

# ELEVATION CERTIFICATE

IMPORTANT: Follow the instructions on pages 1-9.

39470  
 OMB No. 1660-0008  
 Expiration Date: July 31, 2015

SECTION A - PROPERTY INFORMATION		FOR INSURANCE COMPANY USE
A1. Building Owner's Name <b>JOHN RATHBUN</b>		Policy Number
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. <b>4914 YAUPON CIRCLE</b>		Company NAIC Number
City <b>MYRTLE BEACH</b>	State <b>SC</b>	ZIP Code <b>29575</b>
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) <b>LOT 2 BLOCK 18 UPPER LONG BAY TMS 186-14-02-018</b>		
A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) <b>RESIDENTIAL</b>		
A5. Latitude/Longitude: Lat. <b>33°38'31.52" N</b> Long. <b>78°56'31.02" W</b> Horizontal Datum: <input type="checkbox"/> NAD 1927 <input checked="" type="checkbox"/> NAD 1983		
A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.		
A7. Building Diagram Number <b>8</b>		
A8. For a building with a crawlspace or enclosure(s):		A9. For a building with an attached garage:
a) Square footage of crawlspace or enclosure(s) <b>2679</b> sq ft		a) Square footage of attached garage <b>692</b> sq ft
b) No. of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade <b>18</b>		b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade <b>4</b>
c) Total net area of flood openings in A8.b <b>NOTE</b> sq in		c) Total net area of flood openings in A9.b <b>NOTE</b> sq in
d) Engineered flood openings? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		d) Engineered flood openings? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION					
B1. NFIP Community Name & Community Number <b>HORRY COUNTY 450104</b>			B2. County Name <b>HORRY</b>		B3. State <b>SC</b>
B4. Map/Panel Number <b>45051C0694</b>	B5. Suffix <b>H</b>	B6. FIRM Index Date <b>09/17/2003</b>	B7. FIRM Panel Effective/Revised Date <b>08/23/1999</b>	B8. Flood Zone(s) <b>AE</b>	B9. Base Flood Elevation(s) (Zone A0. use base flood depth) <b>14</b>
B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9: <input type="checkbox"/> FIS Profile <input checked="" type="checkbox"/> FIRM <input type="checkbox"/> Community Determined <input type="checkbox"/> Other/Source: _____					
B11. Indicate elevation datum used for BFE in Item B9: <input checked="" type="checkbox"/> NGVD 1929 <input type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____					
B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Designation Date: _____ / _____ / _____ <input type="checkbox"/> CBRS <input type="checkbox"/> OPA					

SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)	
C1. Building elevations are based on: <input type="checkbox"/> Construction Drawings* <input type="checkbox"/> Building Under Construction* <input checked="" type="checkbox"/> Finished Construction *A new Elevation Certificate will be required when construction of the building is complete.	
C2. Elevations - Zones A1-A30, AE, AH, A (with BFE), VE, V1-V30, V (with BFE), AR, AR/A, AR/AE, AR/A1-A30, AR/AH, AR/A0. Complete Items C2.a-h below according to the building diagram specified in Item A7. In Puerto Rico only, enter meters. Benchmark Utilized: <b>SCCC 5240-B</b> Vertical Datum: <b>NGVD 29</b>	
Indicate elevation datum used for the elevations in items a) through h) below. <input checked="" type="checkbox"/> NGVD 1929 <input type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____ Datum used for building elevations must be the same as that used for the BFE.	
Check the measurement used.	
a) Top of bottom floor (including basement, crawlspace, or enclosure floor) <b>12.5</b>	<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters
b) Top of the next higher floor <b>15.6</b>	<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters
c) Bottom of the lowest horizontal structural member (V Zones only) <b>N/A</b>	<input type="checkbox"/> feet <input type="checkbox"/> meters
d) Attached garage (top of slab) <b>12.8</b>	<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters
e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments) <b>15.8</b>	<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters
f) Lowest adjacent (finished) grade next to building (LAG) <b>11.6</b>	<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters
g) Highest adjacent (finished) grade next to building (HAG) <b>12.7</b>	<input checked="" type="checkbox"/> feet <input type="checkbox"/> meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support <b>N/A</b>	<input type="checkbox"/> feet <input type="checkbox"/> meters

SECTION D - SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION			
This certification is to be signed and sealed by a land surveyor, engineer, or architect authorized by law to certify elevation information. I certify that the information on this Certificate represents my best efforts to interpret the data available. I understand that any false statement may be punishable by fine or imprisonment under 18 U.S. Code, Section 1001.			
<input checked="" type="checkbox"/> Check here if comments are provided on back of form.		Were latitude and longitude in Section A provided by a licensed land surveyor? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
<input type="checkbox"/> Check here if attachments.			
Certifier's Name <b>MICHAEL S CULLER, III</b>	License Number <b>29114</b>		
Title <b>PRESIDENT</b>	Company Name <b>CULLER LAND SURVEYING III, INC</b>		
Address <b>1010 5th AVE. NW EXT</b>	City <b>SURFSIDE BEACH</b>	State <b>SC</b>	ZIP Code <b>29575</b>
Signature <i>Michael S Culler III</i>	Date <b>08/26/2015</b>	REV 9/1/15	Telephone <b>(843) 238-2333</b>

**ELEVATION CERTIFICATE, page 2**

<b>IMPORTANT: In these spaces, copy the corresponding information from Section A.</b>			FOR INSURANCE COMPANY USE	
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. <b>4914 YAUPON CIRCLE</b>			Policy Number:	
City <b>MYRTLE BEACH</b>	State <b>SC</b>	ZIP Code <b>29575</b>	Company NAIC Number:	

**SECTION D – SURVEYOR, ENGINEER, OR ARCHITECT CERTIFICATION (CONTINUED)**

Copy both sides of this Elevation Certificate for (1) community official, (2) insurance agent/company, and (3) building owner.

Comments ITEM C2-A REFERS TO FLOOR LEVEL OF CRAWL SPACE; ITEM C2-E TO THE HVAC SYSTEM. ITEM A8-C, THIS DWELLING HAS 17 ENG. VENTS NET AREA OF FLOOD OPENING EA IS 105SI RATED FOR 205 SF AND ONE ADDITIONAL ENG. VENT W/ 850SI RATING FOR 1765SF: TOTAL 2635SI RATED FOR 5260SF, ITEM A9-C HAS 4 ENG VENT AT 105SI WITH 205 SF RATE TOTALING = 420 SI RATED FOR 820 SF.

Signature *[Handwritten Signature]* REV 9/1/2015 Date 08/26/2015

**SECTION E – BUILDING ELEVATION INFORMATION (SURVEY NOT REQUIRED) FOR ZONE AO AND ZONE A (WITHOUT BFE)**

For Zones AO and A (without BFE), complete Items E1–E5. If the Certificate is intended to support a LOMA or LOMR-F request, complete Sections A, B, and C. For Items E1–E4, use natural grade, if available. Check the measurement used. In Puerto Rico only, enter meters.

- E1. Provide elevation information for the following and check the appropriate boxes to show whether the elevation is above or below the highest adjacent grade (HAG) and the lowest adjacent grade (LAG).
- a) Top of bottom floor (including basement, crawlspace, or enclosure) is \_\_\_\_\_ . \_\_\_\_\_  feet  meters  above or  below the HAG.
- b) Top of bottom floor (including basement, crawlspace, or enclosure) is \_\_\_\_\_ . \_\_\_\_\_  feet  meters  above or  below the LAG.
- E2. For Building Diagrams 6–9 with permanent flood openings provided in Section A Items 8 and/or 9 (see pages 8–9 of instructions), the next higher floor (elevation C2.b in the diagrams) of the building is \_\_\_\_\_ . \_\_\_\_\_  feet  meters  above or  below the HAG.
- E3. Attached garage (top of slab) is \_\_\_\_\_ . \_\_\_\_\_  feet  meters  above or  below the HAG.
- E4. Top of platform of machinery and/or equipment servicing the building is \_\_\_\_\_ . \_\_\_\_\_  feet  meters  above or  below the HAG.
- E5. Zone AO only: If no flood depth number is available, is the top of the bottom floor elevated in accordance with the community's floodplain management ordinance?  Yes  No  Unknown. The local official must certify this information in Section G.

**SECTION F – PROPERTY OWNER (OR OWNER'S REPRESENTATIVE) CERTIFICATION**

The property owner or owner's authorized representative who completes Sections A, B, and E for Zone A (without a FEMA-issued or community-issued BFE) or Zone AO must sign here. The statements in Sections A, B, and E are correct to the best of my knowledge.

Property Owner or Owner's Authorized Representative's Name \_\_\_\_\_

Address _____	City _____	State _____	ZIP Code _____
Signature _____	Date _____	Telephone _____	

Comments \_\_\_\_\_

Check here if attachments.

**SECTION G – COMMUNITY INFORMATION (OPTIONAL)**

The local official who is authorized by law or ordinance to administer the community's floodplain management ordinance can complete Sections A, B, C (or E), and G of this Elevation Certificate. Complete the applicable item(s) and sign below. Check the measurement used in Items G8–G10. In Puerto Rico only, enter meters.

- G1.  The information in Section C was taken from other documentation that has been signed and sealed by a licensed surveyor, engineer, or architect who is authorized by law to certify elevation information. (Indicate the source and date of the elevation data in the Comments area below.)
- G2.  A community official completed Section E for a building located in Zone A (without a FEMA-issued or community-issued BFE) or Zone AO.
- G3.  The following information (Items G4–G9) is provided for community floodplain management purposes.

G4. Permit Number _____	G5. Date Permit Issued _____	G6. Date Certificate Of Compliance/Occupancy Issued _____
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G7. This permit has been issued for:  New Construction  Substantial Improvement

G8. Elevation of as-built lowest floor (including basement) of the building: \_\_\_\_\_ . \_\_\_\_\_  feet  meters Datum \_\_\_\_\_

G9. BFE or (in Zone AO) depth of flooding at the building site: \_\_\_\_\_ . \_\_\_\_\_  feet  meters Datum \_\_\_\_\_

G10. Community's design flood elevation: \_\_\_\_\_ . \_\_\_\_\_  feet  meters Datum \_\_\_\_\_

Local Official's Name _____	Title _____
Community Name _____	Telephone _____
Signature _____	Date _____

Comments \_\_\_\_\_

Check here if attachments.

See Instructions for Item A6.

<b>IMPORTANT: In these spaces, copy the corresponding information from Section A.</b>			<b>FOR INSURANCE COMPANY USE</b>
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 4914 YAUPON CIRCLE			Policy Number:
City MYRTLE BEACH	State SC	ZIP Code 29575	Company NAIC Number:

If using the Elevation Certificate to obtain NFIP flood insurance, affix at least 2 building photographs below according to the instructions for Item A6. Identify all photographs with date taken; "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8. If submitting more photographs than will fit on this page, use the Continuation Page.



FRONT VIEW



LEFT SIDE VIEW

PHOTOS TAKEN AUG. 12, 2015



REAR VIEW



RIGHT VIEW

<b>IMPORTANT: In these spaces, copy the corresponding information from Section A.</b>			<b>FOR INSURANCE COMPANY USE</b>
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 4914 YAUPON CIRCLE			Policy Number:
City MYRTLE BEACH	State SC	ZIP Code 29575	Company NAIC Number:

If submitting more photographs than will fit on the preceding page, affix the additional photographs below. Identify all photographs with: date taken; "Front View" and "Rear View"; and, if required, "Right Side View" and "Left Side View." When applicable, photographs must show the foundation with representative examples of the flood openings or vents, as indicated in Section A8.



LARGE VENT



LARGE VENT AND SMALL VENTS

PICTURES TAKEN AUGUST 26, 2015

# Certification of Engineered Flood Openings

In accordance with NFIP, FEMA TB 1-08, and ASCE/SEI 24-05

I hereby certify that the **Crawl Space Door Systems flood vents 816CS, 1220CS, 1232CS, 1616CS, 1624CS, 1632CS, 2032CS, 2424CS, and 2436CS** are designed in accordance with the requirements of the NFIP "Flood Insurance Manual" (2011) to provide automatic equalization of hydrostatic flood forces by allowing for the entry and exit of floodwaters, when properly installed and sized as set forth below. This certification follows the design requirements and specifications established in FEMA Technical Bulletin 1-08, "Openings in Foundation Walls and Walls of Enclosures Below Elevated Buildings in Special Flood Hazard Areas", and the ASCE Standard for "Flood Resistant Design and Construction" (ASCE/SEI 24-05).

## Design Characteristics

Section 2.6.2.2 of ASCE 24 provides an equation to determine the required net area of engineered openings ( $A_o$ ) for a given enclosed area ( $A_e$ ). This equation is based on the hydraulic formula for the flow rate across sharp edged orifices. I have utilized this equation to calculate 1) the respected flow rate through the individual openings between louvers; 2) the flow rate through the main frame opening in case the louver is blown out during a flood event; and 3) the flow rate of water flowing through louver blades following hydraulic short tube theory. The ultimate maximum total enclosed area ( $A_e$ ) that can be serviced by a single vent has then been determined by utilizing the lowest flow rate of the three assessed scenarios for each vent and is listed in Table 1.

These values are based on the following assumptions:

- In absence of reliable data, the rates of rise and fall have been assumed with 5 feet/hour;
- The (maximum) difference between the exterior and interior floodwater levels has been assumed with 1 foot during base flood conditions;
- A factor of safety of 5 has been assumed, which is consistent with design practices related to protection of life and property;
- The net area of openings ( $A_o$ ) as provided by the manufacturer.

*)	Model	H x W [in]	$A_o$ [in <sup>2</sup> ]	$A_e$ [ft <sup>2</sup> ]
<input checked="" type="checkbox"/>	816CS	8 x 16	105	205
<input type="checkbox"/>	1220CS	12 x 20	235	500
<input type="checkbox"/>	1232CS	12 x 32	305	645
	1616CS	16 x 16	180	395
<input type="checkbox"/>	1624CS	16 x 24	310	670
<input type="checkbox"/>	1632CS	16 x 32	405	835
<input type="checkbox"/>	2032CS	20 x 32	630	1240
<input type="checkbox"/>	2424CS	24 x 24	570	1230
<input checked="" type="checkbox"/>	2436CS	24 x 36	850	1765

**Table 1** Maximal total enclosed area ( $A_e$ ) that can be served by each individual model based on the given net area of engineered openings ( $A_o$ )

## Installation Requirements and Limitations

This certification will be voided if the following installation requirements and limitations are not enforced:

- There shall be a minimum of two openings on different sides of each enclosed area;
- The bottom of each required opening shall be no more than 1ft above the adjacent ground level;
- No temporary (e.g. during cold weather) or permanent solid cover may be placed into or over the flood vent that would block the automatic entry or exit of floodwaters at any time;
- Where analysis indicates rates of rise and fall greater than 5 ft/hr, the total enclosed area as given in Table 1 shall be reduced accordingly to account for the higher rates of rise and fall.

## Identification of the Building and Installed Flood Vents

The flood vent models marked in Table 1\*) are being installed at the following building:

Building Address \_\_\_\_\_

## Certifying Design Professional

Name **Frederick Allen House**  
 Title **President-House Engineering P.C.**  
 Address **P O Box 466, Kitty Hawk, NC 27949**  
 Type of License **Professional Engineer**  
 License # **26841**  
 Issuing State **South Carolina**

Signature

*Frederick Allen House 7/23/12*

