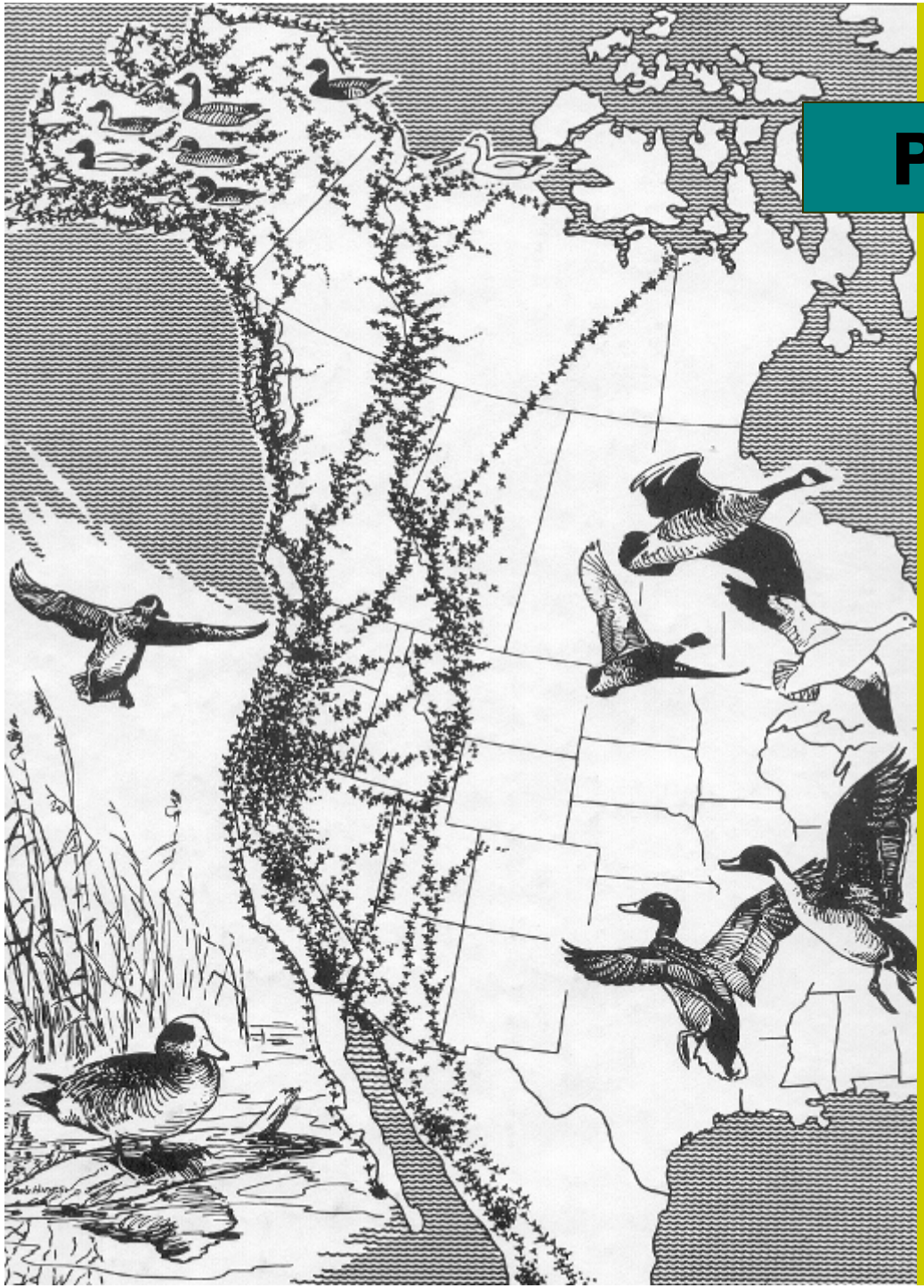
Bird-friendly Building Design:

emerging dimensions in green building

Audubon Society of Portland 2012



Pacific Flyway

- Oregon sits along a primary North-South migration route
- In addition to residents, migrants move through Oregon between wintering & breeding grounds
- Over 209 bird species occur in Portland!

Birds disperse seeds, pollinate plants, & help control insect, pigeon, & small mammal populations

Up to 1 billion birds die annually in the US as a result of window strikes; a cause of mortality 2nd only to habitat destruction

Fatal Light Awareness Program, Toronto

We're improving the ecosystem function of our city: preserving greenspaces, planting trees, naturescaping, installing ecoroofs…but are we managing hazards?

Window Strikes 101

- **Can occur anywhere** that unmarked glass is used

- Glass is not perceived as a solid:
  - **Reflections:** create a habitat mirage
  - **Transparency:** visibility of habitat on the other side of glass pane

- **Songbirds migrate at night** using celestial cues & are attracted into lit areas

- **Strikes go undetected** if you're not looking (scavengers, vegetation, awnings, maintenance crews, etc)

BirdSafe Portland Surveys

Fall 2009 Pilot: dawn surveys of 44 buildings (downtown, Lloyd, LC Law School)

Spring 2010-Fall 2011: migration season monitoring

- Four seasons of data on 21 buildings
- 40-65 birds/season; WCC logs additional 200-300 intakes and calls/year
- 36 species of warblers, flycatchers, sparrows & hummingbirds
- 83 species of natives admitted to WCC (same time period)

BirdSafe Species (36)

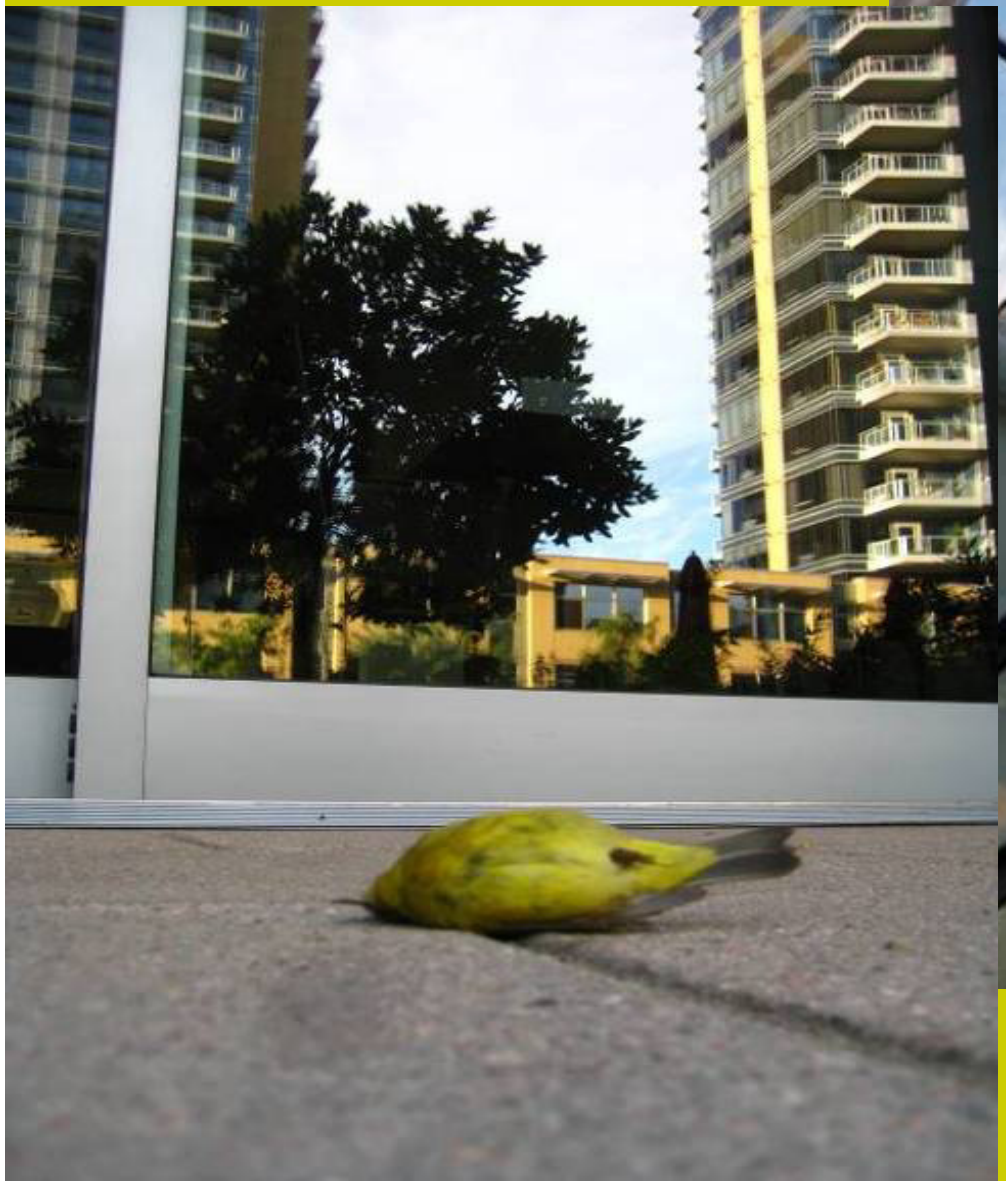
- Anna's Hummingbird
- Bewick's Wren
- Black-capped Chickadee
- Black-throated Gray Warbler
- Cedar Waxwing
- Cooper's Hawk
- Common Yellowthroat
- Dark-eyed Junco
- Fox Sparrow
- Golden-crowned Kinglet
- Golden-crowned Sparrow
- Hammond's Flycatcher
- Hairy Woodpecker
- Hermit Thrush
- Lesser Goldfinch
- Lincoln's Sparrow
- MacGillivray's Warbler
- Mourning Dove
- Orange-crowned Warbler
- Pileated Woodpecker
- Pacific-Slope Flycatcher
- Red-breasted Nuthatch
- Red-breasted Sapsucker
- Rufous Hummingbird
- Savannah Sparrow
- Song Sparrow
- Spotted Towhee
- Swainson's Thrush
- Townsend's Warbler
- Varied Thrush
- Warbling Vireo
- Western Tanager
- White-crowned Sparrow
- Willow Flycatcher
- Wilson's Warbler
- Yellow Warbler

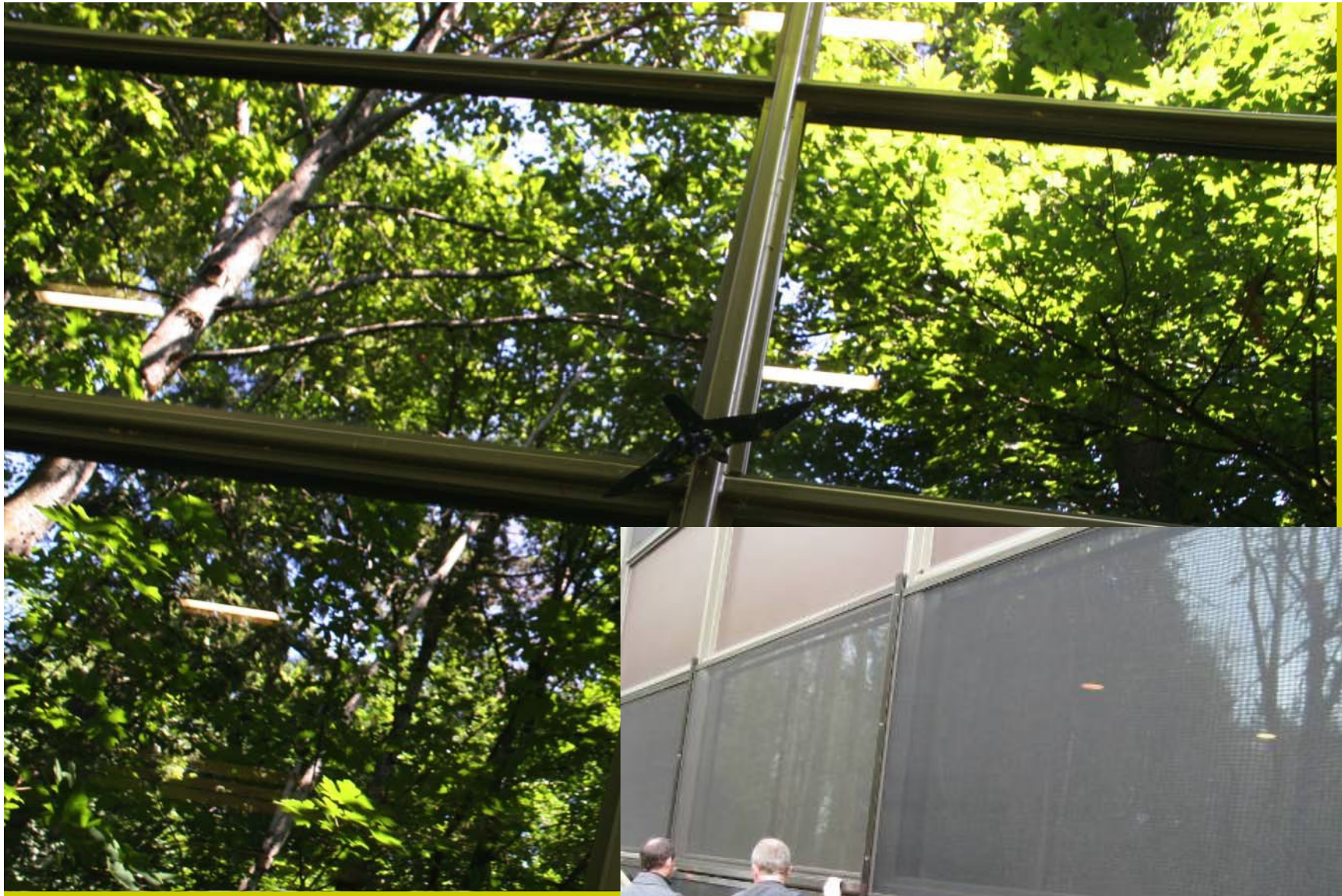
The % of **unmarked glass** on a façade is the strongest predictor of the magnitude of bird mortality at a building, particularly where vegetation is reflected.

Design Traps

- Unmarked glass walls
- Proximate banks of glass (corners & skybridges)
- Reflections in transparent or reflective glass

Reflections:
vegetation, sky, or
urban canyons



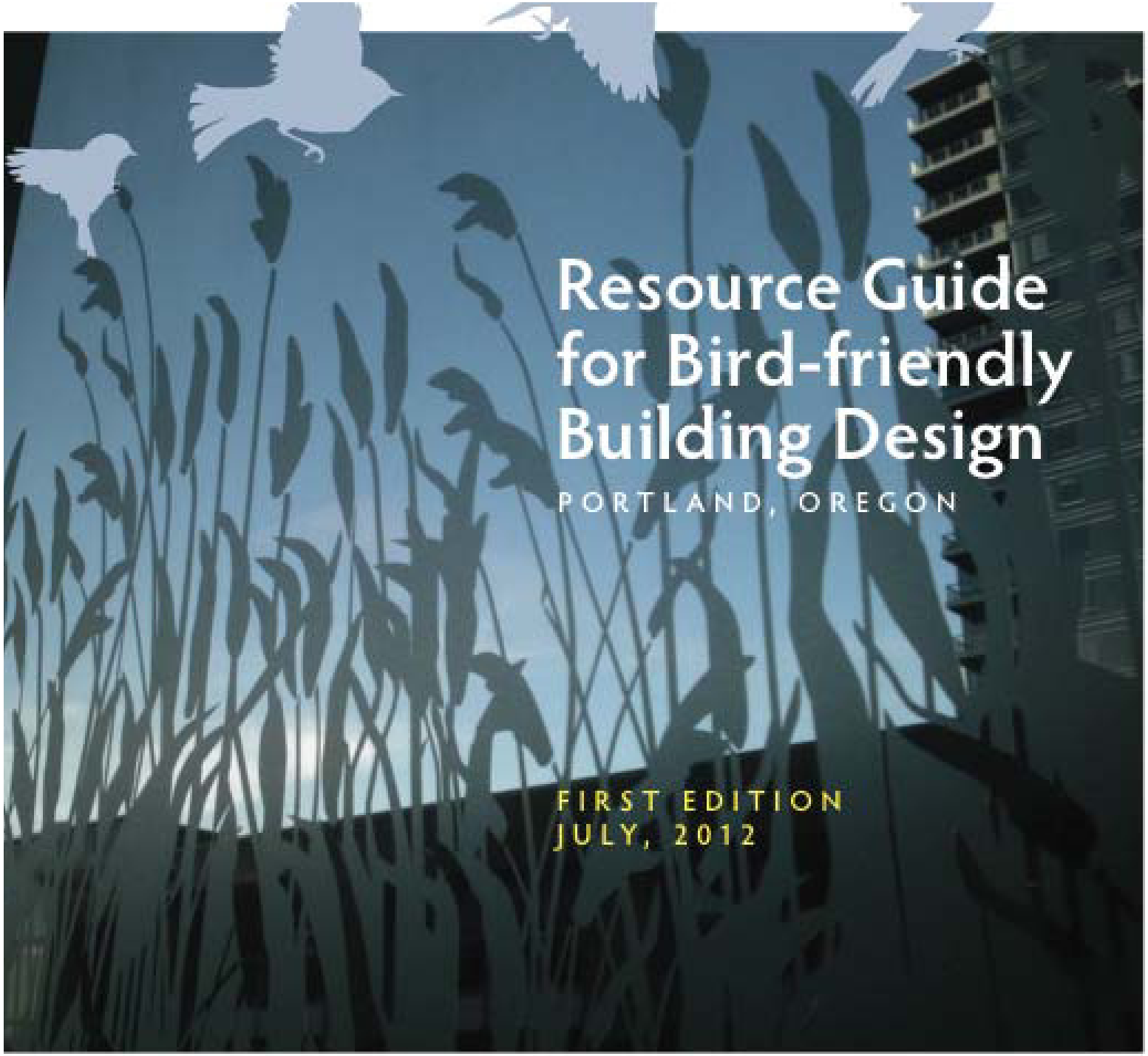


Mirrored glass

Bird-Friendly Building Guidelines

Morphosis building at Cooper Union has semitransparent stainless steel skin to reduce heat gain in summer

- NYC, **voluntary** (2007)
- Cook County, IL **mandatory** (2008)
- Minnesota, **mandatory** for state buildings/projects (2010)
- Toronto, **mandatory** (2011)
- San Francisco, **voluntary/mandatory** (2011)
- **American Bird Conservancy, universalized template (2011)**
- Portland, **voluntary Resource Guide, First Edition** (July 2012)



Resource Guide for Bird-friendly Building Design

PORTLAND, OREGON

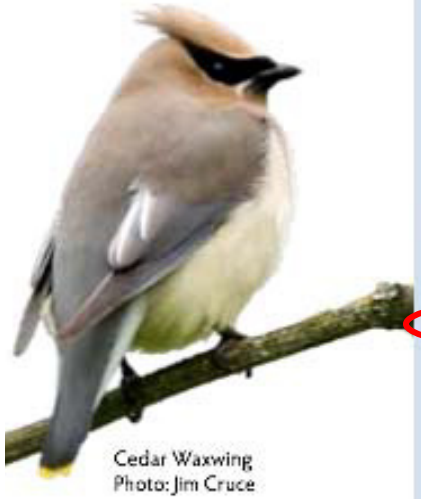
FIRST EDITION
JULY, 2012

Audubon Society of Portland
Founded in 1902

AMERICAN BIRD CONSERVANCY

Together Green

A Quick Look at Bird-friendly Building Design Recommendations



Cedar Waxwing
Photo: Jim Cruce

Treat High Risk Zones:

- Glass on first 40' of a building
- Glass on first floor adjacent to an ecoroof or rooftop garden
- Windows at corners, on skybridges and in atria
- Freestanding glass around courtyards, ecoroofs, patios, and balconies

See page 13 for more information.

Window Treatment Options for High Risk Zones:

- Exterior frits, sandblasting, translucence, etching or screenprinting
- Exterior branding on glass for retail
- Exterior window films
- Exterior shades or shutters
- Glass block
- Exterior netting or screens
- Exterior framework, grilles, or trellises
- Awnings, overhangs, and deeply-recessed windows
- Louvers

See page 17 for more information.

Tips for Achieving Cost-effectiveness in New Construction and Retrofits:

- Have bird-friendly building design in mind from the start of project design.
- Plan to work within your project budget using bird-friendly design principles and materials—may or may not result in design modifications.
- Look for economies—unit costs go down as amount of materials increases.
- Seek opportunities to meet multiple project goals using bird-friendly design approaches (e.g. window treatments that provide privacy or branding or meet energy-reduction goals).

Lighting:

- Shield all outdoor lighting (full cut-off above 90 degrees)
- Properly design all outdoor lighting to be directed to minimize light spill
- Eliminate up-directed architectural vanity lighting
- Minimize down-directed architectural vanity lighting
- Design interior lights to minimize light spill
- Install or design for motion sensor lighting
- Design all non-exempt interior and exterior lighting to be off overnight (minimum: midnight to 6 am)
- Participate in Audubon's Lights Out Portland program

See page 32 for more information.

Other:

- Monitor bird mortality
- Distribute materials about birds and window collisons
- Report window collisions to Portland Audubon 503.292.6855

Song Sparrow
Photo: Jim Cruce

Basic BFBD Concepts

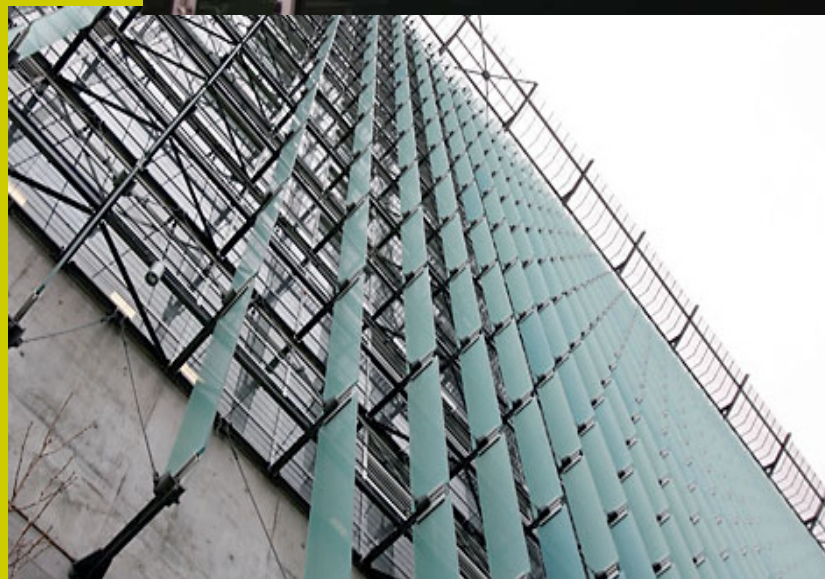
- **Consider location & surroundings**
- **Treat glass:** visual markers (2" x 4" rule)
  - **Interrupt reflections,** especially first 40' above grade & adjacent to ecoroofs
  - **Treat transparency** at corners, sky-bridges, atria
- **Minimize light spill** from building interiors
- **Properly shield all exterior fixtures** (full cut-off above 90 degrees)
- **Eliminate unnecessary lighting 12-6 am**

Bird-friendly glass on corner windows at WCS, Bronx Zoo

LEED Pilot Credit 55: Bird Collision Deterrence

Interrupt reflections in glass

- UV-patterned glass (Ornilux Mikado)
- Etched, fritted, translucent screenprinted or frosted glass
- Exterior facades, netting, screens, louvers, shades, grilles, shutters



SF Federal Building metal catwalks & fins

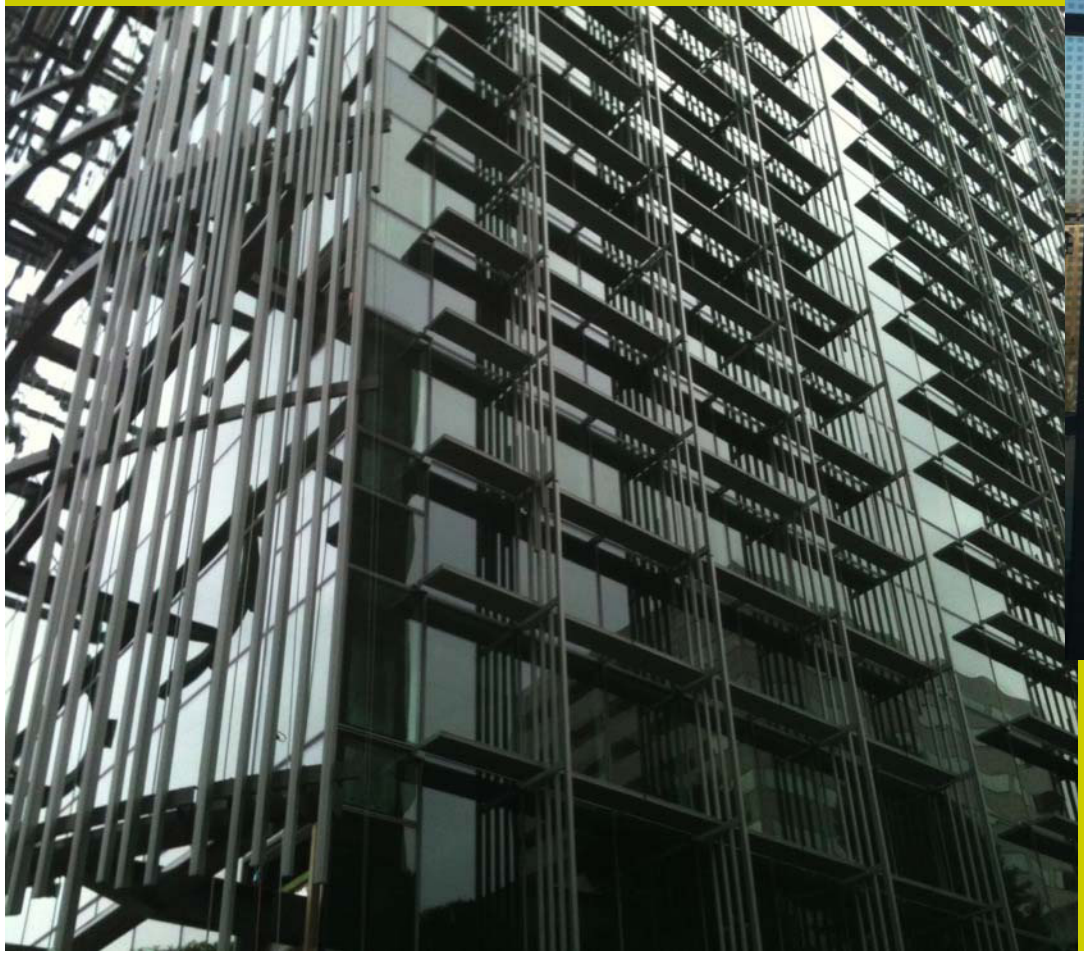
Research on marked glass

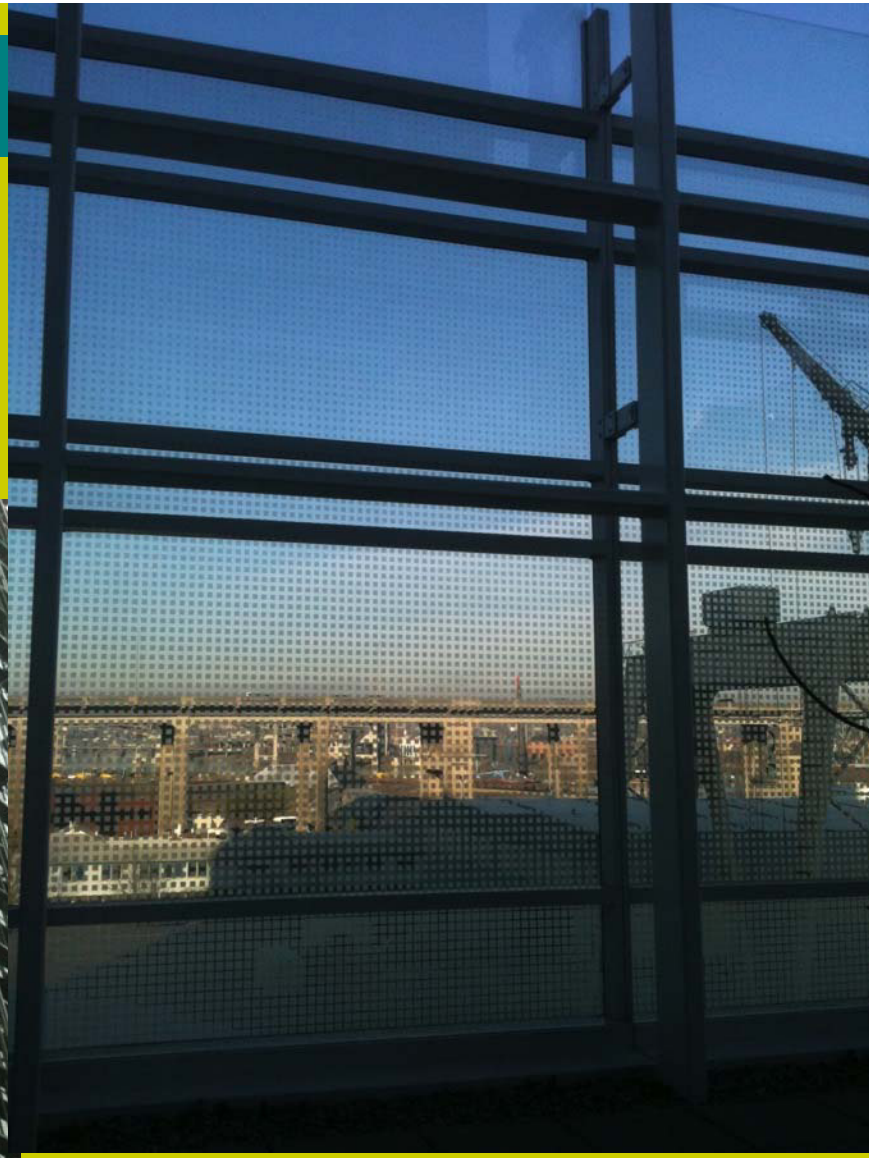
- Glass treatment testing: Klem, Rossler and Sheppard
- Effective patterns (90% deterrence) can cover **as little as 5% of glass**
- Patterns on glass should generally follow 2" x 4" (handprint) rule

Narrow horizontal stripe pattern – highly effective at deterring collisions, while covering only 7% of the glass surface

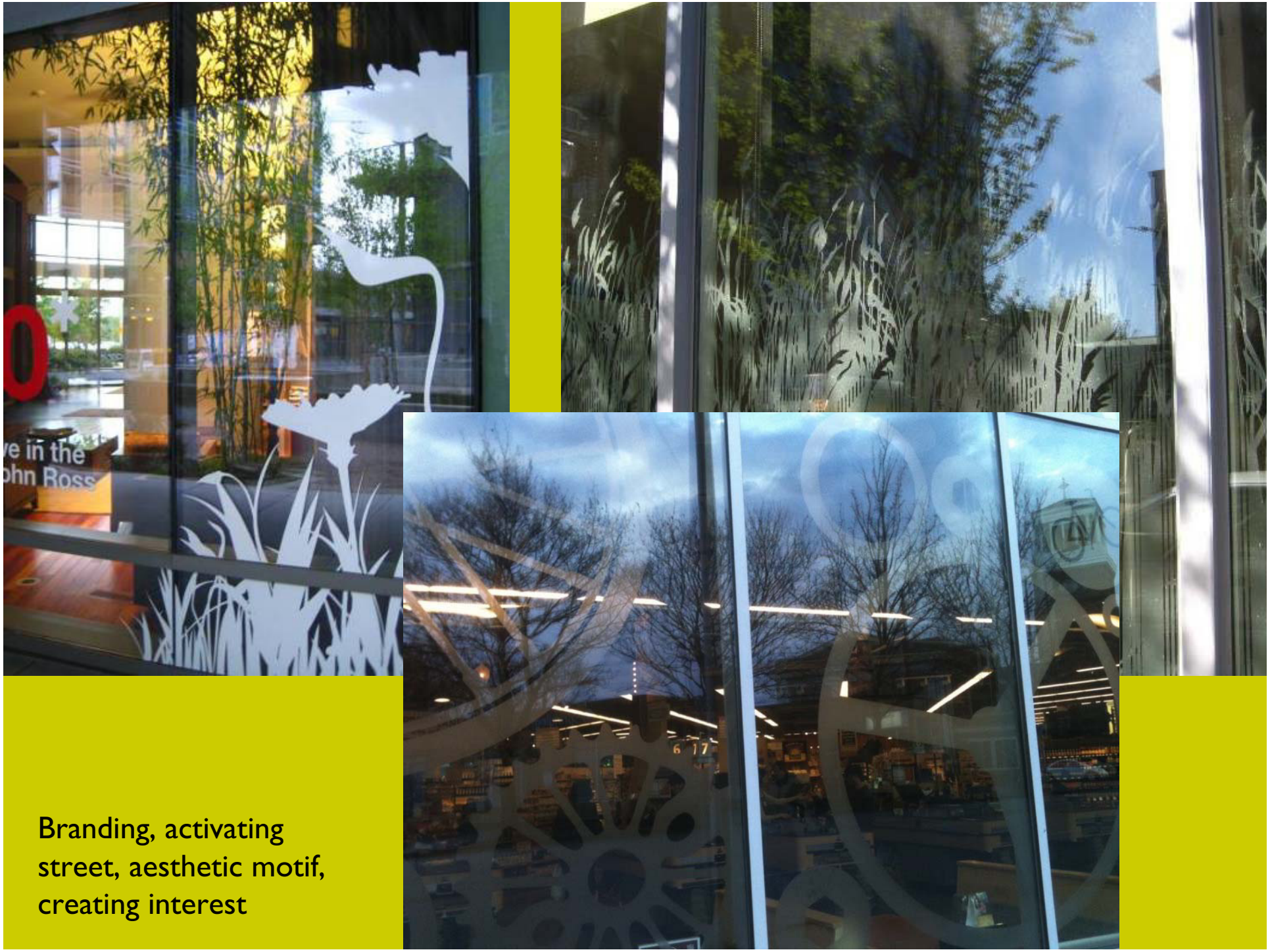
Finding synergies

- Reducing solar heat gain
- Branding
- Creating privacy
- Carrying aesthetics
- Reducing vandalism





Reducing solar heat gain



Branding, activating street, aesthetic motif, creating interest

Use of graphics on glass has been shown to reduce vandalism

Award-winning Aqua Tower, Studio Gang: undulating overhangs interrupt glass façade.

New York Times HQ Building
Renzo Piano/FX Fowle

Horizontal ceramic tubing:
reduces heat gain & creates
architectural interest

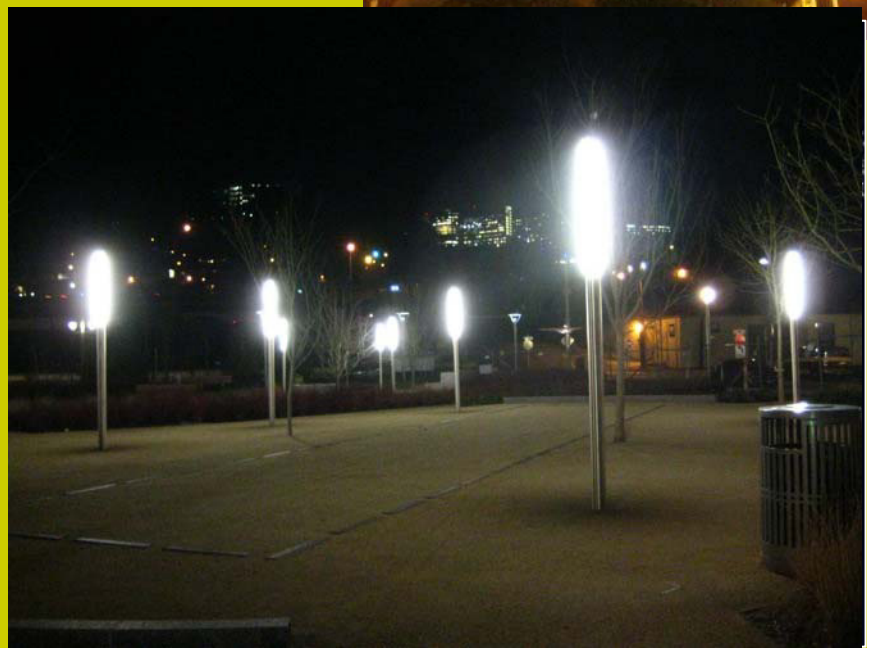
Appendix VI: Cost Effectiveness-- Considerations & Case Studies

- **Pacific Northwest National Laboratory** Window wall ratio over 20% results in energy penalty in all climatic zones (WWR >30% excessive E+ loss)
- **Prendergast Laurel Architects** 12,625 sq foot library w/3,000 sq feet of glass; fritting 100% glass increased overall project cost by 0.18%
- **OHSU Center for Health and Healing** 78,000 sq feet of glass; fritting 12% of the glass increased overall project cost by 0.03%
- **Retrofit: Lewis and Clark Law School** exterior screen retrofit, budgeted $88,000
- **Retrofit: Port of Vancouver** Roll-up solar shade pilot project on 3 windows now expanding building-wide (July 2012) due to cooling cost savings

Artificial Lighting

Solutions: Lighting Design

- **Improving lighting design:**
  optimize useful light, minimize light spill
  - Full cut-off shields above 90 degrees
  - Eliminate vanity lighting and uplighting
  - Reduce interior light spill
  - Eliminate spotlights and searchlights during migration
  - Use auto controls: motion sensors, photo sensors, timers



Portland Resource Guide to BFBD:
www.audubonportland.org/issues/metro/bsafe/birdsafe