



Permit 25942

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 Use:

A1. Building Owner's Name <i>Raymond Williams</i>		Policy Number
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. <i>4815 Williams Dr</i>		Company NAIC Number
City <i>LR</i>	State <i>SC</i>	ZIP Code <i>29514</i>
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) <i>Lot 27 Paradise Island 1302901017</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 1983
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:
a) Square footage of crawl space or enclosure(s) _____ sq ft		a) Square footage of attached garage _____ sq ft
b) No. of permanent flood openings in the crawl space or enclosure(s) walls within 1.0 foot above adjacent grade _____		b) No. of permanent flood openings in the attached garage walls within 1.0 foot above adjacent grade _____
c) Total net area of flood openings in A8.b <i>1156</i> sq in		c) Total net area of flood openings in A9.b _____ sq in
d) Engineered flood openings? <input type="checkbox"/> Yes <input type="checkbox"/> No		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(s) (Zone AO, use base flood depth)
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: 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.
Benchmark Utilized _____ Vertical Datum _____

Indicate elevation datum used for the elevations in items a) through h) below. NGVD 1929 NAVD 1988 Other/Source: _____

COMMENTS:

changed A8-c to square inches already

Date of Review: *3-6-15*

Community Official: *MAR*

ELEVATION CERTIFICATE

Sh# 24
 9-19-13

25942

Important: Read the instructions on pages 1-9.

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

SECTION A - PROPERTY INFORMATION

FOR INSURANCE COMPANY USE

A1. Building Owner's Name <u>WARN KEITH HAYWOOD ETAL</u>	Policy Number:
A2. Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No. <u>4813 WILLAMS ISLAND DRIVE</u>	Company NAIC Number:
City <u>LITTLE RIVER</u> State <u>SC</u> ZIP Code <u>29582</u>	
A3. Property Description (Lot and Block Numbers, Tax Parcel Number, Legal Description, etc.) <u>LOT 27 PARADISE ISLAND TMS No. 130-29-01-047</u>	
A4. Building Use (e.g., Residential, Non-Residential, Addition, Accessory, etc.) <u>RESIDENTIAL</u>	
A5. Latitude/Longitude: Lat. <u>33-50-55</u> Long. <u>78-39-47</u> 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 <u>6</u>	
A8. For a building with a crawlspace or enclosure(s): a) Square footage of crawlspace or enclosure(s) <u>1703</u> sq ft b) Number of permanent flood openings in the crawlspace or enclosure(s) within 1.0 foot above adjacent grade <u>11</u> c) Total net area of flood openings in A8.b <u>2255</u> sq in d) Engineered flood openings? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	A9. For a building with an attached garage: a) Square footage of attached garage <u>N/A</u> sq ft b) Number of permanent flood openings in the attached garage within 1.0 foot above adjacent grade <u>0</u> c) Total net area of flood openings in A9.b <u>0</u> sq in d) Engineered flood openings? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

SECTION B - FLOOD INSURANCE RATE MAP (FIRM) INFORMATION

B1. NFIP Community Name & Community Number <u>HORRY COUNTY / 450104</u>	B2. County Name <u>HORRY</u>	B3. State <u>SC</u>			
B4. Map/Panel Number <u>45051CO581</u>	B5. Suffix <u>H</u>	B6. FIRM Index Date <u>09/17/2003</u>	B7. FIRM Panel Effective/Revised Date <u>08/23/1999</u>	B8. Flood Zone(s) <u>AE</u>	B9. Base Flood Elevation(s) (Zone AO, use base flood depth) <u>12</u>
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: 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. In Puerto Rico only, enter meters.
 Benchmark Utilized: SC VRF SYSTEM Vertical Datum: 1929
 Indicate elevation datum used for the elevations in items a) through h) below. NGVD 1929 NAVD 1988 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)	<u>7.67</u>	<input checked="" type="checkbox"/> feet	<input type="checkbox"/> meters
b) Top of the next higher floor	<u>18.83</u>	<input checked="" type="checkbox"/> feet	<input type="checkbox"/> meters
c) Bottom of the lowest horizontal structural member (V Zones only)	<u>N/A</u>	<input type="checkbox"/> feet	<input type="checkbox"/> meters
d) Attached garage (top of slab)	<u>N/A</u>	<input 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)	<u>12.34</u>	<input checked="" type="checkbox"/> feet	<input type="checkbox"/> meters
f) Lowest adjacent (finished) grade next to building (LAG)	<u>7.70</u>	<input checked="" type="checkbox"/> feet	<input type="checkbox"/> meters
g) Highest adjacent (finished) grade next to building (HAG)	<u>8.20</u>	<input checked="" type="checkbox"/> feet	<input type="checkbox"/> meters
h) Lowest adjacent grade at lowest elevation of deck or stairs, including structural support	<u>7.00</u>	<input checked="" 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.

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

Check here if attachments.

Certifier's Name ROBERT A. PRAETE License Number SC 17227

Title LAND SURVEYOR Company Name SELF

Address 1087 REDI MIX ROAD, UNIT 1 City LITTLE RIVER State SC ZIP Code 29566

Signature [Signature] Date 6/12/2013 Telephone 843-399-4260

[Signature]
 REV
 6/18/2013

12-79
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IMPORTANT: In these spaces, copy the corresponding information from Section A.			FOR INSURANCE COMPANY USE	
Building Street Address (including Apt., Unit, Suite, and/or Bldg. No.) or P.O. Route and Box No.			Policy Number:	
City	State	ZIP Code	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 A8-d FLOOD VENTS CERTIFIED BY CRAWL SPACE SYSTEMS (crawlspacedoors.com) vent model 816CS. Each vent 8"x16" is rated for the equivalent to 205 sq. in which is equivalent to 205 sq ft.
C2-e ELEVATOR PUMP SYSTEM IN GARAGE
& A/C IS ON ELEVATED DECK AT ELEVATION OF 16.92

Signature 	Date 6/12/2013
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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, crawspace, or enclosure) is _____ feet meters above or below the HAG.
 - b) Top of bottom floor (including basement, crawspace, 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's or Owner's Authorized Representative's Name			
Address	City	State	ZIP Code
Signature	Date	Telephone	
Comments			
<input type="checkbox"/> 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–G10) 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	
<input type="checkbox"/> Check here if attachments.	

HAYWOOD 25942
6-19-13

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_e) for a given enclosed area (A_c). 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_c) 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_e) as provided by the manufacturer.

Model	H x W (ft)	A_e (ft ²)	A_c (ft ²)
816CS	8 x 16	105	205
1220CS	12 x 20	235	500
1232CS	12 x 32	305	645
1616CS	16 x 16	180	395
1624CS	16 x 24	310	670
1632CS	16 x 32	405	835
2032CS	20 x 32	630	1240
2424CS	24 x 24	570	1230
2436CS	24 x 36	830	1765

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.

Table 1 Maximal total enclosed area (A_c) that can be serviced by each individual model based on the given net area of engineered opening (A_e)

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: Christopher Mark Loney
 Title: Mechanical Engineer
 Address: 1675 Meredith Road, Virginia Beach, VA 23455
 Type of License: Professional Engineer
 License #: 0402029000
 Issuing State: Virginia

Signature

