<div align="center">

NC Department of Insurance
Office of the State Fire Marshal - Engineering Division
1202 Mail Service Center, Raleigh, NC 27699-1202
919-647-0000

</div>

<div align="center">

High Wind Porch Uplift

</div>

Code: 2018 Residential Code   **Date:** February 26, 2019
Section: R4508

Question:
Is there a prescriptive way to calculate the uplift values for a porch post in a high wind zone?

Answer:
Yes. The reaction values from pre-engineered trusses can be used to determine uplift values.

Usable values can also be derived from the table shown below.
- The table is limited to a maximum post spacing of 12 feet.
- The maximum mean roof height of the porch roof is 15 feet.
- The connection needs to resist the value derived from the table below at both the top and bottom of the porch post.
- The connector at the base shall be anchored into the resisting footing and its components installed as required by the manufacturer of the connector.

<div align="center">

Residential Porch Columns Uplift Values (psf)

| Pitch:12	Angle	130	140	150
1	4.8	-19.5	-22.7	-26.0
2	9.5	-29.9	-34.7	-39.8
3	14.0	-29.4	-34.1	-39.1
4	18.4	-35.5	-41.2	-47.3
5	22.6	-39.5	-45.8	-52.6
6	26.6	-39.8	-46.2	-53.0
7	30.3	-38.5	-44.6	-51.2
8	33.7	-35.6	-41.3	-47.4
9	36.4	-34.4	-39.9	-45.8
10	39.8	-32.8	-38.1	-43.7
11	42.5	-30.2	-35.0	-40.2
12	45.0	-29.0	-33.6	-38.6

</div>

Calculation steps:
  a) Determine the roof pitch of the building.
  b) Determine the wind speed for the building location using Tables R301.2(4), and (5).
  c) The intersection of the roof pitch and the wind speed will provide the uplift value per square foot of roof.
  d) Determine the area of roof that will be held down by a column (also known as tributary area).
  e) Multiply the tributary area (step "d" above) by step c above to get the uplift value on any given porch post.

Example:
  • Roof pitch = 4:12 or 18.4 degrees.
  • Porch mean roof height is 14'-6".
  • Ultimate wind speed from Table R301.2(4) = 140mph.
  • It is not in a mountain region.
  • Porch posts are located one at each corner and 12' on center.
  • Porch is 10' deep.

Calculation:
  • Uplift per square foot of roof is -41.2 (per the above table).
  • Corner post uplift area = 5' x 6' = 30sf
  • Corner post uplift = 30sf x -41.2psf = -1236 lbs.
  • Other post uplift area = 5' x 12' = 60sf
  • Other post uplift = 60sf x -41.2psf = -2472 lbs.
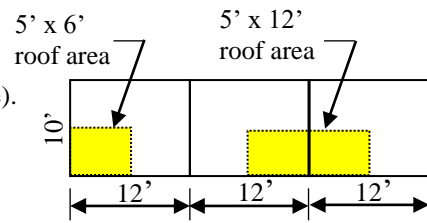
Question:
When using the method described above how can I pick a continuous footing size that will resist the uplift value of the porch column?

Answer:
Footing size and reinforcement of Section R4503 can be used where all the following apply:
  1. Porch posts are spaced a maximum distance of 12 feet.
  2. The porch roof mean roof height is a maximum of 15 feet.
  3. An 8" or greater CMU foundation wall with a minimum height of 2 feet is constructed on the footing. This added weight of the foundation wall is part of the uplift resistance. Other methods, such as additional footing size, for providing equal weight as is provided by the CMU's is also acceptable.
  4. The connector at the base shall be anchored into the resisting footing and its components installed as required by the manufacturer of the connector.

The above is intended as a prescriptive method for code compliance, but an engineered design is also acceptable.

Keywords:
Anchor, structure, tie-down, tiedown, tie down

4508 – High Wind Porch Post Uplift.doc