Title:	**Debating Tall: Should Tall Buildings in Cold Climates be Designed Specifically to Stop Falling Ice?**
Authors:	Michael Carter, Director, Northern Microclimate Inc. Roman Stangl, Director, Northern Microclimate Inc.
Subjects:	Architectural/Design Façade Design Fire & Safety History, Theory & Criticism Urban Design
Keywords:	Climate Context Façade Life Safety
Publication Date:	2014
Original Publication:	CTBUH Journal, 2014 Issue II
Paper Type:	1. Book chapter/Part chapter 2. **Journal paper** 3. Conference proceeding 4. Unpublished conference paper 5. Magazine article 6. Unpublished

Should Tall Buildings in Cold Climates be Designed Specifically to Stop Falling Ice?

Recent media attention in major urban centers such as New York City and Chicago has brought the issue of falling ice from tall buildings to the forefront. In an effort to bring clarity to the subject, we have asked the authors of a previously published CTBUH article on the topic to debate both sides of the issue.

YES

Roman Stangl
Director, Northern Microclimate, Inc.

A collision of factors is contributing to the potential for a dramatic increase of falling ice incidents. Winter weather in recent years has been increasingly severe and variable, dropping greater amounts of precipitation, and this trend is expected to continue. The use of coatings and new materials as well as advancements in design geometries, roof spans, and building height, are taking designers into uncharted waters. The influence or impact on snow/ice formation and release are often unrealized.

Ironically, more energy-efficient strategies may also be to blame. Changes in interior heating strategies have reduced excess heat at the building perimeter in close proximity to the curtain wall. Improved thermal performance of various components of the curtain wall or façade system, such as high-performance glass, thermally broken mullions, and improved insulation are also contributing factors. Increasing solar shading has also increased the exterior surface area where snow and ice can collect.

Larger, taller, and more complex designs are creating new design challenges. For example: a solution for a smaller roof does not necessarily perform the same on a larger roof; a more complex façade, either in shape or texture, can create more complex ice formation; and, a taller building will be exposed to icing and wind influences that do not occur at lower elevations.

The key is in understanding how design details will perform in all potential variations of microclimate conditions, predicting and addressing the potentially hazardous, frequently-occurring scenarios at the design stage, and recommending a method for owners and managers to predict and manage the remaining unusual and less-frequently occurring hazards.

Designing a building or structure within the context of its environment is crucial to performance. This should extend to the buildings' interaction with winter precipitation.

To improve performance and safety, we need regulatory guides and standards for the assessment and evaluation of building designs.

NO

Michael R. Carter
Director, Northern Microclimate Inc.

Design is an artistic expression, and should be followed by the further development of ideas and solutions to address concerns. In architectural terms, this can apply to function, safety exterior performance, etc. Falling ice from buildings has a long history, and, due to the variability in weather, cannot be completely eliminated. However, once a concern arises, design can counteract frequently occurring winter precipitation that leads to hazardous conditions through assessments and testing. A design detail or geometry that would pose potential concern in one situation may be completely manageable or safe in another.

In regards to ice and snow, modern buildings perform significantly better than older buildings. Advancements in ice and snow retention and control products and the development of industry design practices have created multiple means of identification and mitigation.

This past winter, the northeastern United States received extreme weather with wet, icy precipitation in unusually large volumes, along with longer periods of cold temperatures, creating greater opportunity for, and frequency, of problematic conditions.

Addressing ice and snow formation at the design stage must happen within the context of the design, but without governing the design. All buildings or structures should be assessed for their anticipated winter performance within the context of their microclimate, just as they would be for wind load, structural integrity, and rainwater management. The severity and frequency of probable events are estimated and addressed where an unacceptable condition is predicted.

We need greater awareness of the winter performance of a building façade or roof. Snow and ice formations have complex and transient life-cycles governing their movement, creating a potential hazard for people and property. The design process should reflect this.

Mike Carter and Roman Stangl are Co-chairs of the ASTM International – E06.55.13 Task Group for the Evaluation of Snow & Ice Accretion on Buildings & Structures.