PART 1: INTRODUCTION

1.1 PURPOSE

A. To reduce bird deaths caused by collisions with buildings through balancing the use of façade glass and bird-friendly design.

Windows are one of the largest sources of human-caused mortality for birds in North America. Birds are not able to perceive glass, whether reflective or clear. Birds collide with windows because they are trying to fly to the habitats they see beyond, or reflected by, glass. It is estimated that between 365 and 988 million birds are killed annually by collisions with buildings across the United States. At Yale University, bird collisions occur often, and mitigation is necessary to minimize collisions.[1]

1.2 DEFINITIONS

A. Bird-Friendly Material

A bird-friendly material has, or has been treated to have, a maximum material Threat Factor (TF) of <= 30, as defined by the American Bird Conservancy (ABC) following its Bird Collision Deterrence Material Threat Factor Reference Standard. This definition of bird-friendly material is the same adopted by New York City in 2020 in its bird-friendly building requirements law.[2]

1. References
   a) Products & Solutions to Stop Birds Flying into Windows | ABC (abcbirds.org)
   b) Database of products with Threat Factor ratings
   c) Bird-Friendly Building Design by NYC Audubon and ABC. This document provides an overview of the science of bird collisions and solutions.
   d) New York City's Bird-Friendly Building Design and Construction Guidance Document provides illustrations, pictures, and commentary to assist builders, building owners, and glazing manufacturers in understanding bird-friendly material requirements.

B. Threat Factor (TF)

As of June 2023, there is one rating system for bird-friendly building materials: the Threat Factor system developed by American Bird Conservancy. This system assigns building materials scores of 1 (least likely to result in collisions) to 100 (most likely to result in collisions) based primarily on data from tunnel tests and field trials. In line with ABC's standard, bird-friendly materials are defined as having a Threat Factor of equal to or less than 30. A TF of >=50 indicates no effect in reducing bird collisions. Some materials with TF >= 50 may contribute to collisions.

[1] Scott R. Loss and others, Bird–building collisions in the United States: Estimates of annual mortality and species vulnerability, *The Condor*, Volume 116, Issue 1, 1 February 2014, Pages 8–23, https://doi.org/10.1650/CONDOR-13-090.1.
[2] City of New York, "Bird Friendly Building Design & Construction Requirements Guidance Document," November 2020, www1.nyc.gov/assets/buildings/bldgs_bulletins/bird_friendly_guidance_document.pdf.

C. Bird Hazard Installation

A bird hazard installation is any installation with glazing that is transparent, providing a clear line of sight through the structure, or that reflects the surrounding environment. This includes glass awnings, handrails and guards, acoustic barriers, bus shelters, and skywalk building connectors. Skylight windows on roofs are not considered bird hazard installations.

D. Fly-Through Condition

In alignment with New York City's bird-friendly building standard, a fly-through condition is defined as 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 or less, or a convergence of glass sides creating a perpendicular, acute or obtuse corner.

PART 2: GENERAL DESIGN REQUIREMENTS

2.1 EXTERIOR GLAZING

A. Project design teams for new construction, comprehensive renovation of existing buildings, or full window replacement projects are required to submit a design narrative describing how the university's bird-safe design standards will be met for the façade design. Include this design narrative in the schematic design submission as part of the Basis of Design form and in subsequent design submissions. If multiple strategies will be used on the project, strategies must be indicated. Risks that are not mitigated in the design, due to historic preservation or other factors, need to be noted as a deviation in the Basis of Design and require approval of the Yale planner and/or project manager.

B. At least 90 percent of the exterior wall envelope needs to be constructed with bird-friendly materials. Materials other than bird-friendly materials shall not exceed an aggregate of 10 square feet (0.93 square meters) within any 10-foot squared area of the exterior wall above grade.

2.2 REDUCE LIGHT POLLUTION

A. Reduce unnecessary building glazing light-spill through shielding and targeted lighting to prevent collisions due to the combination of disorientation by and attraction to lights.

B. Reduce interior night lighting as lit rooms at night can render the glass invisible. See design standard 26 51 10 Lighting Controls.

C. Minimize exterior lighting levels to prevent collisions due to bird disorientation. See design standard 26 56 00 Exterior Lighting, and for more information, see the International Dark Sky Association's recommendations and database.

Date	Description of Change	Pages / Sections Modified	ID
7/2019	New document	N/A	Cathy Jackson
9/2023	Revised requirements	All sections	Cathy Jackson