

Climate Resilient Construction

Lessons Learned on the Path of Continual Improvement.

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- Our Climate is Changing:
- Builders on the path to Net Zero, but we don't mention more Resilient Construction.
- Forest Fires, Floods, Wind Events, Hurricane's, Tornados, High Wind Occurrences, these events are happening with greater frequency and greater ferocity.
- Insurance Industry is primary driver. Without mortgage insurance, we have no sales.
- Does it matter who's to blame or why it's happening?

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- HOPE AGUA VITA field work in Puerto Rico!
- Four Missions to date.
 - Constructed Five Roofs.
 - One Home from Slab in 6 days.
 - Created a Team of women (Mom's and Grandma's) to repair concrete roofs.
- Working with Western University Engineering



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- 3 types of housing in P.R.!
- Concrete home with concrete roof - badly damaged.
- Concrete home with wood roof - severely damaged.
- Wood Frame with wood roof - catastrophically damaged.
- All those blue tarps are homes damaged by Maria.
- On Mission Hiatus as we look at funding models.



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Ottawa tornados of 2018.

- The 2018 Dunrobin / Gatineau tornado was an EF3, however,
- The great majority that occur in North America are an EF2 or less.
- Even more severe tornados have diminished winds on the edges.



- A hard lesson. If you lose your roof, your house goes to the landfill.
- Even a Net Zero Home.

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But The Research Says.

“Our research conducting damage surveys following extreme wind storms in Ontario indicates that the roof is the most vulnerable part of a house, particularly the roof sheathing and the roof-to-wall (toe-nailed) connections.

This is consistent with wind tunnel data and full-scale tests in our labs, which indicate that longer sheathing nails and use of hurricane straps will mitigate this structural damage for up to EF-2 tornadoes. This represents more than 90% of all tornadoes, and can be implemented for relatively little cost.”



Dr. Kopp's research would show that adding hurricane straps and changing our sheathing nails from 2" to 2.5" would help builders construct homes able to withstand an F2 tornado.

Dr. Gregory Kopp, Dean of the Western University Engineering program

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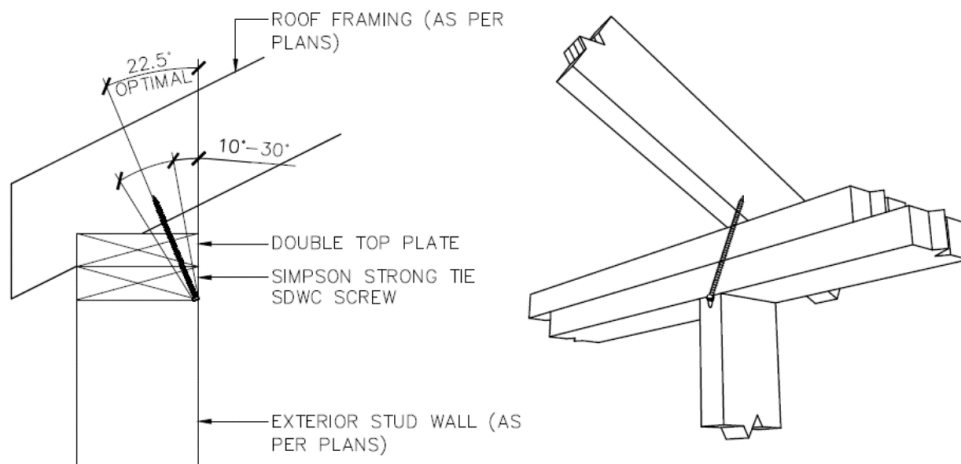
Climate Resilient Construction!

Three Construction Changes We Can Implement Immediately:

1. Change Roof Sheathing Nails from 2" to 2.5" and follow the nailing pattern in the Ontario Building Code.
2. Install Hurricane Straps, or screws to fasten double top plate to truss.
3. Flash your windows according to existing building code requirement CSA A440. structural framing that's rotted won't hold the roof.

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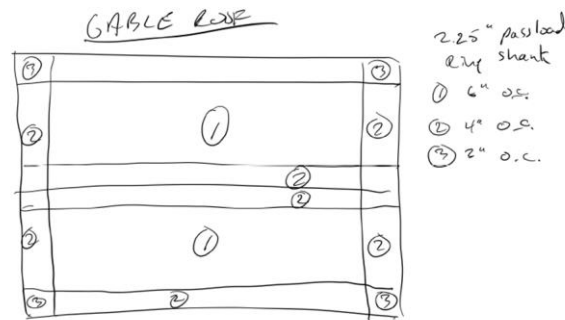
WALL TO ROOF FRAMING CONNECTION (ANCHOR INSTALLED DIAGONALLY)

ENGINEERING DETAIL COURTESY CENTRIC ENGINEERING

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Cost Effective Weather Resilient Construction



- Roof DIVIDED INTO ZONES.
- Sheathing installed from outside edges
- partial sheets placed in the center / through zone ①

Sample of recommended nailing pattern. (Best Practice)

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Cost Effective Weather Resilient Construction



A440.4-07
(reaffirmed 2016)

Window, door, and skylight
installation



The Actual Standard listed
in the Building Code.

\$50/window



- WINDOW FLASHING
- IF 2 PUERTO RICAN GRANDMAS CAN LEARN IT
IN AN HOUR!

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Climate Resilient Construction Pilot Project with Institute for Catastrophic Loss Reduction:

- 5 builders, 100 housing units, singles, semis and towns.
- Builder required to:
 - Builder Trade fastens roof sheathing using 2.5" roof sheathing nails & OBC pattern.
 - Builder Trade installs hurricane clips or screws as required by truss loads.
 - Provide material purchase for sheathing nails.
- ICLR to provide \$200 / house to builder upon completion of framing inspection and project reporting.
- NOTE: Window flashing not in project scope. AHJ is looking at this issue for enforcement.

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