

U.S. DEPARTMENT OF HOMELAND SECURITY  
Federal Emergency Management Agency  
National Flood Insurance Program

# ELEVATION CERTIFICATE

16990  
6-8-12  
16990

OMB No. 1660-0008  
Expires March 31, 2012

Important: Read the instructions on pages 1-9.

**SECTION A - PROPERTY INFORMATION**

**For Insurance Company Use:**

A1. Building Owners Name **RONALD H. AND ANNA T. GOODRICH** Policy Number \_\_\_\_\_

A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. **250 LANDS END BLVD** City **MYRTLE BEACH** State **SC** ZIP Code **29572** Company NAIC Number \_\_\_\_\_

A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) **155-00-01-135**

A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) **RES** Horizontal Datum:  NAD 1927  NAD 1983

A5. Latitude/Longitude: Lat. **33-46-35** Long. **78-45-58**

A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.

A7. Building Diagram Number **6**

A8. For a building with a crawlspace or enclosure(s):

a) Square footage of crawlspace or enclosure(s) **1284** sq ft

b) No. of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade **6**

c) Total net area of flood openings in A8 b **1380** sq in

d) Engineered flood openings?  Yes  No

A9. For a building with an attached garage:

a) Square footage of attached garage \_\_\_\_\_ sq ft

b) No. of permanent flood openings in the attached garage within 1.0 foot above adjacent grade \_\_\_\_\_

c) Total net area of flood openings in A9 b \_\_\_\_\_ sq in

d) Engineered flood openings?  Yes  No

**SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION**

B1. NFIP Community Name & Community Number **450104** B2. County Name **HORRY** B3. State **SC**

B4. Map/Panel Number **45051C0569** B5. Suffix **H** B6. FIRM Index Date **8-23-99** B7. FIRM Panel Effective/Revised Date **8-23-99** B8. Flood Zone(s) **AE** B9. Base Flood Elevation(s) (Zone AO, use base flood depth) **15**

B10. Indicate the source of the Base Flood Elevation (BFE) data or base flood depth entered in Item B9.  
 FIS Profile  FIRM  Community Determined  Other (Describe) \_\_\_\_\_

B11. Indicate elevation datum used for BFE in Item B9:  NGVD 1929  NAVD 1988  Other (Describe) \_\_\_\_\_  Yes  No

B12. Is the building located in a Coastal Barrier Resources System (CBRS) area or Otherwise Protected Area (OPA)?  CBRS  OPA

**SECTION C - BUILDING ELEVATION INFORMATION (SURVEY REQUIRED)**

C1. Building elevations are based on:  Construction Drawings\*  Building Under Construction\*  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/AO. Complete items C2.a-h below according to the building diagram specified in item A7. Use the same datum as the BFE.  
Benchmark Utilized **AERO** Vertical Datum **NGVD 29**

Conversion/Comments \_\_\_\_\_

Check the measurement used.

a) Top of bottom floor (including basement, crawlspace, or enclosure floor) **13.4**  feet  meters (Puerto Rico only)

b) Top of the next higher floor **25.2**  feet  meters (Puerto Rico only)

c) Bottom of the lowest horizontal structural member (V Zones only) **N/A**  feet  meters (Puerto Rico only)

d) Attached garage (top of slab) **N/A**  feet  meters (Puerto Rico only)

e) Lowest elevation of machinery or equipment servicing the building (Describe type of equipment and location in Comments) **15.7**  feet  meters (Puerto Rico only)

f) Lowest adjacent (finished) grade next to building (LAG) **12.0**  feet  meters (Puerto Rico only)

g) Highest adjacent (finished) grade next to building (HAG) **12.1**  feet  meters (Puerto Rico only)

h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support **13.4**  feet  meters (Puerto Rico only)

**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.

Check here if comments are provided on back of form. Were latitude and longitude in Section A provided by a licensed land surveyor?  Yes  No

Certifier's Name **J. LUCKEY SANDERS** License Number **4554**

Title **LAND SURVEYOR** Company Name **SANDERS SURVEYORS, LLC**

Address **210 CLELAND STREET** City **GEORGETOWN** State **SC** ZIP Code **29440**

Signature *J. Luckey Sanders* Date **5-18-12** Telephone **843-527-2300**

*JLS*  
5-18-12

<b>IMPORTANT: In these spaces, copy the corresponding information from Section A.</b>	16970 6-8-12 1800	For Insurance Company Use:
Building Street Address (Including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. 250 LANDS END BLVD.		Policy Number
City MYRTLE BEACH State SC ZIP Code 29572		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 WATER VALVE IN FRONT OF LOT 3 IS 8.88 MSL RAILROAD SPIKE IN POWER POLE IN FRONT OF LOT 1 IS 12.76 MSL  
C2e HVAC PLATFORM

THIS CERTIFICATE IS FOR THE EXCLUSIVE USE OF THE PERSONS LISTED IN SECTION A1. AND IS NONTRANSFERABLE.

Signature \_\_\_\_\_ Date 5-18-12  Check here if attachments

**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 8-9 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's or Owner's Authorized Representative's Name \_\_\_\_\_

Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ ZIP Code \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_ Telephone \_\_\_\_\_

Comments \_\_\_\_\_

**SECTION G - COMMUNITY CERTIFICATION (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 and G9.

- 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 (PR) Datum \_\_\_\_\_
- G9. BFE or (in Zone AO) depth of flooding at the building site: \_\_\_\_\_  feet  meters (PR) Datum \_\_\_\_\_
- G10. Community's design flood elevation \_\_\_\_\_  feet  meters (PR) Datum \_\_\_\_\_

Local Official's Name \_\_\_\_\_ Title \_\_\_\_\_

Community Name \_\_\_\_\_ Telephone \_\_\_\_\_

Signature \_\_\_\_\_ Date \_\_\_\_\_

Comments \_\_\_\_\_

Check here if attachments

# 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.

## 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.

*)	Model	H x W [in']	$A_o$ [in <sup>2</sup> ]	$A_e$ [ft <sup>2</sup> ]
<input 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
<input type="checkbox"/>	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 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 ( $A_o$ )

## Identification of the Building and Installed Flood Vents

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

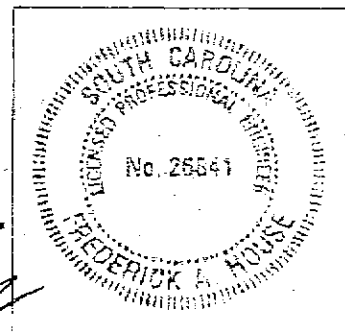
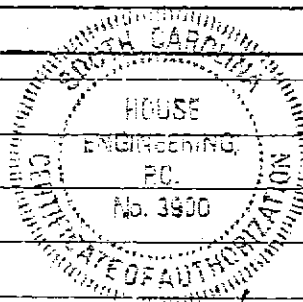
Building Address

## 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 #: **26241**  
 Issuing State: **South Carolina**

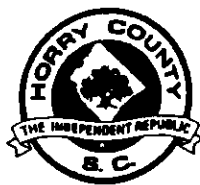
Signature

*Frederick Allen House* 7/23/12



**Horry County Code Enforcement**

1301 2<sup>nd</sup> Ave Suite 1D09  
Conway, SC 29526



Phone: (843) 915-5090  
(843) 205-5090

Fax: (843) 915-6090

MEMO OF REVIEW FOR CORRECTNESS AND COMPLETION

In accordance with this community's participation in the National Flood Insurance Program's Community Rating System, all FEMA Elevation Certificates must be correct and complete. The attached Certificate has some incorrect items which are noted here.

SECTION A - PROPERTY INFORMATION		For Insurance Company U
A1. Building Owner's Name <i>RONALD + ANNA GOODRICH</i>	Policy Number	
A2. Building Street Address (including Apt., Unjt, Suite, and/or Bldg. No.) or P.O. Route and Box No. <i>250 LANDS END BLVD.</i>	Company NAIC Number	
City <i>MURKIN BEACH</i> State <i>SC</i> ZIP Code <i>29572</i>		
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) <i>155-00-01-125</i>		
A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) _____		
A5. Latitude/Longitude: Lat. _____ Long. _____		Horizontal Datum: <input type="checkbox"/> NAD 1927 <input type="checkbox"/> NAD
A6. Attach at least 2 photographs of the building if the Certificate is being used to obtain flood insurance.		
A7. Building Diagram Number _____		
A8. For a building with a crawl space or enclosure(s), provide		A9. For a building with an attached garage, provide: <i>N/A</i> a) Square footage of attached garage <i>N/A</i> b) No. of permanent flood openings in the attached garage walls within 1.0 foot above adjacent grade <i>N/A</i> c) Total net area of flood openings in A9.b <i>N/A</i> d) Engineered flood openings? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
a) Square footage of crawl space or enclosure(s) _____ sq ft		
b) No. of permanent flood openings in the crawl space or enclosure(s) walls within 1.0 foot above adjacent grade _____		
c) Total net area of flood openings in A8.b _____ sq in		
d) Engineered flood openings? <input type="checkbox"/> Yes <input type="checkbox"/> No		

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION					
B1. NFIP Community Name & Community Number		B2. County Name		B3. State	
B4. Map/Panel Number	B5. Suffix	B6. FIRM Index Date	B7. FIRM Panel Effective/Revised Date	B8. Flood Zone(s)	B9. Base Flood Elevation( use base flood de
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 type="checkbox"/> FIRM <input type="checkbox"/> Community Determined <input type="checkbox"/> Other (Describe) _____					
B11. Indicate elevation datum used for BFE in Item B9: <input 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 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 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/AO. Complete Items C2.a-h below according to the building diagram specified in Item A7. Benchmark Utilized _____ Vertical Datum _____			
Indicate elevation datum used for the elevations in items a) through h) below. <input type="checkbox"/> NGVD 1929 <input type="checkbox"/> NAVD 1988 <input type="checkbox"/> Other/Source: _____			

COMMENTS:  
*A9. INCOMPLETE*

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Date of Review: *2/27/2015* Community Official: *Harold R. Eby*

All elevation certificates shall be maintained by the community and copies with the attached memo made available upon request.