.
      (3) Set and backfilled only..... –100 pts
2. Masonry or concrete columns (piers) supported on footing
   a. Embedment and footing size
      (1) Footing elevation and dimensions consistent with CCM Section 12.4.3.2..... 75 pts.
      (2) Less than required by (1) ..... –75 pts.

POST-CONSTRUCTION

b. Column (pier) design
(1) Consistent with requirements of CCM Sections 13.2.4 or 13.2.5 ..... 75 pts. [ ]
(2) Less than required by (1) ..... –75 pts.

c. Bracing
(1) Bracing (including grade beams) is required to resist lateral loads, and bracing conforms to CCM Sections 12.4.5, 13.2.3.1, 13.2.3.2, and 13.2.3.3 ..... 25 pts. [ ]
(2) Designed to resist lateral loads without bracing or grade beams ..... 50 pts.

C. Lowest horizontal supporting member (Complete item 1 and item 2, or item 1 and item 3)

1. Orientation (see Figure 11 in Instructions)
a. ≤ +/- 20 degrees from perpendicular to shoreline ..... 20 pts. [ ]
b. > +/- 20 degrees from perpendicular to shoreline ..... 0 pts.

2. Connections between lowest horizontal supporting member and foundation (wood piles and beams)
a. Wood pile notching
(1) All piles AND horizontal members notched 50% or less ..... 0 pts. [ ]
(2) Any piles OR horizontal members notched more than 50% ..... –100 pts.

b. Connections between wood piles and beams
(1) All bolted connections ..... 50 pts.
(2) Any non-bolted connections (e.g., light-gauge metal connectors, nailed connections) ..... –250 pts. [ ]

3. Engineered connections between beam and pile (when either pile or beam is not wood) ..... 50 pts. [ ]

IV. OBSTRUCTIONS AND ENCLOSURES

A. Obstructions below BFE (Complete item 1, item 2, and item 5, and either item 3 or item 4; see NFIP Technical Bulletin 5-93 in CCM Appendix H)

1. Free of obstruction AND no enclosed areas below BFE (open stairs, insect screening, and open lattice are permitted — see Instructions for discussion of open lattice) ..... 100 pts. [ ]

2. Spacing of piles/columns/piers
a. < 8 feet on center (o.c.) ..... 0 pts. [ ]
b. ≥ 8 feet o.c . ..... 20 pts.

3. Breakaway walls (non-loadbearing) are used below the BFE
a. Length of breakaway walls ≤ 20 feet ..... –10 pts.
b. Length of breakaway walls > 20 feet but ≤ 60 feet ..... –20 pts. [ ]
c. Length of breakaway walls > 60 feet ..... –40 pts.

4. Area enclosed by non-loadbearing breakaway walls, and some portion of the non-loadbearing walls is finished
a. Length of finished breakaway wall < 20 feet ..... –50 pts.
b. Length of finished breakaway wall ≥ 20 feet but < 50 feet ..... –100 pts. [ ]
c. Length of finished breakaway wall ≥ 50 feet ..... –250 pts.

5. Elevator, stairwell, masonry chimney, or other solid obstruction in 1- to 4-family, 3-story or less, residential structure ..... –100 pts. [ ]

B. Equipment

1. ALL equipment and ductwork below building lie at or above BFE ..... 0 pts. [ ]

2. ANY equipment or ductwork below the building is below the BFE and is NOT resistant to flood damage, but will not adversely affect the ability of other parts of the building to resist velocity flows and wave action (complete item 1 in Section C of this form below; FEMA may use the additional information from item 1 in section C of this form to deduct fewer than 100 points) ..... –100 pts. [ ]

V. BUILDING POINT TOTAL ..... [ ]

SECTION C — INFORMATION PERTAINING TO THE BUILDING

1. List all equipment below BFE (check all that apply):

☐ Air conditioner/heat pump ☐ Furnace ☐ Air handler

☐ Ductwork ☐ Electric panel, fuse box ☐ Elevator equipment

☐ Water heater ☐ Water softener/conditioner ☐ Pump

☐ Clothes washer/dryer ☐ Other (list)

2. To support the point values claimed in item II.A in Section B of this form, provide the following:

Average annual erosion rate _____ feet/year

Source of rate _____

Date of rate calculation _____

Reference feature used (e.g., dune crest, vegetation line, top of bluff, crest of armoring) _____

Source of most landward vegetation line _____

When claiming points for compliance with item II.B.2.b.(3) (erosion control device meets requirements of CERC TR 89-15), describe how the device meets the requirements. _____

When claiming points for compliance with item II.B.3.a (beach nourishment project), provide the name of the project, the name of the sponsoring government entity, and the date of the last nourishment or renourishment work.

Name of Project

Sponsor Date of last nourishment/renourishment

When submitting the completed V-Zone Risk Factor Rating Form, provide the following supporting material:

- Building plans for "before construction" rating
- Completed NFIP Elevation Certificate (FEMA Form 81-31), Flood Insurance Application, and photographs of building for "after construction" rating

SECTION D — CERTIFICATION

POST-CONSTRUCTION CERTIFICATION. I meet the qualifications set forth on page 1 of 7 of the Instructions for this V-Zone form and certify that the above statements are correct to the best of my knowledge. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.

Name of Registered Professional Engineer or Architect

Title

Address

Signature Date

Flood Program Use Only

NFIP Flood Risk Factor CONFIRMATION

Total Coastal V-Zone Flood Risk Factor

POST-CONSTRUCTION

Buildings:

Contents:

NFIP Underwriter's Signature

Date

V-Zone Risk Factor Rating Form Instructions

This V-Zone Risk Factor Rating Form is to be used in the determination of the flood insurance discount for buildings and contents located in a coastal area designated by the NFIP as Zone V, VE, or V1-V30.

The basic premise behind this form is that flood insurance premiums can be reduced for V-zone buildings that exceed minimum NFIP requirements. This form allows an engineer or architect to claim points for a variety of siting, design, and construction practices that exceed minimum NFIP requirements. Section B of the form, Coastal V-Zone Flood Risk Building Point Calculation Sheet, is divided into four main categories:

I. Lowest Floor Elevation
II. Site and Environmental Considerations
III. Building Support System and Design Details
IV. Obstructions and Enclosures

The NFIP will review the completed form and assign a premium discount, depending on the number of points awarded.

This form may be submitted only after construction is completed. However, the form may be used **before** construction is begun (during site selection and project planning) to guide the designer and owner with regard to those practices that will result in the greatest flood insurance premium reduction—that is, those practices that are deemed most important in reducing potential flood and erosion losses.

The maximum number of points that can be claimed on this form is 1,030. The greater the number of points, the greater the reduction in the flood insurance premium. Of the total number of possible points, the approximate percentage for each of the four categories listed above is as follows:

- Lowest Floor Elevation - 30 percent
- Site and Environmental Considerations - 30 percent
- Building Support System and Design Details - 30 percent
- Obstructions and Enclosures - 10 percent

This form is used solely to adjust insurance rating for a building and does not replace other forms and certificates that may be required by a community or state.

To complete this form, the engineer or architect will need to refer to the Coastal Construction Manual (FEMA 55). See the inside cover of this form for information about how to obtain a copy of FEMA 55.

Completion of this form must be accomplished by a registered professional engineer or registered architect duly licensed in the state where the subject structure is located.

The completed form should be submitted to the NFIP Bureau and Statistical Agent, Underwriting Department, 8400 Corporate Drive, Suite 350, Landover, MD 20785. Confirmation of the V-zone risk discount and rate for National Flood Insurance coverage will be returned in approximately 30 days.

Local permit officials will have on file copies of the community's most recent Flood Insurance Rate Map (FIRM) and Flood Insurance Study (FIS). Your client's property and casualty insurance agent may have a copy of the community's FIRM and is a valuable source of related information. If you need assistance, call the NFIP toll-free at 1-800-358-9616.

SPECIFIC INSTRUCTIONS FOR SECTION B, COASTAL V-ZONE FLOOD RISK BUILDING POINT CALCULATION SHEET

I. Lowest Floor Elevation. The lowest floor elevation measurement should be made at the bottom of the lowest horizontal structural member supporting the lowest floor. Lowest floor guidance can be obtained from the Elevation Certificate or the *Flood Insurance Manual* (Lowest Floor Guide):

- The Elevation Certificate can be downloaded from FEMA's site on the World Wide Web at **http://www.fema.gov/business/nfip/elvinst.shtm**. The certificate is also available from the FEMA Distribution Center at 1-800-480-2520 (ask for FEMA Form 81-31).
- The *Flood Insurance Manual* is available from the FEMA web site at **http://www.fema.gov/business/nfip/manual.shtm.**

II.A. Distance from shoreline. Siting structures away from the shoreline is recognized as one of the most important ways of preventing building damage. This form provides credit for siting buildings landward of dunes, bluffs, and erosion control devices (item II.A.1), and landward of shorelines that fluctuate large distances (i.e., those that experience large-scale erosion and accretion through time, item II.A.2).

Points may be claimed for II.A.1 or II.A.2, but not for both. In the majority of situations, II.A.1 will be used for calculating points.

II.A.1. Points will be awarded based on (1) the distance between the seaward side of the building foundation and the dune crest, bluff edge, or erosion control device crest and (2) the average annual erosion rate (AAER) for the site.

This item requires the engineer or architect to (1) measure the horizontal distance between the building foundation and the dune crest, bluff edge, or erosion control device crest, (2) obtain the average annual erosion rate at the site, and (3) calculate the ratio between the distance and the erosion rate (consult the local jurisdiction or state coastal management program for erosion rate information). The examples shown in Figures 1-4b, following, illustrate the calculation of points for five cases.

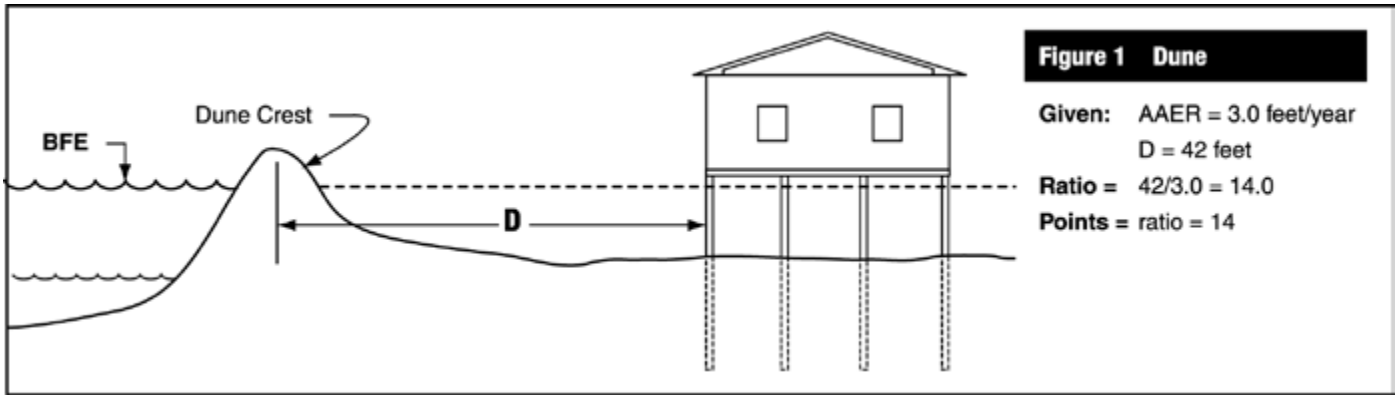


Figure 1 Dune

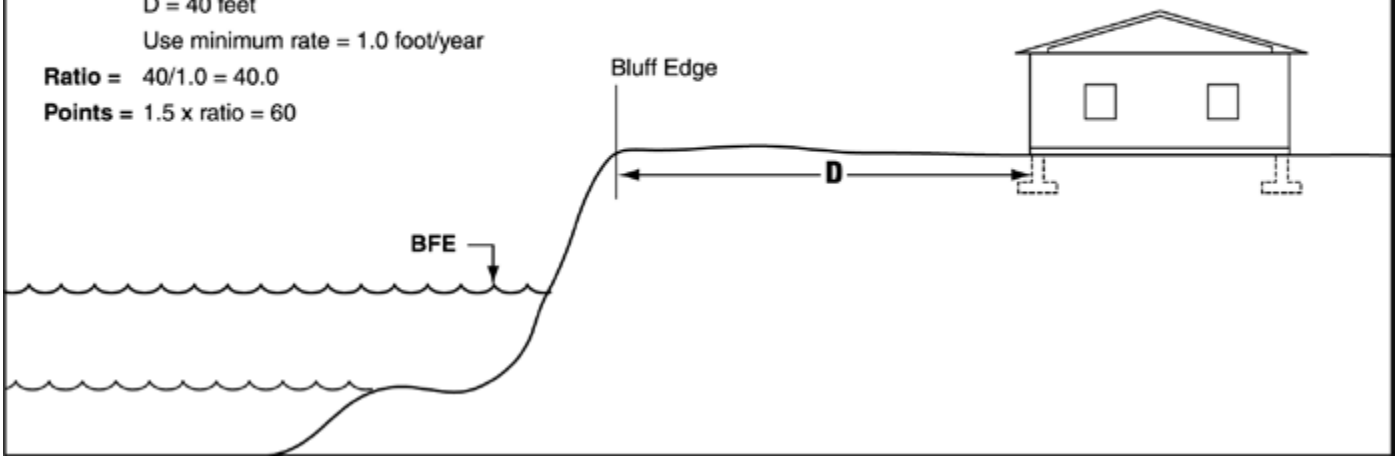
Given: AAER = 3.0 feet/year
D = 42 feet
Ratio = 42/3.0 = 14.0
Points = ratio = 14

Figure 2 Bluff

Given: AAER = 0.5 foot/year
D = 40 feet
Use minimum rate = 1.0 foot/year

Ratio = 40/1.0 = 40.0

Points = 1.5 x ratio = 60



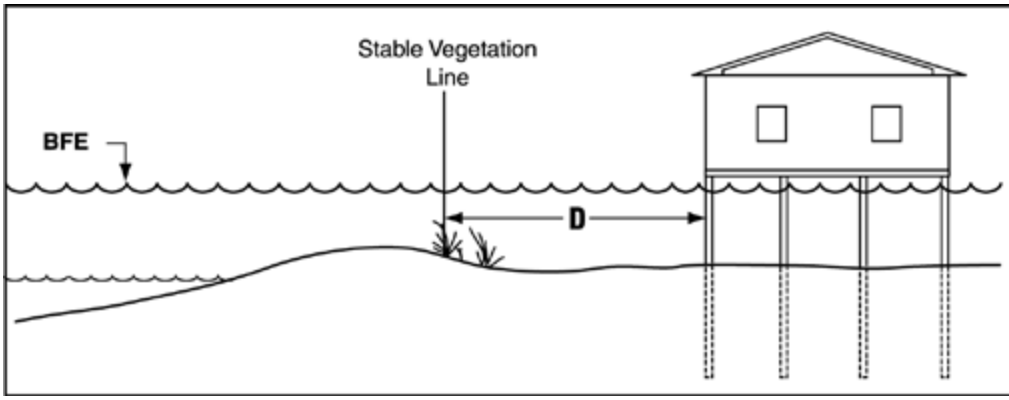


Figure 3
No Dune or Bluff – Use Stable Vegetation Line

Given: AAER = 2.5 feet/year
D = 25 feet

Ratio = 25/2.5 = 10.0

Points = 0

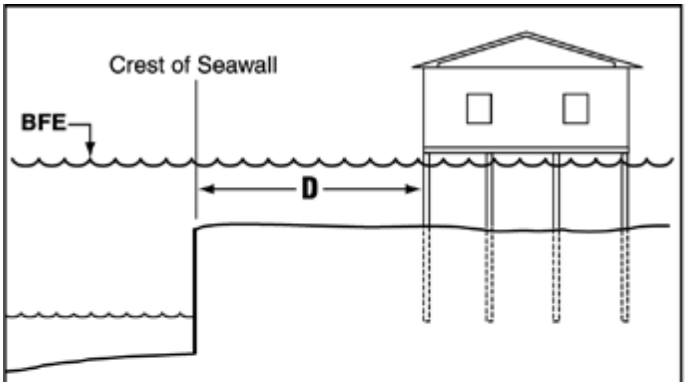


Figure 4a Erosion Control Device, D < 30 Feet

Given: D = 25 feet
D < 30 feet; therefore, No Points Allowed

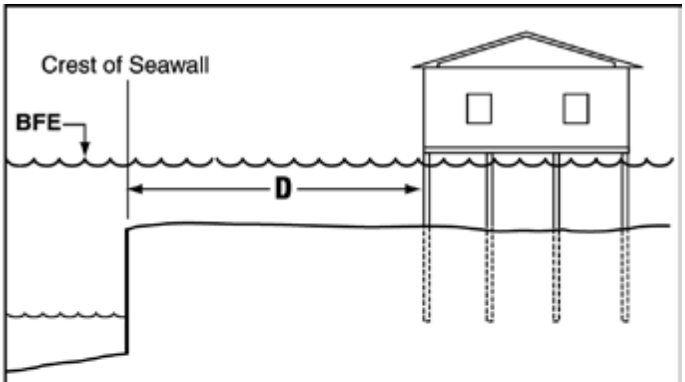


Figure 4b Erosion Control Device, D ≥ 30 Feet

Given: AAER = 0.0 feet/year (post-wall)
AAER = 2.5 feet/year (pre-wall)
D = 35 feet

Ratio = 35/2.5 = 14.0
D ≥ 30 feet; therefore, Points Allowed

Points = ratio = 14

II.A.2. Points will be awarded based on the location landward of the seaward side of the building foundation relative to the fluctuating shoreline on the site. Average annual erosion rates are not used for this calculation. CCM Figures 7-47, 7-48, and 7-49 show a situation in which item II.A.2 would be used to calculate points.

This item requires the engineer or architect to (1) obtain historical shoreline (vegetation line) positions at the site, (2) locate the seaward side of the building foundation, and (3) determine how long it has been since the vegetation line was landward of the seaward side of the building foundation. An example is shown in Figure 5 using the data from CCM Figure 7-49.

Figure 5 shows that the seaward side of the building foundation was seaward of the vegetation line as recently as 1997. No points would be claimed in this example. In order for points to be claimed for this item, the building would have had to have been constructed landward of all vegetation lines for the past 40+ years—since approximately 1957.

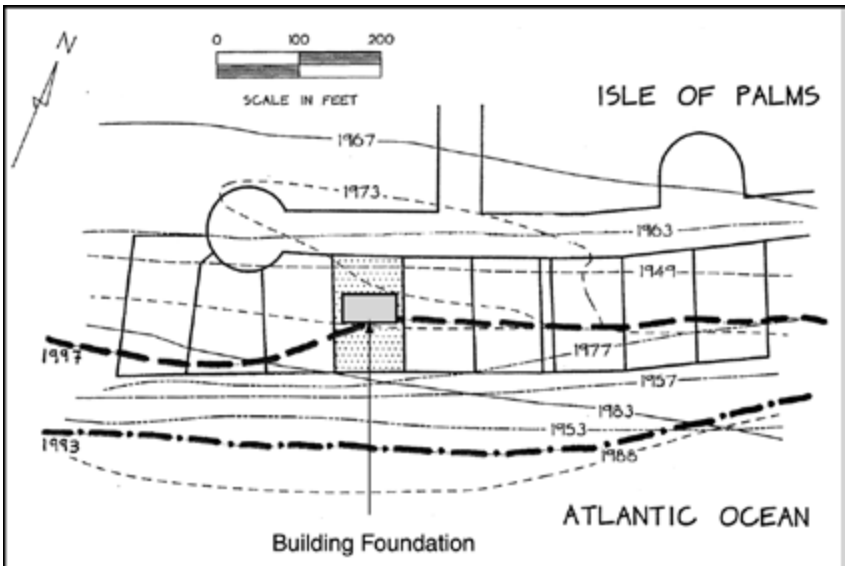


Figure 5 Shoreline Subject to Large Fluctuations

II.B Dune, structural, or beach nourishment protection. This form provides credit for protection received from large dunes (item II.B.1), erosion control devices (item II.B.2), and beach nourishment projects (item II.B.3) that meet certain criteria. Points will be awarded based on the level of flood and erosion protection afforded by a dune, erosion control device, or beach nourishment project.

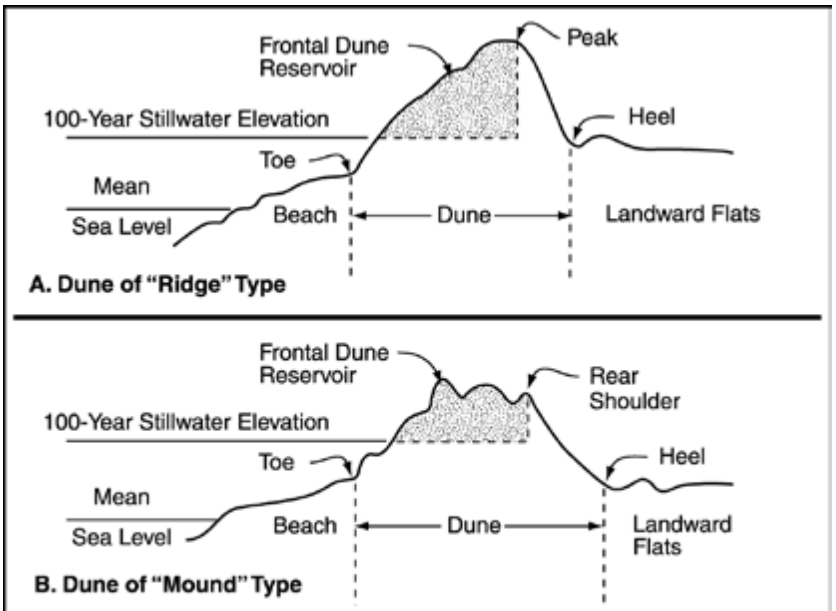


Figure 6 Calculating Frontal Dune Reservoir

Points may be claimed for II.B.1, II.B.2, and II.B.3, if applicable.

II.B.1. The dune reservoir is the cross-section (in square feet) above the 100-year stillwater elevation (obtained from the Flood Insurance Study [FIS] report) and seaward of the dune crest or shoulder (see Figure 6).

This item requires the engineer or architect to (1) plot a dune cross-section seaward of the building site, (2) determine the 100-year stillwater elevation (from the FIS report) and plot on the dune profile, (3) characterize the dune as a ridge type or mound type, and (4) define the limits of the dune reservoir and calculate its cross-sectional area.

II.B.2. Points may be claimed for protection offered by an erosion control device (seawall or revetment) only if the crest elevation of the device is above the 100-year stillwater elevation, which may be obtained from the FIS report (see Figures 7 and 8.) **Points may be claimed for II.B.2.b.(2) or II.B.2.b.(3).** If the crest elevation is above the 100-year stillwater elevation, points may be obtained for II.B.2.b.(2)—the distance between the crest of the device and the seaward side of the building foundation—or II.B.2.b.(3)—a device that satisfies the criteria set forth in the U.S. Army Corps of Engineers, Coastal Engineering Research Center report CERC TR 89-15, *Criteria for Evaluating Coastal Flood Protection Structures*.

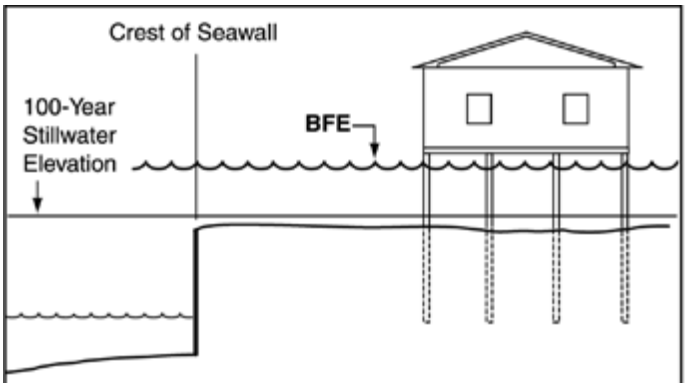


Figure 7 Erosion Control Device Below 100-Year Stillwater Elevation

Crest elevation is below 100-year stillwater elevation; therefore, No Points Allowed

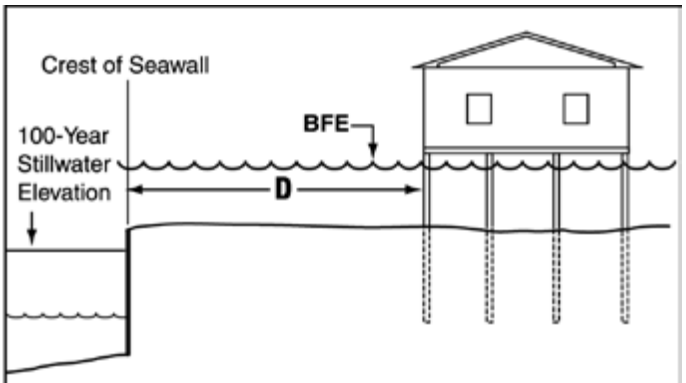


Figure 8 Erosion Control Device Above 100-Year Stillwater Elevation

Crest elevation is above 100-year stillwater elevation; therefore, Points Allowed

This item requires the engineer or architect to (1) determine the crest elevation of the seawall or revetment, (2) determine the 100-year stillwater elevation (from the FIS report) and compare it against the crest elevation, (3) determine the horizontal distance from the crest of the erosion control device to the seaward side of the building foundation, and (4) if maximum points are desired, evaluate the dimensions, strength, and durability of the erosion control device against the CERC criteria.

II.B.3. Points may be claimed for protection offered by an ongoing beach nourishment project. An eligible project must be sponsored by a Federal, state, or local government entity and must have been constructed—either initial construction or project maintenance—in the recent past (5 years or less from the date of completion of this form).

This item requires the engineer or architect to (1) determine whether an eligible beach nourishment project has been conducted in front of the building for which this form is being completed and (2) provide basic information on the project (i.e., name of project, project sponsor, most recent date of project construction) in Section C of this form. Consult the local jurisdiction for this information.

III.A. Foundation design. This form recognizes foundation designs that consider expected conditions over the life of the building (III.A.1), local scour (III.A.2), and design loads (III.A.3). **Points may be claimed for III.A.1, III.A.2, and III.A.3, if applicable.**

III.A.1. This item requires the engineer or architect to estimate, over the life of the building, (1) the most landward expected shoreline, (2) the lowest expected ground elevation, and (3) the highest expected BFE (see Figure 9). A minimum erosion rate of 1.0 foot/year and a minimum building life of 50 years should be used in the calculations. More details can be found in Section 7.9.2 of the CCM.

Determine the Most Landward Expected Shoreline Location Over the Anticipated Life of the Building or Development

- Use published or calculated long-term erosion rate (ft/yr), increasing the rate to account for errors and uncertainty. It is recommended that a minimum rate of 1.0 ft/yr be used unless durable shore protection or erosion-resistant soil is present.
- Multiply the resulting erosion rate by the building or development lifetime (years) to compute the long-term erosion distance (ft). Use a minimum lifetime of 50 years.
- Measure landward (from the most landward historical shoreline) a distance equal to the long-term erosion distance – this will define the most landward expected shoreline.

Determine the Lowest Expected Ground Elevation at the Base of the Building or Structure

- Beginning with the most landward expected shoreline location:
  - calculate an eroded dune profile using a storm erosion model, or
  - calculate a stable bluff profile using available guidance and data

Determine the Highest Expected BFE at the Base of the Building or Structure

- Beginning with the eroded dune or stable bluff profile, apply Runup and WHAFIS to determine BFEs

Figure 9 Determining Site Conditions Over the Life of the Building

III.A.2. Local scour is illustrated in Figure 10, and its calculation is discussed in Section 11.6.11 of the CCM. Local scour around pilings and columns and grade beams can generally be estimated as twice the diameter of the member (see CCM Formula 11.10.a). Local scour around large objects and enclosed areas can also be estimated, but do **not** use CCM Formula 11.10.b. Instead, estimate local scour as equal to the width of the object facing the flow or waves, with a maximum scour depth of 3 feet.

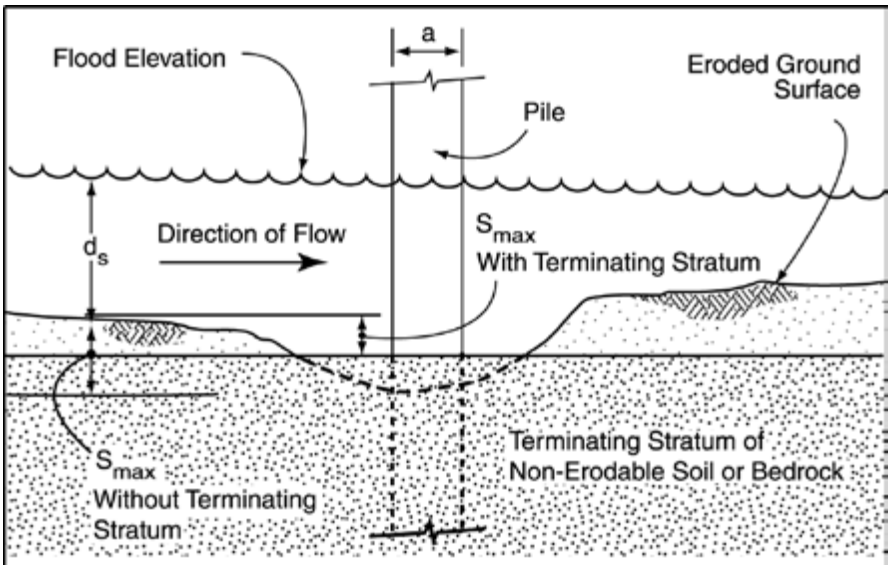


Figure 10 Local Scour

III.A.3. This form awards points for the use of loads and load combinations based on ASCE 7-98 (or later editions) and CCM Chapter 11.

III.B. Foundation type. This form recognizes several types of V-zone foundations (wood, concrete, steel, and masonry; driven piles; piles set in augered holes; cast-in-place piles; and masonry piers/concrete columns on footings). Maximum points can be obtained only with driven piles; reinforced, cast-in-place piles; and jetted or augered piles that satisfactorily pass load tests. Note that it may be very difficult to claim any points for masonry/concrete elements supported on footings.

III.C. Lowest horizontal supporting member. Points can be claimed for (1) orientation of the lowest horizontal supporting member in the expected direction of waves (see Figure 11) and (2) use of bolted or engineered connections between the foundation and lowest horizontal supporting member. For the purposes of this classification, any metal strap, plate, or connector that is not fabricated with structural steel is considered "light-gauge." Point deductions do not apply to the use of light-gauge metal connectors or nailed connections above the top of the lowest horizontal structural member.

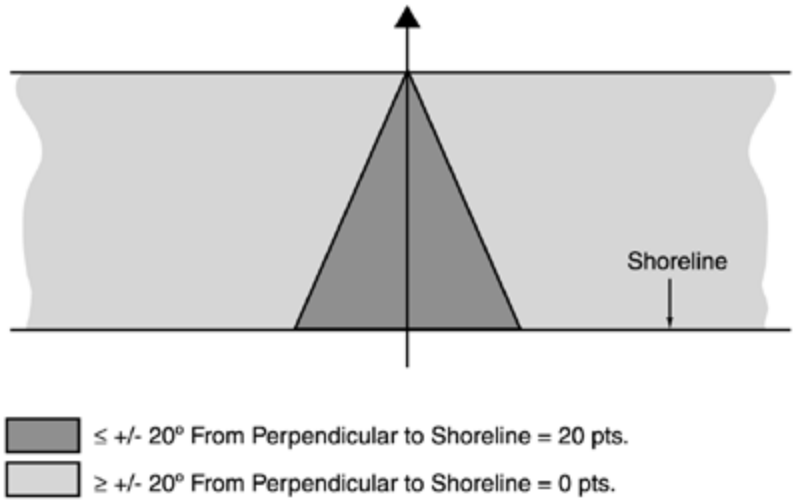


Figure 11 Orientation of Lowest Horizontal Supporting Member

IV. Obstructions and Enclosures. V-zone construction must be free of obstructions below the BFE. NFIP regulations allow breakaway enclosures to be constructed (flood insurance premiums will be higher as a result) and allow limited use of solid obstructions (e.g., shear walls, stairwells, elevators, and chimneys).

This form provides points for buildings without any enclosures or obstructions. The use of open lattice (see IV.A.1) and/or insect screening still allows points to be claimed. Points will be **deducted** for the use of breakaway walls. Points will be **deducted** for finished walls or space (even breakaway) below the BFE. Points will be **deducted** for equipment or ductwork below the BFE and not flood-resistant. The conversion of below-BFE space to habitable uses by building contractors and owners represents one of the most significant (and common) violations of NFIP regulations. This form reflects the importance of the issue through its point deductions.

IV.A.1. Open lattice is defined as thin (1/2 inch or less) wood, vinyl, plastic, or similar lattice material with at least 40 percent of the lattice area open. A wall created of brick or other masonry units meeting the opening requirement will **not** be considered open lattice.

National Flood Insurance Program

V-Zone Risk Factor Rating Form

FEMA FORM 086-0-4

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