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Can NYC glass towers withstand Irene?

The Big Apple more vulnerable than other cities because there's more glass and it seldom experiences hurricane conditions, expert says August 27, 2011 01:30AM **By**
Miranda Neubauer



From left: David Childs, architect of 1 WTC, and Anthony Malkin, owner of the Empire State Building

Falling debris is the biggest risk factor for glass in buildings in the event of a hurricane in New York City this weekend, according to real estate experts. While last night's [radar prediction for Hurricane Irene](#) from the New York Times indicated that the city may not be hit full-force with a hurricane, but rather with a tropical storm, the danger from falling debris and glass is still a cause for concern.

At a press conference yesterday afternoon, Mayor Michael Bloomberg warned New Yorkers to avoid glass windows. "There's always a risk of flying debris shattering windows, and that risk increases if you're in a high-rise, on the 10th floor or higher," he said. "For your own safety, stay in rooms with no or few windows, and close the doors to rooms where there are more windows. Don't stand or congregate in glassed-in lobby or atrium."

In unprecedented moves, the city also ordered all residents from [low-lying Zone A](#) areas to evacuate, and planned to shut down the entire Metropolitan Transportation Authority system to protect equipment as well as transit riders beginning at 12 p.m. today.

"The greatest damage is caused by the winds picking up debris," said Mark Baker, president of Innovative Building and Architecture Consultants, which is based in Florida, but has an office in New York City. That debris, he explained, could then smash into buildings and glass, letting wind into the buildings "causing what is called internal pressurization, which ends up compounding the wind pressure on the backside of the building and it essentially blows apart buildings, and then that debris [becomes a danger] to neighboring buildings and it creates a sort of domino effect."

Irene, an Atlantic hurricane, hit the Bahamas earlier this week and had already begun inflicting damage in North Carolina late yesterday.

Up to about 30 feet, a significant threat comes from what the building code refers to as "large missiles", namely debris such as street signs and construction that can be lifted up by the storm, Baker said. Above 30 feet the danger comes from so-called small missiles such as roof gravel and broken glass from other buildings, he said, which is harder to remove beforehand.

"The glass is going to be able to withstand the direct force of the wind," he said. "It's the flying debris that's going to make it very vulnerable. New York City is not different from any other cities except that there's a lot more glass and a lot more buildings that haven't been subjected to this." He added: "There's zero likelihood that any of the glass on any of the buildings, unless it was designed to be blast resistant, is going to withstand the flying debris."

While New York and other northeastern states adopted new building codes as "hurricane prone regions" in 2008 that are more resistant towards hurricanes, he said, not many new buildings have yet been built under that code. He said that many older New York buildings were vulnerable because they did not have impact-resistant glass. "Even if you are the tallest building, you have a little bit of an advantage, but basically once that debris field is created, it isn't a ground-based event, it is a roof-based event," Baker said.

With Hurricane Irene seeming to be heading directly for New York, the question is whether the winds will die down enough to prevent large debris fields, he said. He urged building owners to take photos of intact structures for insurance purposes.

Robert Otani, vice president of engineering company Thornton Tomasetti, which offers engineering expertise to projects nationwide, said that most buildings erected in the city in the past 20 years or so were built to withstand wind pressures up to 90 or 100 miles an hour. Earlier building codes, he said, had been based less on scientific study of hurricanes and more on historic experiences. But he agreed with Baker that other elements less securely attached to buildings would create the most danger. He added that deterioration of façade elements could be another problem.

"It takes a lot for an entire structure to be [affected] by the wind pressures, especially if they're intermittent, but a piece of glass or a façade gets the full brunt of that pressure right away," Otani said.

Roofs also face separate dangers.

"In a very high wind pressure, roofs will tend to lift. There were some examples of that when the tornado hit in Queens last year," Otani said. In addition, 25,673 buildings in New York City are at risk for surge and/or flood inundation, according to data released yesterday by CoreLogic.

Otani said his company was already scheduled to examine properties after the storm for damage.

"If in fact the wind pressure gets to what they're predicting, a Category 1 or Category 2 hurricane, the city has not seen that," Otani said. "Things that are not in the greatest shape are going to get tested." Still, he said he thought most buildings would not suffer much damage.

Manhattan's tallest buildings are constructed withstand horizontal force of winds, and glass in the newest towers is much stronger than the typical windows, architect David Childs, who designed [1 World Trade Center](#), [Time Warner Center](#) and [Worldwide Plaza](#) among several other Manhattan towers, told Bloomberg News. "Many tall buildings have a large base to stand on, and they're anchored to the granite which forms the base of all of Manhattan," he said.

Skyscraper skin is thicker and tends to be installed in two or three layers, he told Bloomberg, and if it does break, it usually breaks down into pellets like an auto windshield. Though those pellets can be dangerous in hurricane winds, the latest building designs are typically tested in Florida, he said, where hurricanes are more common.

[Anthony Malkin](#), owner of the Empire State Building, sounded optimistic. "We were fine after [the hurricane] in 1938, and we'll be fine after this," he said via email. According to New York City's website, that storm killed 10 people in New York City and caused millions of dollars in damage. Floods knocked out electrical power in all areas above 59th Street in Manhattan and in all of the Bronx, the new IND subway line lost power, and 100 large trees in Central Park were destroyed.

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