Falling Ice and Snow

Examples of: Impromptu Caution Sign (upper left), Sliding Snow at Entry (upper right), Falling Ice from a Failed Snow Barrier (lower left), and Windblown Snow Cornice over Entry (lower right).

by Mike Carter, C.E.T. & Roman Stangl, C.E.T.
Northern Microclimate Inc. – *A Winter Perspective on Design*

Introduction

Then envelope or enclosure of a building is experiencing many demands and innovations in this era of continuous change. The influences of climate change, counter terrorism, energy conservation, and the integration of mechanical systems are a few motivators of change in facade design. However, the fact is, the further we venture from a tried and true building envelope which has proven performance in a multitude of meteorological conditions; there is a greater need to investigate overall performance. Specifically, the performance of modern facades during the winter season and the potential for the formation of ice and snow accumulations that can fall, slide or be windblown from a facade, creating hazard for people or property below. Consequently, the goal of the following discussion is to promote *A Winter Perspective on Design*, in a hope to raise the awareness of an issue that is increasing in occurrence and severity.

Issues of concern include:

Energy Efficiency

In an effort to improve the overall energy performance of buildings, the profile of their exterior envelope or facade is changing. An increased use of solar shading devices or double facades has contributed to an increase in falling ice and snow incidents (these elements provide greater surface area for ice and snow to collect). While an overall increase in facade energy performance (i.e., increased insulation, reduced air leakage and better performing glazing) is contributing to larger ice and snow formations that can be windblown, slide or fall from a building. Furthermore, the melt and re-freeze of the additional accumulated precipitation on these colder exterior surfaces contributes to dangerous icicles or ice sheets that also fall.

Design Trends

Building crowns, wing walls, large mullions, low or no parapets, green roofs, sloped walls/glazing (etc.); all contribute to falling ice and snow. Thus, a review of predicted winter performance of facade details during the design stages of a building is beneficial in identifying and reducing potential falling ice and snow risks.

Sliding Ice and Snow on Slippery Surfaces

Slippery roofs and sloped metal or glazed walls, allow snow accumulations to slide and impact building components or areas below the roof, posing a danger to people and property. Currently, there is little guidance available to address moving ice or snow on buildings; however, often if the topic is identified and awareness brought to the potential for hazard, solutions can be sought.

Technology

Tall buildings experience frequent wind driven icing at higher elevations. The ice collects in large volumes on parapets, cold walls, antennas and other structural elements, and then falls. Incidents are rarely reported (publicly); however, are frequent and increasing due to current design trends and number of tall buildings. Experienced guidance is required to reduce potential of larger formations.

Lack of Knowledge within the Industry

The study of falling ice and snow from buildings and structures is still in its infancy. The complexity of models required to predict the potential for building designs to collect and shed accumulated ice and snow is beyond the current capabilities of economic study. Thus, the industry must rely on investigations that combine past experience and physical testing. Subsequently, the following points are offered for consideration:

a) Building designs are reviewed and tested for rain water infiltration and cladding winds loads, however it is significantly less common for investigations of ice and snow formations to be commissioned, despite the significant impact on safety and the reputation of a finished building. The four factors described above (Energy Efficiency, Design Trends, Sliding Ice and Snow on Slippery Surfaces, Technology) are having significant impact on how modern buildings perform in the winter season, creating the need for increased due diligence and experienced guidance with respect to winter performance.

b) Additional guidance can be given to building owners and operators, with respect to how their newly completed buildings will perform in the winter months. Many examples exist in recent years of falling ice and snow from prominent buildings, ending in injury or damage. Why are people and property present at the base of slippery roofs or other building features with dangerous amounts of ice and snow on them? Guidance and knowledge of these issues are needed to create pro-active operational protocols for owners and operators of buildings.

c) Lastly, product suppliers (snow guards, snow fences & heat trace) are not regulated and naturally have a focus on making a sale over educating clients on the limitations or potential short comings of their individual products. In our experience, the solution that best balances the key factors of risk, cost and aesthetics is a collaborative approach applied in the early design stages; thereby integrating ice and snow management concepts directly into the building design and reducing the reliance on these types of products.