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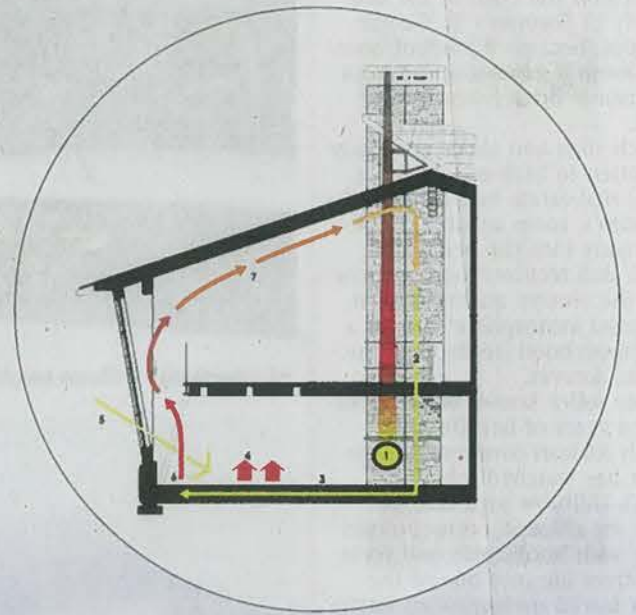
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Globe Real Estate

ARCHITECTURE

Gusty design

Architects Alex Temporale and Mark Driedger used wind tunnel studies to calibrate the look of a home built on a blustery strip of land PAGE 10



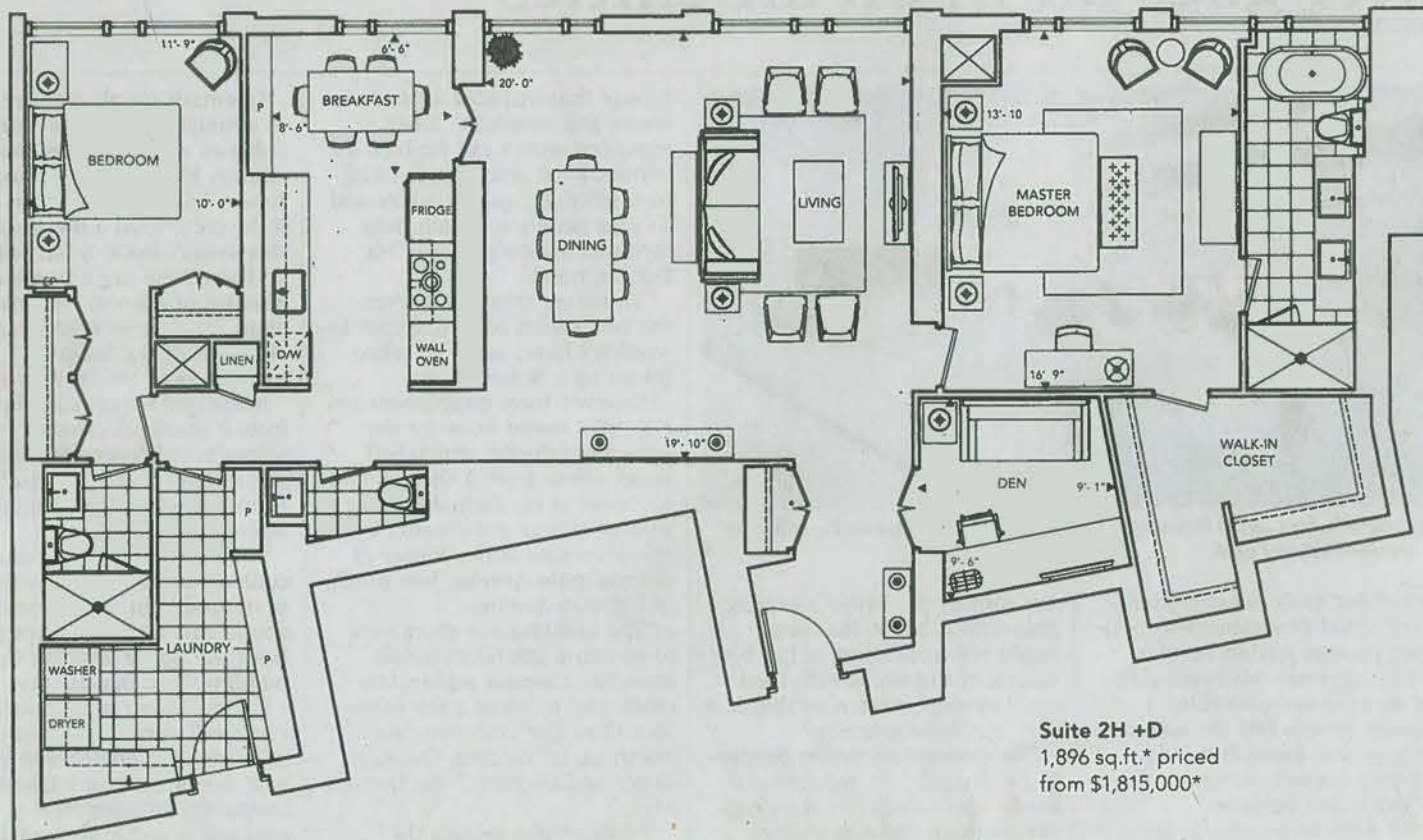
Two wings resembling triangular carports extend from two corners of the house. The first shapes how the wind travels around the house; the second influences how it leaves: 'It's sort of like the [Toyota] Prius ... it sort of has that slope,' Mark Driedger says. Windows are precisely angled to maximize seasonal heat loss or retention. MARK J. DRIEDGER

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EDITOR: D'ARCY MCGOVERN

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Gusty design

Wind tunnel studies help calibrate the look of a home built on a blustery strip of land



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Testing a house in a wind tunnel seems about as logical as buying an aerodynamic toaster. But here, squarely in the middle of that thin strip of land separating Lake Ontario and Lake Erie near Smithville, air moves quickly ... and often.

Today, it's whipping the blades of distant turbines into a controlled frenzy, and reddening the cheeks of architects Alex Temporale and Mark Driedger as they step over semi-frozen puddles on the 26-acre lot to take in Delta House's three façades.

Save for a small square window, the garage wall, which faces northwest, has no glazing. Circle around to the south-facing wall, however, and there are windows all over, including the "three sisters" that take light deep into the lower level.

"The idea is to create a pocket of non-velocity, non-turbulent air on this side of the house," Mr. Driedger explains. "When wind hits windows in the winter, you get about 30 per cent extra [heat] loss."

The sisters are tilted 10 degrees



Aerodynamics count for something if a structure is built on a windy stretch of land, such as Delta House near Smithville on the Niagara Peninsula. Architects Alex Temporale and Mark Driedger needed three tests in a wind tunnel at Ryerson University's Department of Architectural Science to get the design just right.

PHOTOS BY MARK J. DRIEDGER

in order to reflect heat, mirror-like, in summer but allow solar energy to warm the lower level's polished concrete floor in winter.

Big, serpentine berms (earth mounds) have been strategically placed at various spots around the house - unfortunately funds ran out before they were fully developed and planted - to further influence the wind.

These, and the entire exterior design, were modelled in a wind tunnel at Ryerson University's Department of Architectural Science, with the help of professor Ramani Ramakrishnan, to "figure out how to get the wind up and over [the house]."

To further mitigate the wind, two wings that resemble triangular carports extend from two corners of Delta House. The first shapes how the wind travels around the house; the second influences how it leaves: "It's sort of like the [Toyota] Prius and how the back continues out, it sort of has that slope," Mr. Driedger continues. "So this takes the exiting wind and keeps it from swirling back in."

It took three tries in the wind tunnel to get it just right. And rather than producing an awkward Frankenstein's monster of a structure that only Neil deGrasse Tyson could love, the results are actually quite handsome.

Inside, it gets even better. Just a few feet from the foyer is the tall fireplace chimney, which pierces the highest point of the hip roof. The web of steel beams that gather and "tent" at that point have all been dropped down so they don't transfer heat or cold into the home.

The chimney, which Ryerson also helped with, is a crucial piece of the home's heating system: "It's a labyrinth, basically," Mr. Driedger says. "We burn hard and fast twice a day, and the heat, it takes a while to get up to the top of the chimney - the exiting fumes are only about 300 degrees." That saved heat, meanwhile, enters the HVAC system and is pulled all the way down to a series of pipes under the floor of the lower level. This air travels to the end of the concrete slab and heats it before exiting via vents. In summer, the system is used to cool the slab, and clerestory windows on either side of the chimney vent hot, rising air.

And all of this - as well as window blinds and the security system - is controlled via touchscreens and automation, which suits the homeowner, Costa Aza, a professor of mechanical engineering at Niagara College and lead researcher at the Walker Innovation Centre, just fine. "As far as energy efficiency and angles and breaking up the wind, I can appreciate it and understand it," he says of his two-year-old home.

The home's systems even parallel Mr. Aza's other profession: chicken farming. When he took over from his father, he automated everything in order to free his schedule to teach. "It monitors temperatures, it knows when to create airflow, when to control the humidity, I know how long everything runs for, so when I'm away I can still control costs." The chickens, he explains, get "very stressed" if the temperature "changes too fast."

"It's amazing that our chickens get more attention than humans in Canadian houses," Mr. Driedger says with a laugh.

"So when we started doing the house," Mr. Aza adds, "it allowed me to look for the same types of things because I had already seen the benefit at the farm of having real-time data."

Aesthetically, the home scores highly also: On the living room ceiling, slatted wood installations hold ambient and directional lighting. The kitchen features a cozy breakfast nook with banquette seating. Stairs to the lower level not only wrap around the chimney, they're anchored to a thick piece of tubular steel; similar steel posts, arranged in a V-shape, hold up the living room floor, which doesn't touch the exterior wall on the south side.

"There are very few residential contractors that will do a house out of steel," Mr. Temporale says. "Like, there could be a steel post in the basement, but that's about it; you show them anything that isn't the regular roof, it's a panic." He has high praise, then, for Lindsay Construction Services in Arkell, Ont., who "are willing to take on interesting projects."

And speaking of projects, this interesting residential one is over for Mr. Aza as a result of a life change, so Delta House is on the market for \$1,350,000.

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