





# ABOUT AGI

## The Architectural Glass Institute

The Architectural Glass Institute (AGI) was created to provide a forum for sharing the collective expertise of our glazier employers of the Philadelphia tri-state region and The Finishing Trades Institute.

Offering consultative insight combined with flawless installation, AGI's specialized work teams ensure your project meets our elevated standards. And yours. Committed to ongoing education, you get more than execution from AGI.

You get innovation @ work.

*AGI affiliated companies raise the bar for glazing contractors so owners benefit from quality installations delivered on time and within budget.*



The Architectural Glass Institute is a registered provider with The American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported for the AIA members. Certificates of Completion for non-AIA members are available on request.

***This program is registered with the AIA for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval, or endorsement by the AIA or the Architectural Glass Institute of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.***



# Mitigating Bird Strikes

Program Bird 2020 | Provider #50111143

1 AIA/CES LU

## LEARNING OBJECTIVES:

1. Understand the risk factors the built environments presents to birds and discuss design strategies to reduce bird strikes.
2. Outline bird friendly glazing options including frit applications and UV coatings.
3. Review studies related to effective spacing of visual markers in design and glass applications.
4. Discuss strategies for protecting migratory birds from nighttime building-related hazards.

A sunset sky with many birds in flight. The sky transitions from a bright orange at the top to a deep red at the bottom. Numerous birds are silhouetted against the colorful background, flying in various directions. A blue rectangular box is overlaid on the bottom center of the image, containing the text 'Bird Safe Glass' in white.

# Bird Safe Glass

*Glass collisions claim the lives of up to*  
**A BILLION BIRDS ANNUALLY**  
*According to the American Bird Conservancy (ABC)*



# Over 300 migrating birds smashed into Charlotte's NASCAR building



## The Vikings' sparkling glass stadium is killing birds at an alarming rate

Bird watchers say the glass stadium is killing almost 500 birds a year



by Will E.

## Buildings are killing up to 1bn birds a year in US, scientists estimate

United States News > National Real Estate News



News

National Construction & Dev

### Can Bird-Safe Glass Ever Become An Industry Standard?

BISNOW NATIONAL NEWSLETTER

Email\*

SUBMIT

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# RISK FACTORS

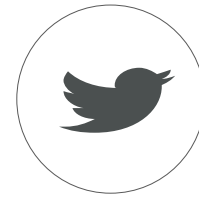
Every site and building combine for a unique set of risk factors



**GEOGRAPHY**



**ECOLOGY**



**MIGRATORY  
PATTERNS**



# BIRD-FRIENDLY DESIGN STRATEGIES

**1**

## MINIMAL GLASS

**2**

## SCREENING

Place glass behind some type of screening like netting, screens, grilles, shutters, exterior shades

**3**

## COLLISION-REDUCING GLASS

Use glass with inherent collision-reduction properties like patterns, frits, films, opaque and translucent glass



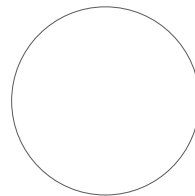
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# Properties of Glass

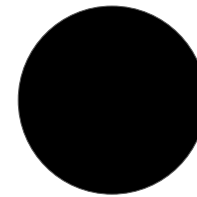
Glass can completely reflect light or let virtually 100% of light pass through



**REFLECTION**



**TRANSPARENCY**



**BLACK HOLE or  
PASSAGE EFFECT**

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# Glass or no Glass?

Glass can completely reflect light or let virtually 100% of light pass through



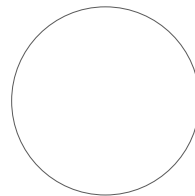
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# Properties of Glass

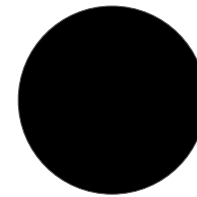
Glass can completely reflect light or let virtually 100% of light pass through



**REFLECTION**



**TRANSPARENCY**

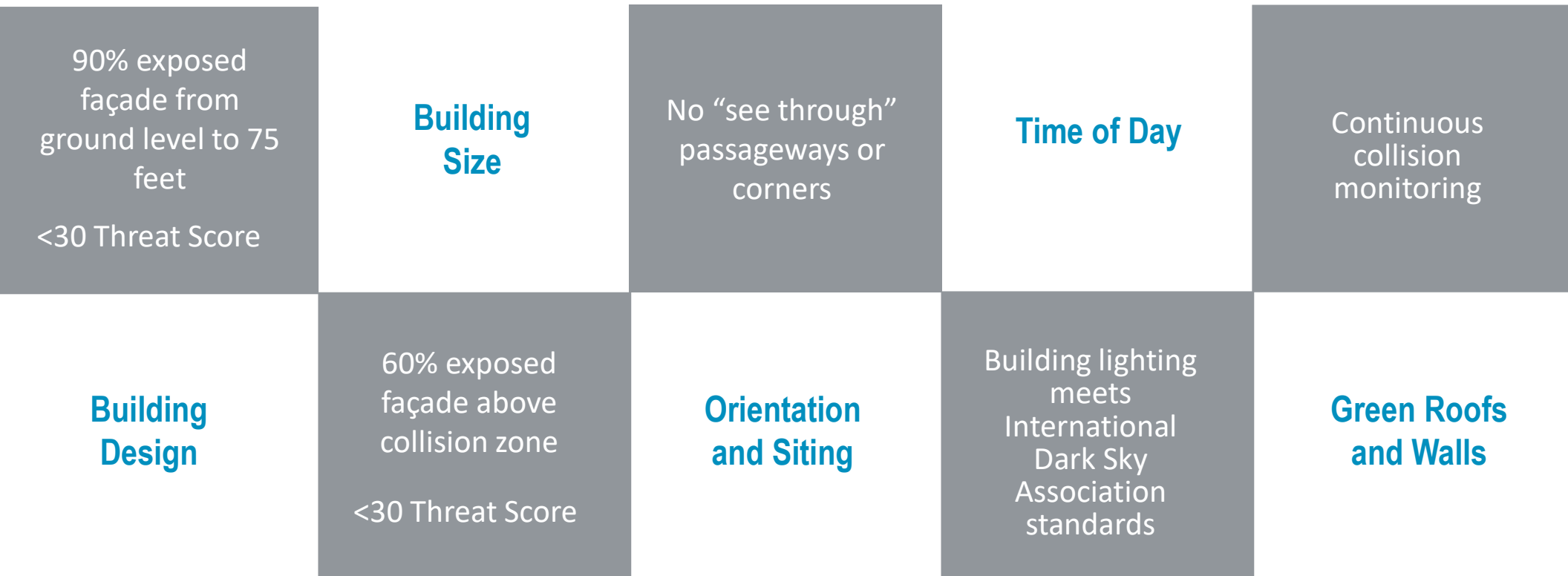


**BLACK HOLE or  
PASSAGE EFFECT**



# BIRD-FRIENDLY BUILDINGS

ABC describes a bird-friendly building as one with:



# National Glass Association

Bird-Friendly Glass Design Strategies



## USGBC Pilot Credit

Pilot Credit 55  
Bird Collision Deterrence



# Creating Visual Markers



ETCH | FRIT

FILM | DECALS

DECORATIVE GRILLES AND LOUVERS

ARTWORK

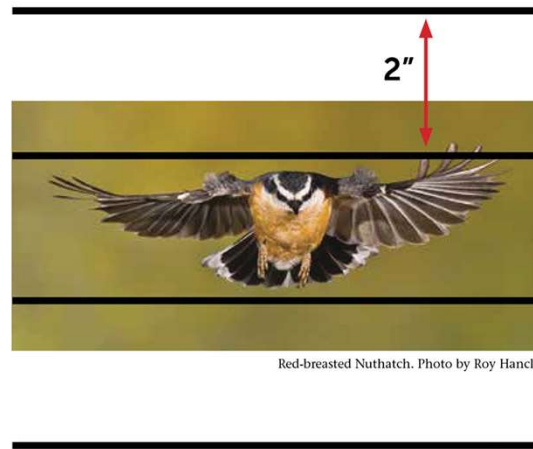
ULTRAVIOLET (UV) PATTERNS

FENESTRATION PATTERNS OF VERTICAL AND  
HORIZONTAL MULLIONS

# Spacing Matters

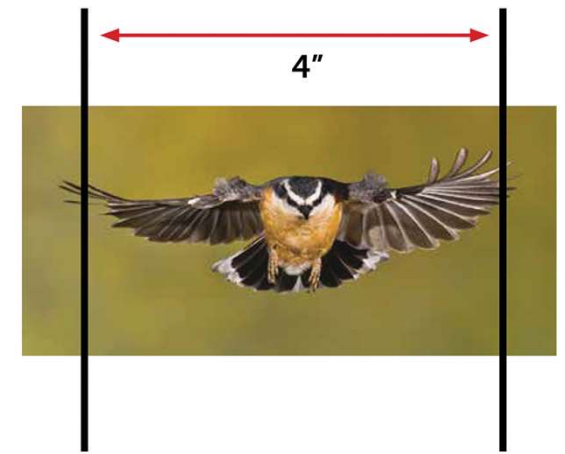
Testing shows that the 2 x 4 Rule is most effective

Horizontal lines with a maximum spacing of 2 inches



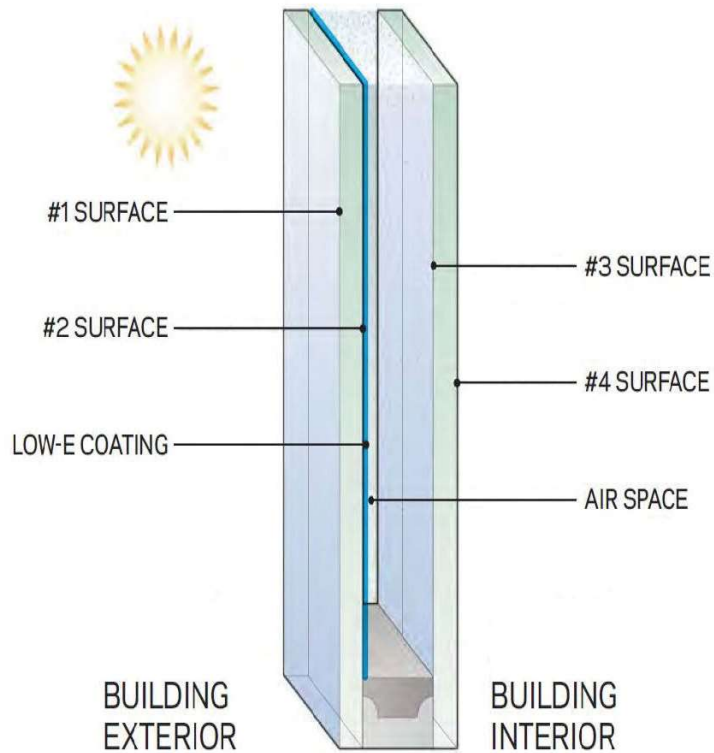
Red-breasted Nuthatch. Photo by Roy Hancliff

Vertical lines with a maximum spacing of 4 inches



# Glass Surface Orientation

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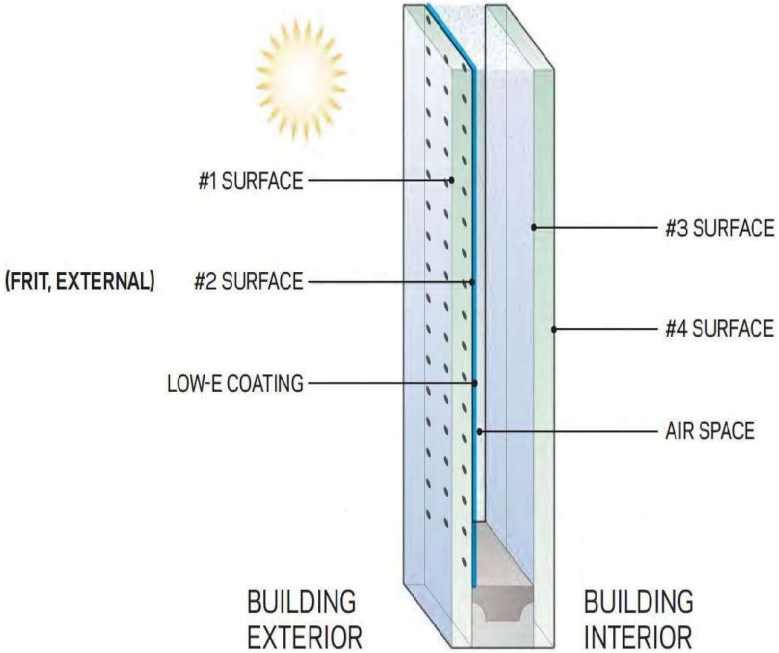
In the case of a regular double-pane IGU, there are four surfaces:

- The exterior surface
- Inside cavity opposite of exterior surface
- Inside cavity opposite on interior surface
- Interior surface



# Frit Application

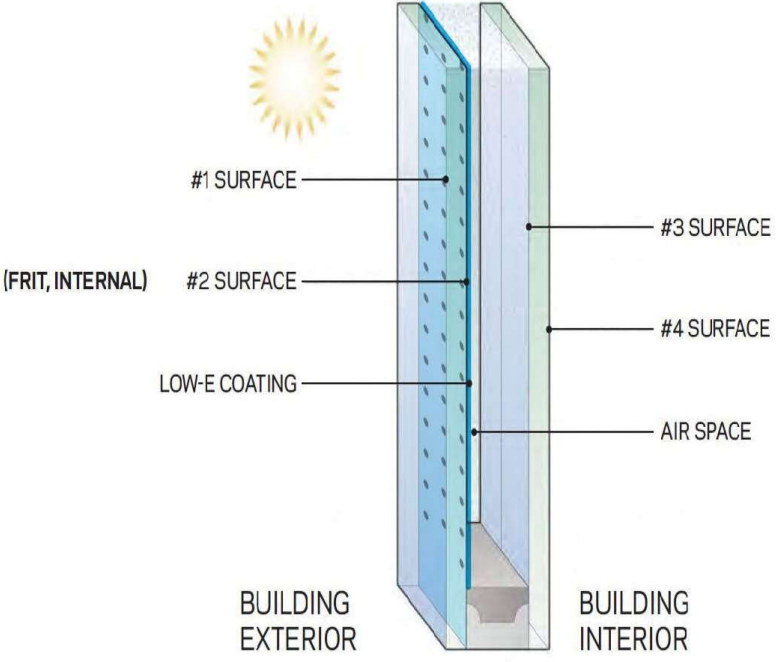
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Exterior = Surface 1

# Frit Application

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Interior = Surface 2

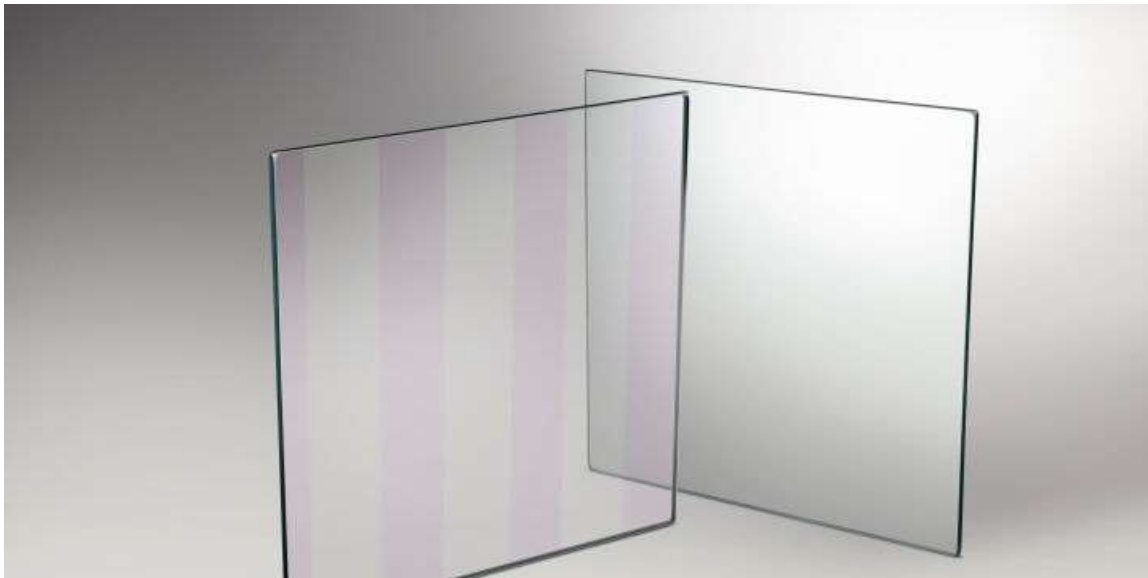


# Frit Application – Surface 2

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# UV Coating – Guardian Bird1st

- A patent-pending UV stripe coating on the first surface visually signals an impending barrier to birds and helps prevent collisions. With an acceptable Avoidance Index score from the American Bird Conservancy, the product follows the 2x2 rule to account for different sizes and species of birds.
- Virtually invisible to the human eye in dry conditions, views remain pristine unlike traditional ceramic frit solutions, all while helping protect birds. Paired with select Guardian SunGuard® low-E coatings, Bird1st glass offers the high performance you want and need and may help your project earn LEED Pilot Credit 55.



## Guardian Glass test results with ABC February 2020

*This document was prepared by Guardian Glass to summarize testing results received from American Bird Conservancy and is distributed with approval from ABC. All results below were tested at Powdermill Avian Research Center in Rector, PA.*

*To pass configurations must score 70 or greater in Avoidance Index (AI).*

### **Bird1st with SN68 and inboard lamination**

Bird strike deterrent: Bird1st surface 1, vertical stripes, 30% coverage

Configuration: IGU with inboard laminate

Low-e: SN 68

Results reported December 1<sup>st</sup>, 2016

**AI Score: 74**

**Useable Flights: 80**

**MT Score: 26**

### **Bird1st with SN 68 and outboard lamination**

Bird strike deterrent: Bird1st surface 1, vertical stripes, 50% coverage

Configuration: IGU with outboard laminate

Low-e: SN 68

Result reported on November 17<sup>th</sup>, 2017

**AI Score: 70**

**Useable Flights: 80**

**MT Score: 30**

### **Bird1st with SNX 62/27 and outboard lamination**

Bird strike deterrent: Bird1st surface 1, vertical stripes, 50% coverage

Configuration: IGU with outboard laminate

Low-e: SNX 62/27

Result reported on December 1<sup>st</sup>, 2018

**AI Score: 75**

**Useable Flights: 81**

**MT Score: 25**

# UV Coating – BirdProtect™ by McGrory Glass

ABC Material Threat (MT) Score of 19



# Muting Reflections



ANGLED GLASS

AWNINGS AND OVERHANGS

SUNSHADES

SCREENS, GRILLS OR MESH

SHUTTERS

LOUVERS

WINDOW FILM





## Dimming Artificial Lights at Night

- Bright lights in metropolitan areas attract and disorient migrating birds
- “Lights Out” Program



**“In 2008, the American Bird Conservancy (ABC) founded what is still the only national-level program dedicated to reducing the billion bird deaths that occur annually from collisions with glass in the U.S.”**

**Christine Sheppard**

Director of ABC/s Glass Collisions Program

**“Since then, more than 20 states, counties, and municipalities have passed bird-friendly legislation. However, the H.R. 919 is a game-changer. The recognition of this issue at the federal level is a momentous achievement because if passed by the Senate and put into law, it will set an example for the entire U.S.”**







## *Bird Safe Building Act of 2019 (H.R. Bill 191)*

Passed the U.S. House of Representatives as part of the Invest in America Act

At least 90% of the exposed façade material from ground level to 40 ft shall not be composed of glass or shall be composed of glass employing:

- Elements that preclude bird collisions without completely obscuring vision;
- Ultraviolet (UV) patterned glass that contains UV-reflective or contrasting patterns that are visible to birds;
- Patterns on glass designed in accordance with the 2 x 4 rule
- Opaque, etched, stained frosted or translucent glass; or
- Any Combination of the methods described



## *Bird Safe Building Act of 2019 (H.R. Bill 191)*

Passed the U.S. House of Representatives as part of the Invest in America Act

At least 60% of the exposed façade material from ground level to 40 ft shall meet such modified glass standard;

- Elements that preclude bird collisions without completely obscuring vision;
- Ultraviolet (UV) patterned glass that contains UV-reflective or contrasting patterns that are visible to birds;
- Patterns on glass designed in accordance with the 2 x 4 rule
- Opaque, etched, stained frosted or translucent glass; or
- Any Combination of the methods described



## *Bird Safe Building Act of 2019 (H.R. Bill 191)*

Passed the U.S. House of Representatives as part of the Invest in America Act

- There shall not be any transparent passageways or corners;
- All glass adjacent to atria or courtyards containing water features, plants and other materials attractive to birds shall meet the standard; and
- Outside lighting shall be appropriately shielded and minimized subject to security and other mission
- Required monitoring

## Bird-Safe Ordinances

- New York City
- Chicago – *“Lights Out Chicago” & Bird Friendly Building Design Ordinance (Chapter 13-150)*
- California – *Mountain View, Oakland, Richmond, San Francisco, San Jose*
- Minnesota – *B3 Program (Building, Benchmark, and Beyond)*
- Canada – *Markham and Toronto, The Canadian Standards Association (CSA)*





*Local Law 15: Bird Friendly Materials*  
New York City Council Passed 43-3

*Bird friendly design and construction requirements. The department shall issue, and update as necessary, bird friendly building design and construction requirements. No later than October 1, 2020, the department shall post on its website such requirements and information about compliance with section 1403.8 of the New York city building code.*



## *NYC Building Code New Definitions*

- **BIRD FRIENDLY MATERIAL** - A material or assembly that has, or has been treated to have a maximum threat factor of 25 in accordance with the American Bird Conservancy Bird Collision Deterrence Material Threat Factor Reference Standard, or with the American Bird Conservancy Bird-friendly Materials Evaluation Program at Carnegie Museum's Avian Research Center test protocol, or with a relevant ASTM standard.
- **BIRD HAZARD INSTALLATIONS** - Monolithic glazing installations that provide a clear line of sight on the exterior of buildings, including, but not limited to, glass awnings, glass handrails and guards, glass wind break panels, or glass acoustic barriers.
- **FLY-THROUGH CONDITIONS**. One or more panels of glass that provide a clear line of sight through such elements creating the illusion of a void leading to the other side, including parallel glass elements, at a distance of 17 feet (5182 mm) or less, or a convergence of glass sides creating a perpendicular, acute or obtuse corner.



## *NYC Building Code Section 1403.8*

**1403.8.1 Exterior wall envelope.** The exterior wall envelope, and any associated openings, shall be constructed with bird friendly materials up to 75 feet (22 860 mm) above grade. Materials other than bird friendly materials shall not exceed an aggregate of 10 square feet (0.93 m<sup>2</sup>) within any 10 feet (3048 mm) by 10 feet (3048 mm) square area of exterior wall below 75 feet (22 860 mm) above grade.

### **Exceptions:**

1. Where ground floor transparency is required by the New York City Zoning Resolution, transparent bird friendly material with a UV-reflective pattern and a maximum threat factor of 27 shall be provided.
2. In areas of special flood hazard and shaded X-Zones where flood resistant glazing is proposed and ground floor transparency is required by the New York City Zoning Resolution, transparent bird friendly material with a UV-reflective pattern and a maximum threat factor of 36 shall be provided.

**1403.8.2 Bird hazard installations.** Bird hazard installations shall be constructed of bird friendly materials regardless of their height above grade.

**1403.8.3 Fly-through conditions.** Fly-through conditions located 75 feet (22 860 mm) or less above grade shall be constructed with bird friendly materials. 3

**1403.8.4 Adjacency to green roofs.** The exterior wall envelope, and any associated openings, installed adjacent to a green roof system on the same building shall be constructed with bird friendly materials up to 12 feet (3658 mm) above the walking surface.



# Javits Center

New York's Javits Center Renovation replaced the building's dark, reflective curtain wall with transparent glazing. The new cladding incorporates a frit pattern that helps birds perceive the glass.





Vertical shading fins and glass with a dual frit that combines patterns on the glazing unit's number two and three surfaces.

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## **Vassar College's Integrated Science Center**

## U.S. Embassy in London

- Three facades covered with ETFE lattice that breaks up reflections with the fourth elevations utilizing a frit pattern.
- A Colonnate wraps the embassy's base, shading the upper portion of the ground-floor glazing, reducing reflections.







**AGMA**  
Architectural Glass & Metal Association



# NAACC

North American Contractor Certification

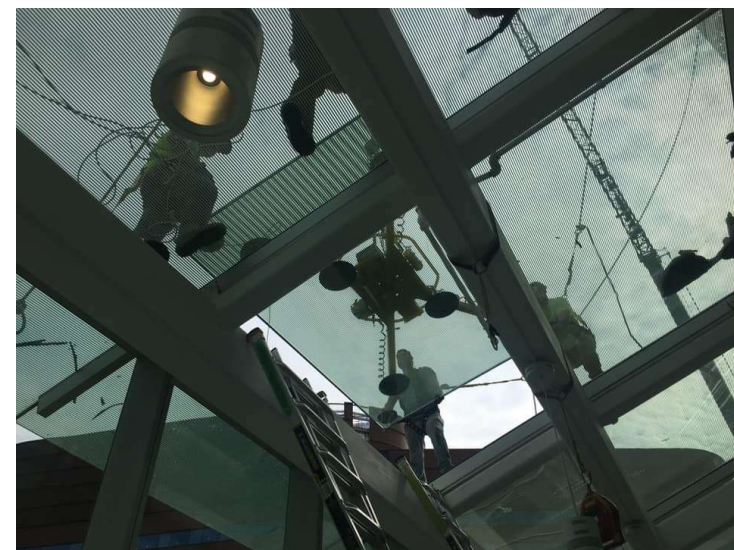
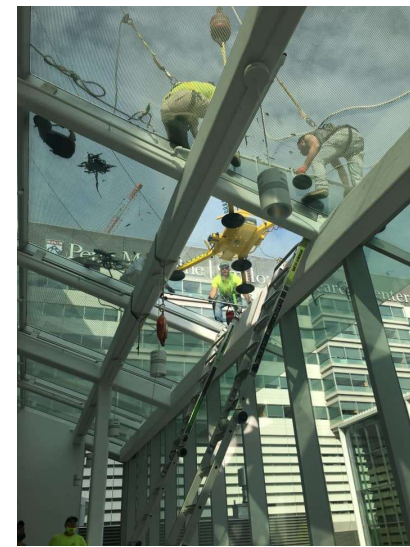


**Architectural Glass  
& Metal Technician**  
**CERTIFICATION PROGRAM**



## Replacements

- Typically bird strikes are on the higher floors of high-rise construction.
- Spontaneous breakage, Stress or Heat
- Different cracking characteristics between heat, stress, and spontaneous breakage.
  - Heat has a wave to it, like a sloping not straight crack.
  - Spontaneous is like tempered it sort of crumbles
- Challenges / Lessons Learned





Architectural Glass Institute  
2190 Hornig Road Suite 100  
Philadelphia, PA 19116  
215-825-1422  
[www.theagi.org](http://www.theagi.org)

For more information:  
Stephanie Staub, CSI, CDT, LEED Green Assoc.  
Marketing Director  
[stephanie@theagi.org](mailto:stephanie@theagi.org)



Architectural Glass & Metal Association  
849 N. Providence Road, Floor 2  
Media, PA 19063  
484-444-0129  
[www.gma.glass](http://www.gma.glass)

For more information:  
Lisa Godlewski  
Executive Director  
[lgodlewski@agma.glass](mailto:lgodlewski@agma.glass)

