

WALKER

Provider Number: K216

*Using and Specifying
Acid-etched Glass or Mirror
in Interior or Exterior Glass Applications*

Course Numbers
AIA: WA0801-22



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Walker Glass Company Ltd.

WALKER



COURSE DESCRIPTION

Acid-etched glass and mirror interacts really well with natural daylight. The presentation covers critical aspects, such as product characteristics, properties, specifications and constructability. It will provide a comprehensive overview of what a creative mind can do with these materials. The project review section will give each attendee a feel for what their peers have done with acid-etched glass and mirror and how it can play a key role with daylighting. The most up-to-date and detailed information will be provided to help understand how performance and design objectives can be achieved with this type of product.

LEARNING OBJECTIVES

The participants will :

- Learn all about the properties and performance of acid-etched glass
- Learn how acid-etched glass and mirror are different from other opacified products and how their interaction with daylighting can play a key role in the overall design
- Learn why acid-etched glass can be used on the exterior surface of an insulated glass unit
- Learn how to write comprehensive specifications for acid-etched glass or mirror while maintaining the desired design integrity

A photograph of a modern building facade. The image shows a grid of windows with dark frames. To the left, there is a curved balcony structure with a light-colored railing. The background is a clear blue sky. A semi-transparent dark grey rectangle is overlaid in the center of the image, containing white text.

WHAT IS
ACID-ETCHED
GLASS & MIRROR



THE PROCESS

Acid-etched Glass

- Glass, the surface of which has been treated with an aqueous solution of hydrofluoric acid, resulting in a smooth satin texture and a matted translucent appearance.

Acid-etched Mirror

- Mirror, the surface of which has been treated with an aqueous solution of hydrofluoric acid, resulting in a smooth satin texture and a soft matted reflection.

Glass

- Reduce glare significantly
- Light diffusion
- Enhance rendering of color on glass
- Increase daylight
- Add a measure of privacy
- Unique design
- Brilliance
- Depth in the glass

Mirror

- Slight reflection
- Unique visual effect
- Light absorption

Glass & Mirror

- Closed-pore surface, does not easily trap dirt & particles
- Cleaning & maintenance similar to unetched glass & mirror



ACID-ETCH IS NOT ...

A Coating

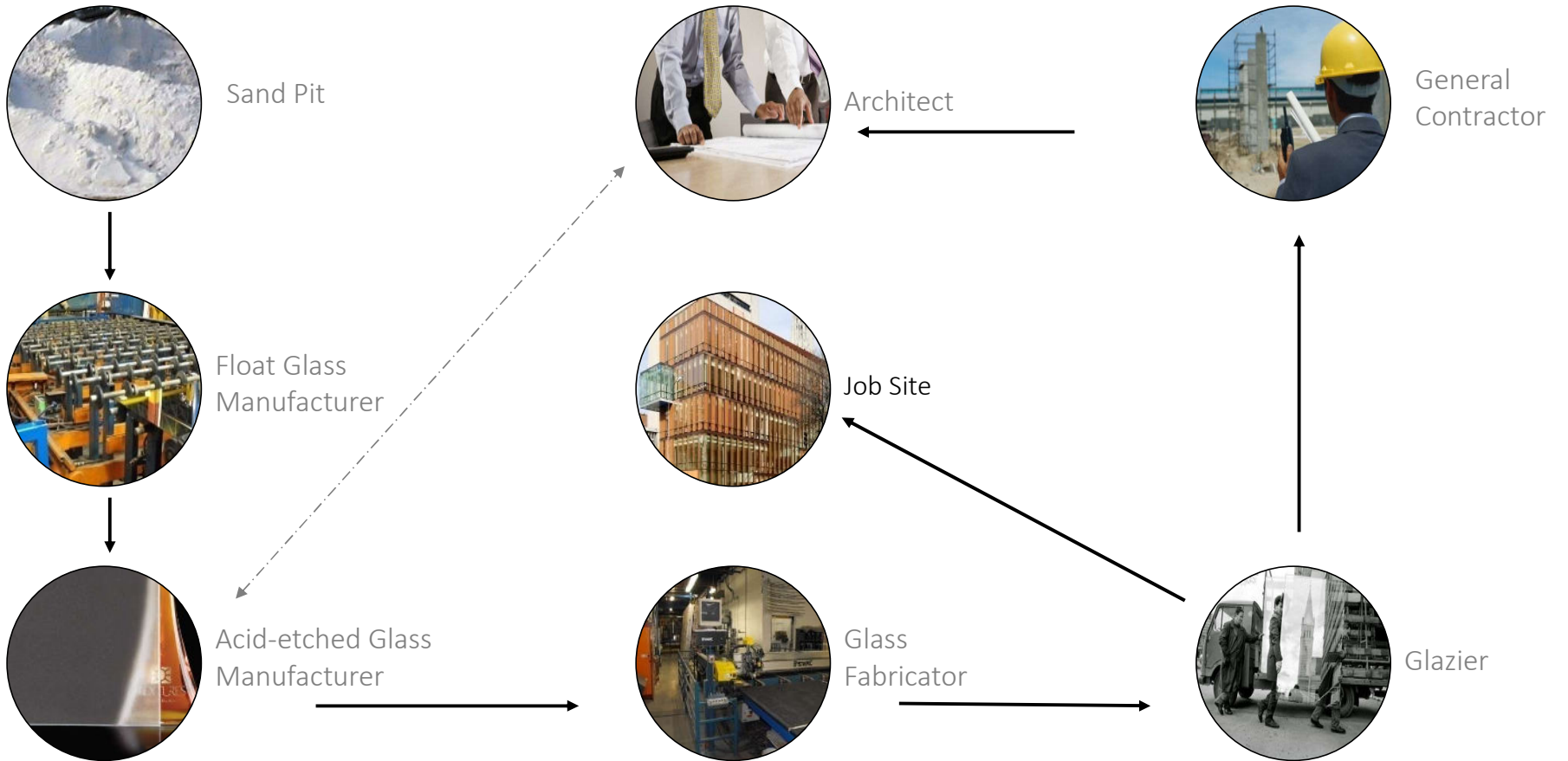
- Liquid etch
- Etched frit
- Simulated etch

A Film

Sandblasted



FROM THE SAND PIT TO THE JOB SITE





ACID-ETCHED OPTIONS

FULL SURFACE ACID-ETCHED GLASS

- 1/8" (3mm) to 3/4" (19mm)
- Size up to 94.5" x 128.5" & 98.5" x 202.5"
- Varying levels of translucency
- Clear, bronze, grey, black, blue & ultra-clear (low-iron)
- One side or two sides

ACID-ETCHED GLASS





ACID-ETCHED MIRROR

FULL SURFACE ACID-ETCHED MIRROR

- 1/8" (3mm) to 1/4" (6mm)
- Size up to 94.5" x 128.5"
- Clear, bronze, grey, black, blue and ultra-clear (low iron)
- Varying levels of mirror reflection

PATTERNED ACID-ETCHED GLASS

- 1/8"(3mm) to 3/4"(19mm)
- Size up to 94.5" x 128.5"
- Clear, ultra-clear(low iron)
- One side or two sides
- Stock or Custom
- One or Two Tone
- Interior & Exterior use
- Gradient effect possible





SLIP RESISTANT

SLIP RESISTANT ACID-ETCHED GLASS

- 1/4" (6mm) to 3/4" (19mm)
- Size up to 94.5" x128.5"
- Interior & exterior use
- One side only
- Tested patterns only
- No prescribed performance standards
- Recognized Test Method
ANSI A137.1-2012
Section 9.6.1

**The assistance of a structural engineer is recommended

A top-down view of a wooden desk with a laptop, pen, notebook, coffee cup, and smartphone. A semi-transparent dark grey rectangle is overlaid in the center, containing the text "PROPERTIES & PERFORMANCE".

PROPERTIES &
PERFORMANCE

ACID-ETCHED GLASS PROPERTIES & PERFORMANCE

Test/Standard		Select acid-etched glass products	Float glass	Unit of Measure
Resistance to Wear	ASTM-C501	198 to 215	183.29	Abrasive Wear Index (Ix)
Resistance to Staining	ASTM-C1378	A	A	Classification
Scratch Hardness	MOHs	5 to 7	5,5	Out of a possible 10

Test/Standard		6mm - Select acid-etched glass product-Tempered		6mm float glass tempered
		Etched in Tension	Un-Etched in Tension	
Modulous of Rupture	ASTM-C158			
Max Load (pounds)		357	351	338
Flexural Strength		1.07	1.05	1
Modulous of Rupture (psi)		28720	28370	26720

VISIBLE LIGHT TRANSMITTANCE

Comparison Between Acid-etch & Ceramic Frit

Description	VLT
6mm clear glass with acid-etched - full surface	91%
6mm clear glass with acid-etched - 35% pattern coverage	91%
6mm clear glass with grey frit - 20% coverage	72%
6mm clear glass with grey frit - 40% coverage	55%

APPLICATIONS

Interior (Glass & Mirror)

- Dividing walls
- Wall covering
- Office partitions & enclosures
- Shower & bath enclosures
- Floors, stairs and railings
- Doors
- Displays & shelving
- Elevator cabs
- Kitchen cabinets
- Furniture components
- ... and more

Exterior (Glass)

- Insulated units
- Spandrel panels
- Balustrades
- Transportation shelters
- Skylights
- Canopies
- Atriums
- Doors
- Bird Friendly Façades
- ... and more

EXTERIOR APPLICATIONS

- Not a coating
- Closed-pore surface structure
- Wear, stain and scratch resistance equal or better than un-etched glass
- Etched surface can be exposed to outside conditions



FULL SURFACE

ACID-ETCH VS. OTHER METHODS TO OPACIFY GLASS

Comparative Analysis				
	Acid-etch	Ceramic frit	Sandblast	Plastic Films
Quality (consistency, pinholes, streaks, etc.)	Excellent	Average	Poor	Good
Physical properties (strength & resistance to wear, stain and scratches)	Equal or better than un-etched glass	Average	Poor	Poor
Performance properties	Does not restrict light flow and has no significant impact on solar performance	Restricts light flow	Unknown	Restricts light flow
Exposure to exterior conditions	Yes	Yes (Few manufacturers)	No	No
Warranty for outside use	Up to 10 years	None	None	None



COMPATIBLE PROCESSES

PROCESSES COMPATIBLE WITH ACID-ETCHED GLASS

- Cutting
- Polishing
- Beveling
- Laminating*
- Insulating
- Bending
- Drilling
- Tempering
- Fire rating

** Acid-etched glass may be laminated in the same manner as unetched glass providing that the laminate is applied to the unetched surface.*

POST INSTALLATION CLEANING & MAINTENANCE

- Follow the manufacturer's post installation cleaning guidelines
- If the glass is unusually dirty after being installed
 - Use a soapy sponge
 - Do not use aggressive chemicals
- Standard building maintenance protocols should be followed

CLEANING & MAINTENANCE

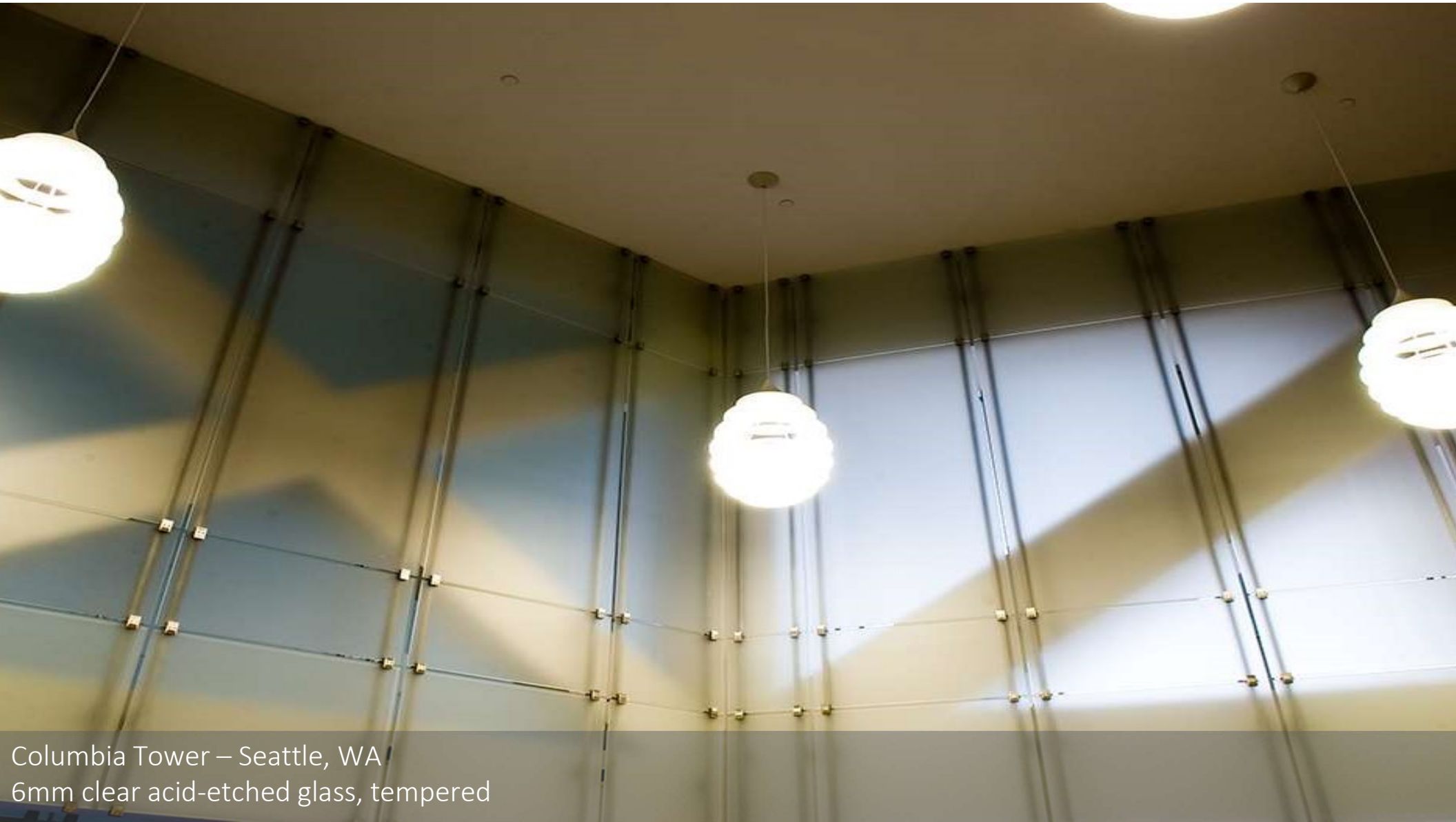




INTERIOR & EXTERIOR
APPLICATIONS



Moody's Investors Service – New York, NY
Custom pattern – 6mm clear glass with acid-etched stripes, tempered



Columbia Tower – Seattle, WA
6mm clear acid-etched glass, tempered



Newark Airport – Newark, NJ
6mm clear acid-etched glass, tempered & laminated



Saint Joseph's Oratory – Montreal, QC
6mm low-iron acid-etched glass, tempered & laminated with colored interlayers



CHUM Intensive Care Unit – Montreal, QC
partial surface – 6mm clear glass with one acid-etched stripe, tempered



AIA Texas Chapter – Dallas, TX
12mm clear acid-etched glass, tempered



Simons Store – Gatineau, QC
6mm low-iron acid-etched glass, back painted and tempered



Aecom – Cleveland, OH
6mm grey acid-etched mirror



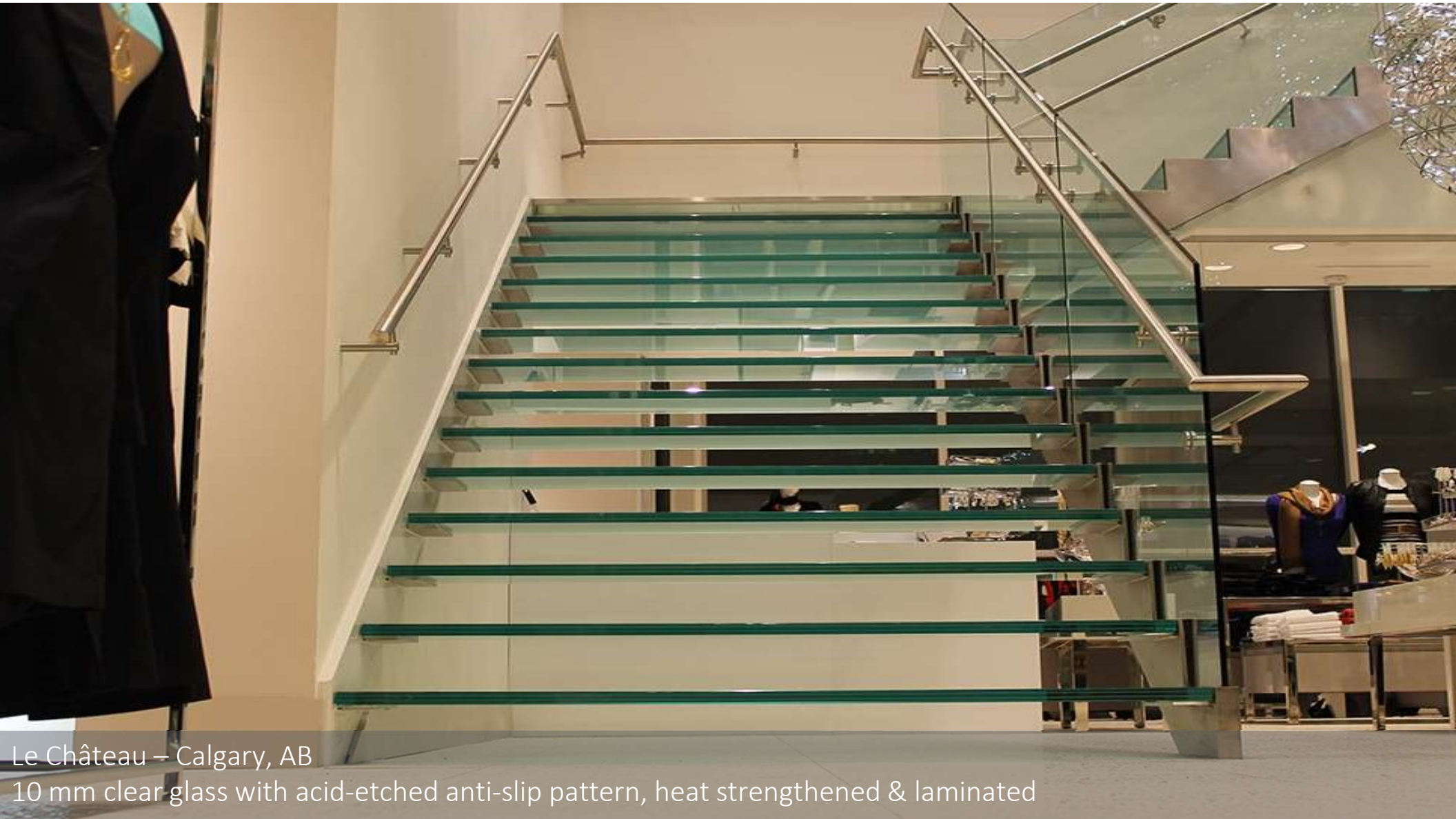
M9 Condo – Montreal, QC
6mm grey mirror & 6mm grey acid-etched mirror



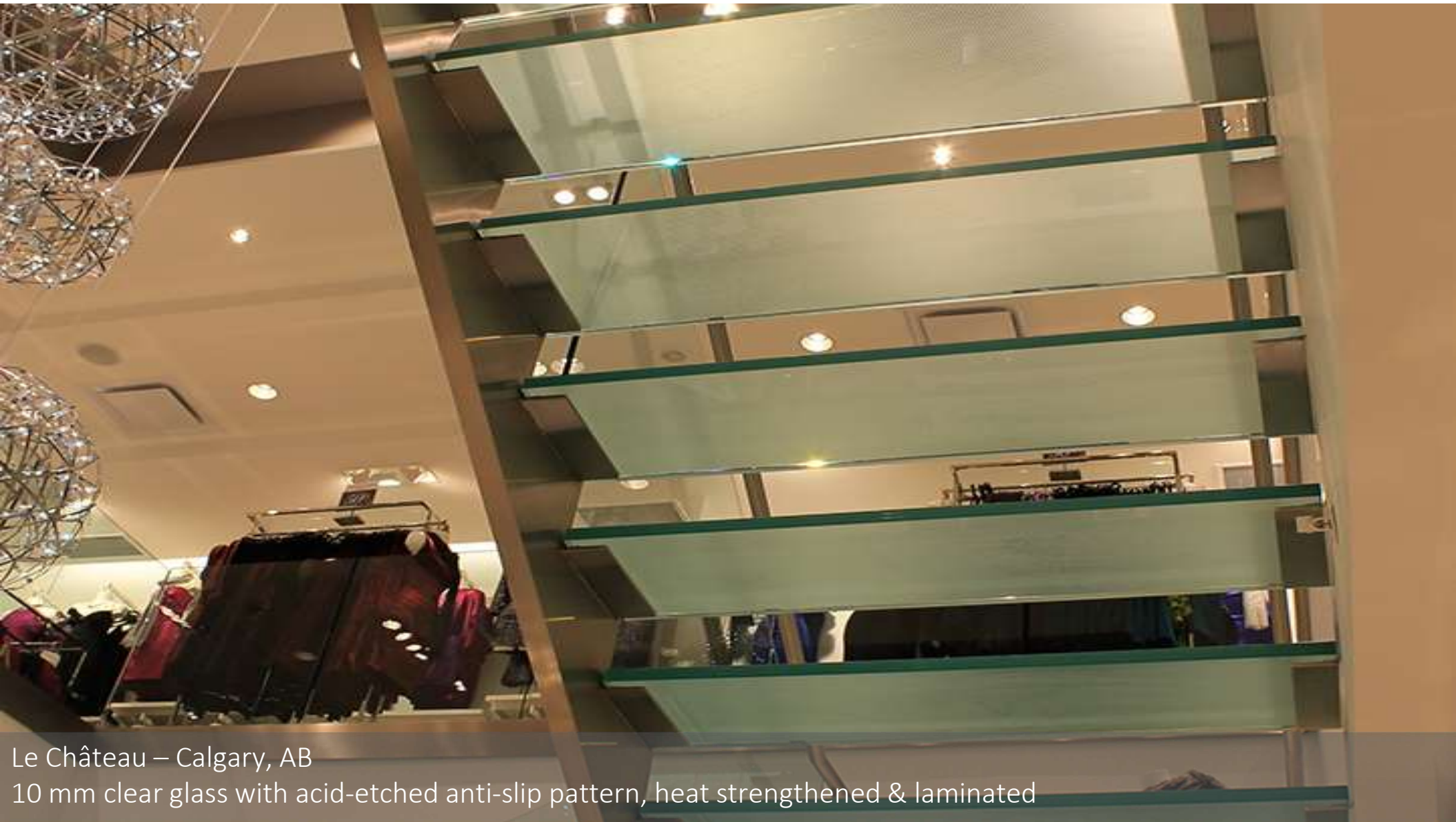
Dr. Philips Center – Orlando, FL
6mm low-iron acid-etched mirror



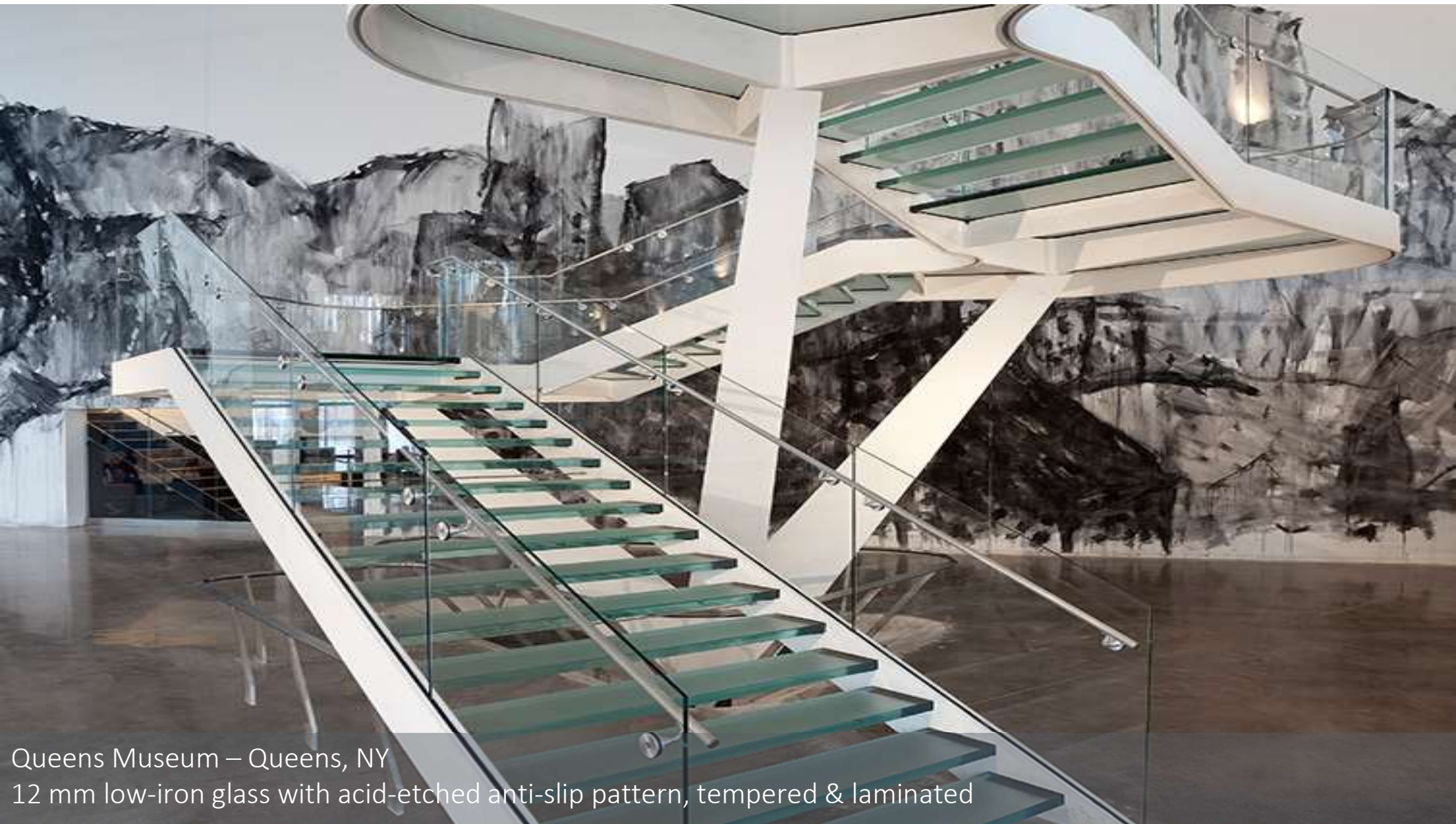
TDC2 (interior) – Montreal, QC
6mm low-iron acid-etched mirror



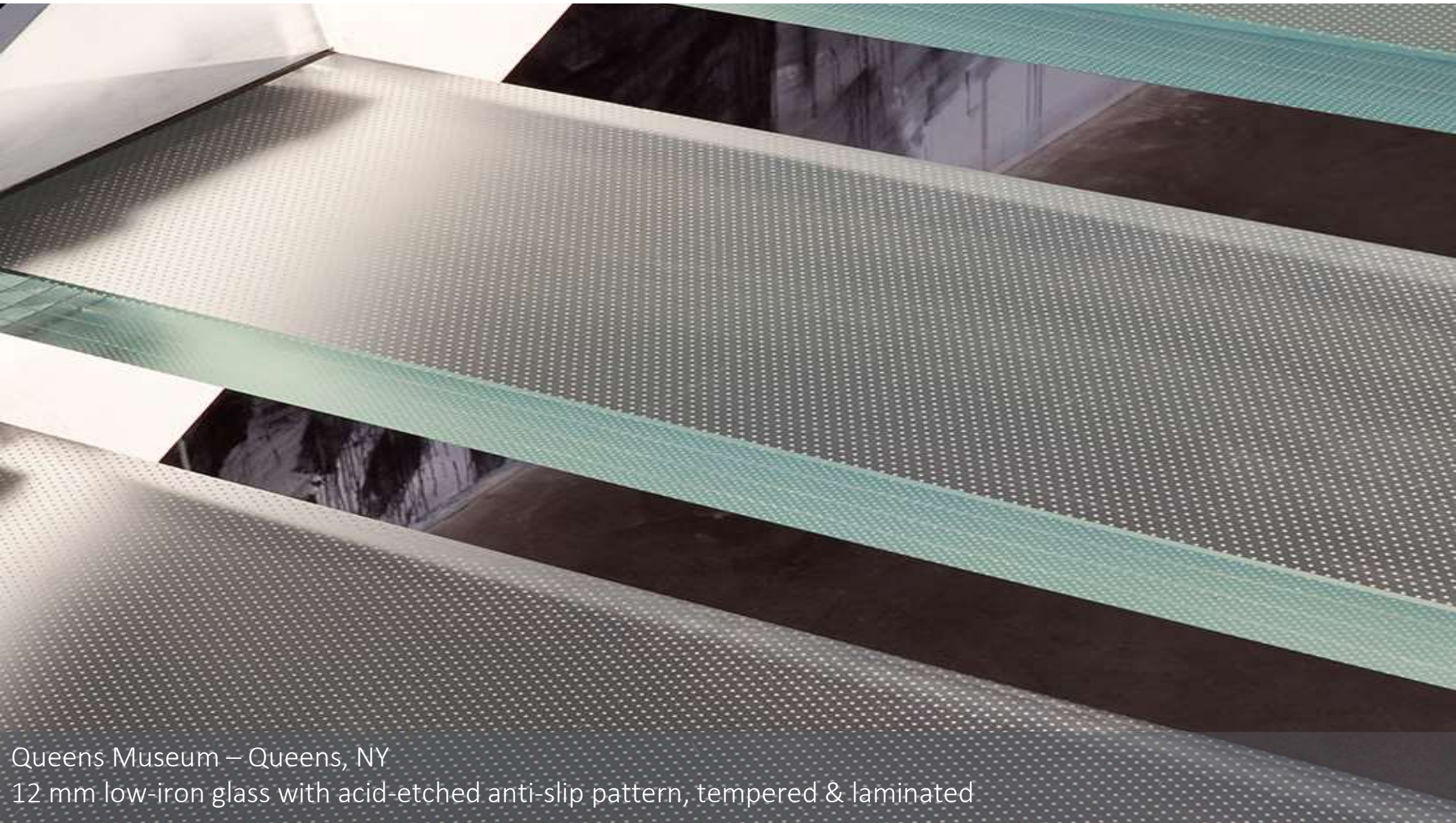
Le Château – Calgary, AB
10 mm clear glass with acid-etched anti-slip pattern, heat strengthened & laminated



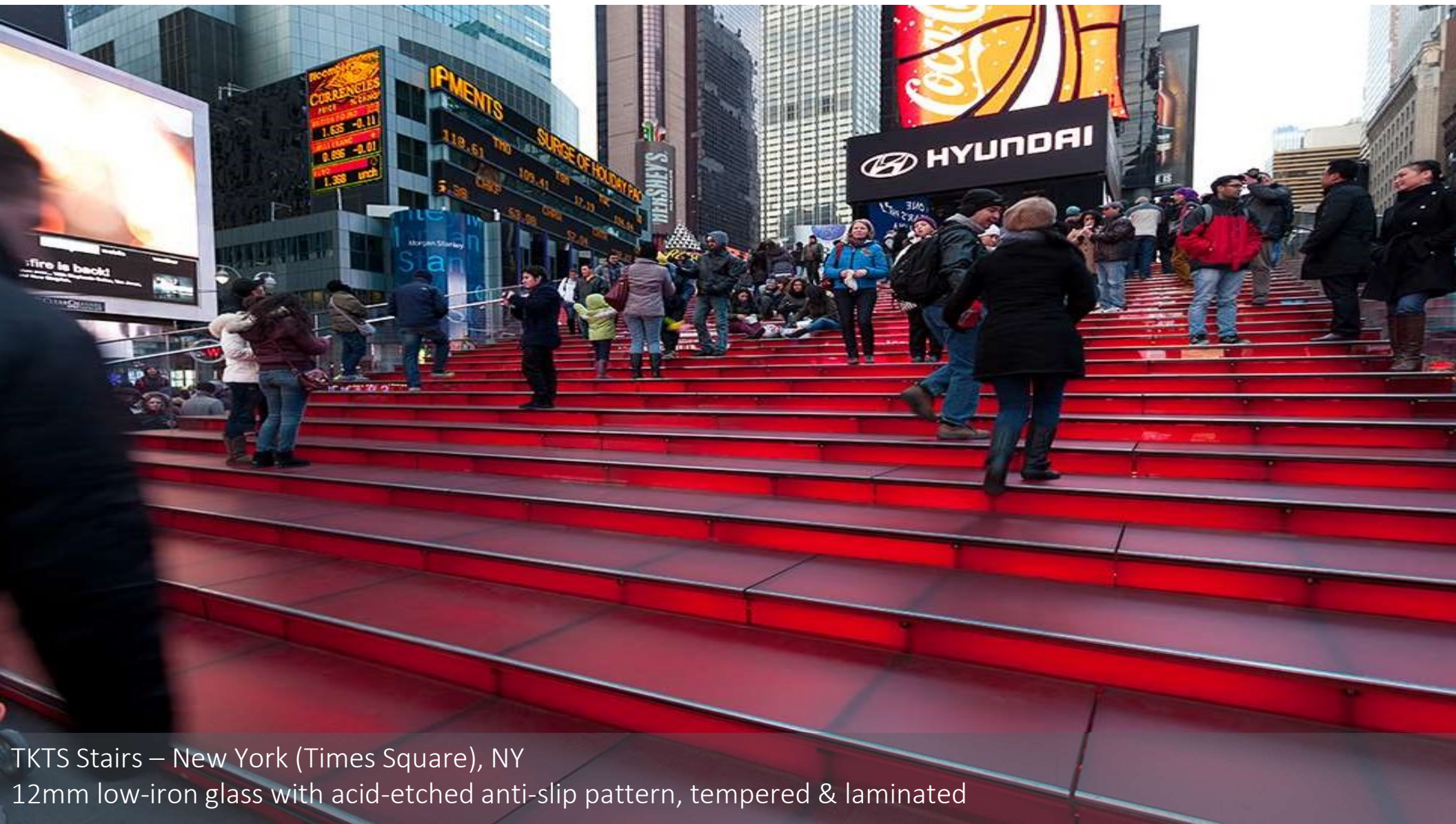
Le Château – Calgary, AB
10 mm clear glass with acid-etched anti-slip pattern, heat strengthened & laminated



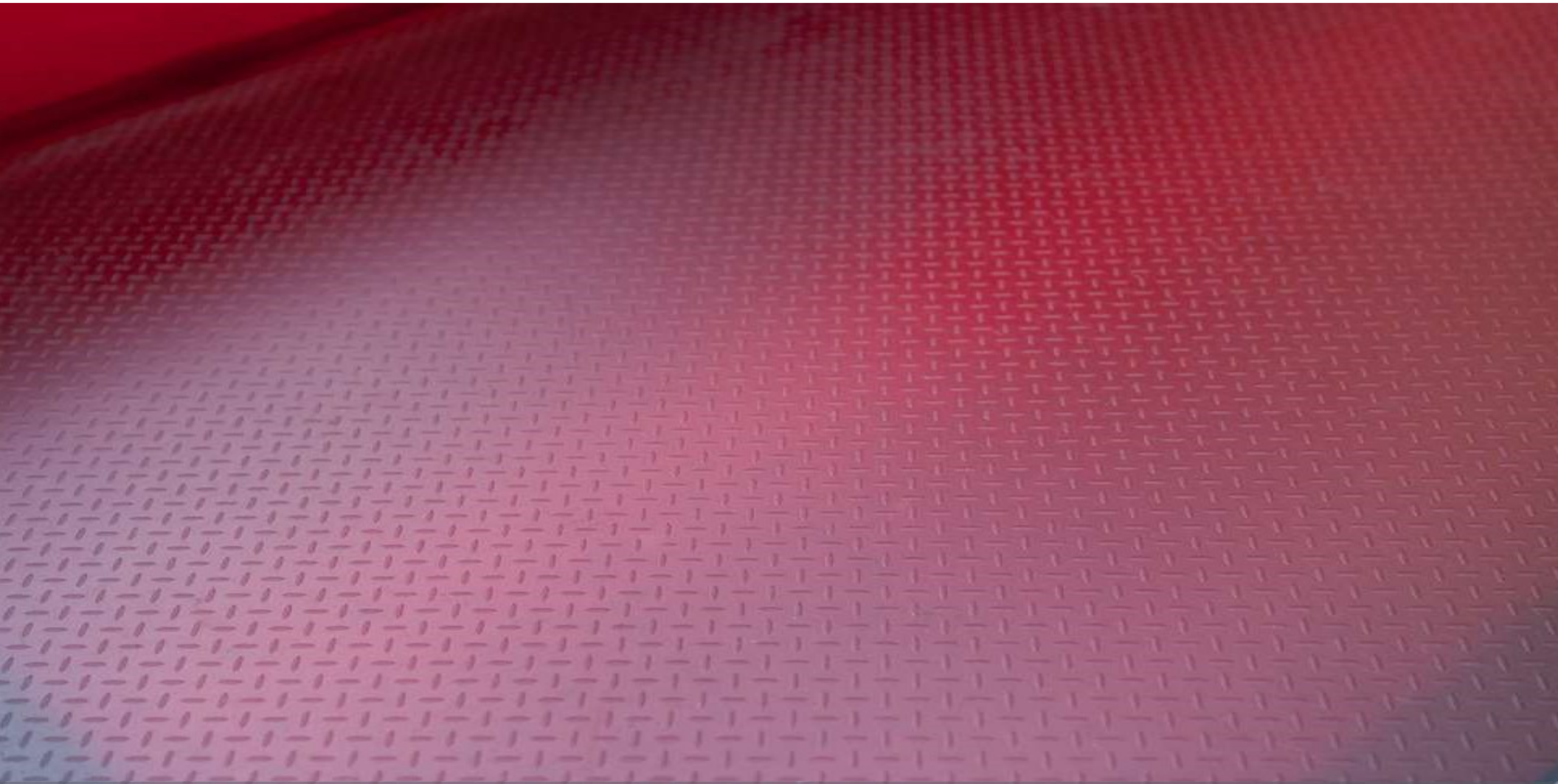
Queens Museum – Queens, NY
12 mm low-iron glass with acid-etched anti-slip pattern, tempered & laminated



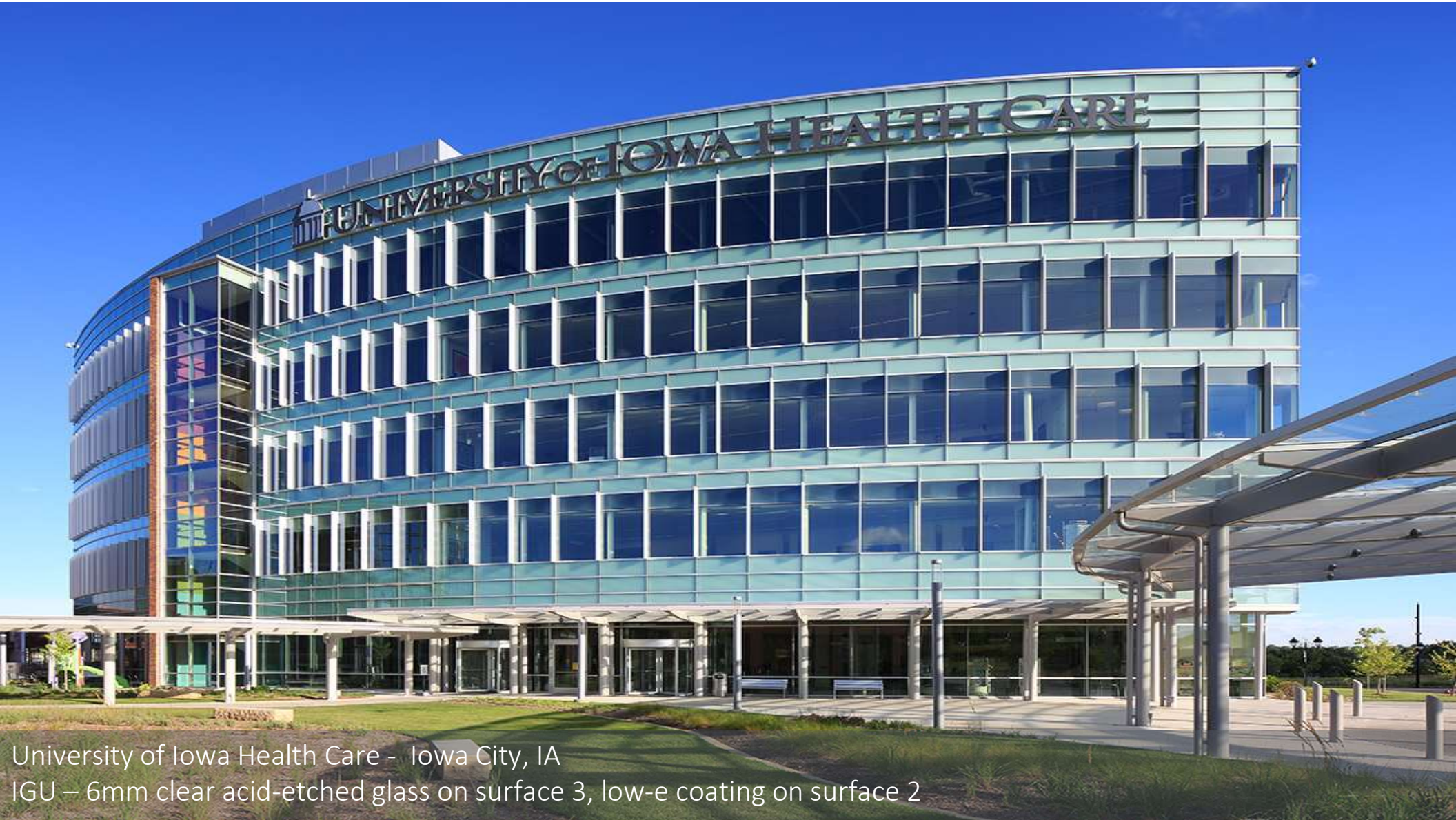
Queens Museum – Queens, NY
12 mm low-iron glass with acid-etched anti-slip pattern, tempered & laminated



TKTS Stairs – New York (Times Square), NY
12mm low-iron glass with acid-etched anti-slip pattern, tempered & laminated

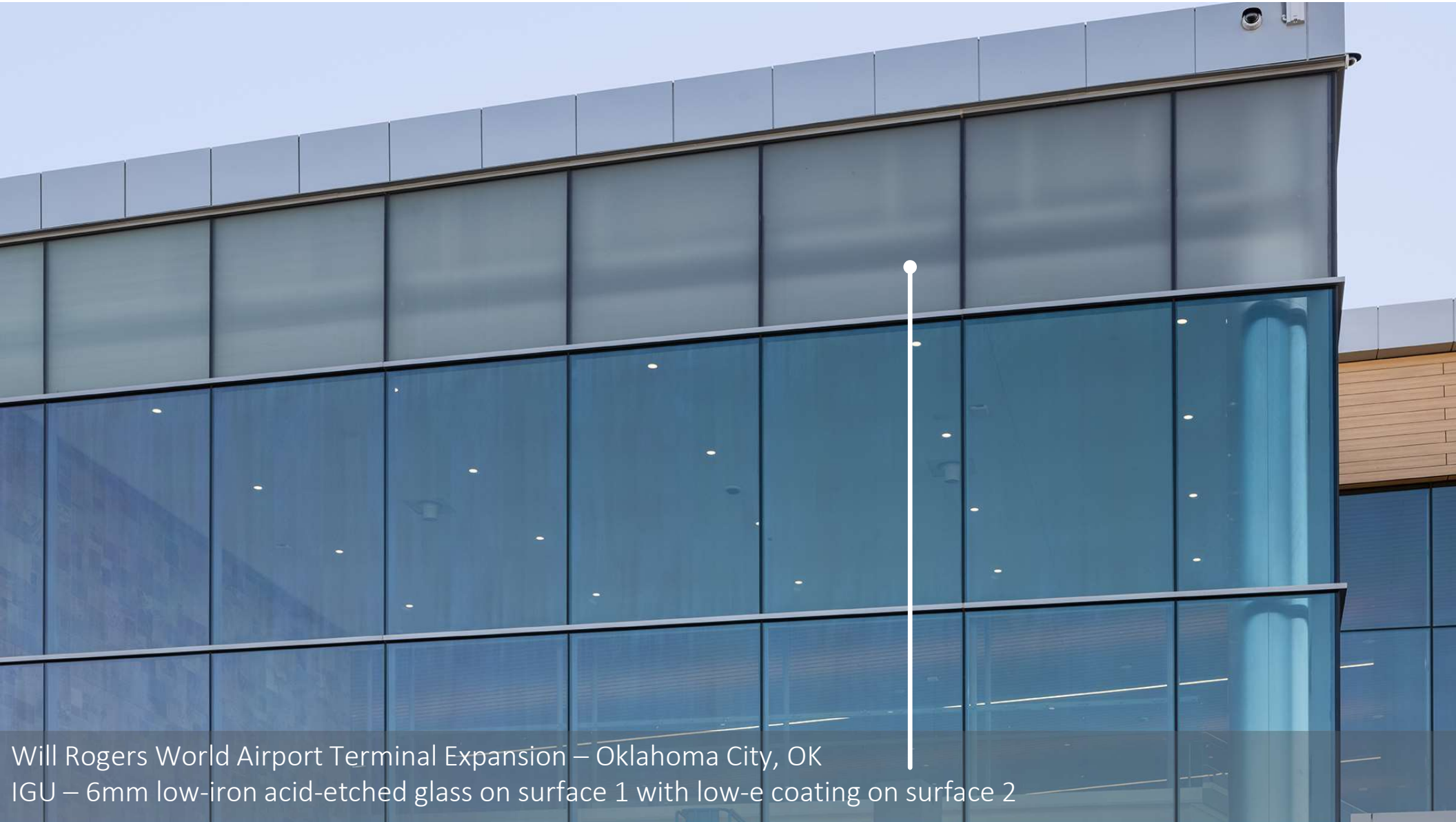


TKTS Stairs – New York (Times Square), NY
12mm low-iron glass with acid-etched anti-slip pattern, tempered & laminated

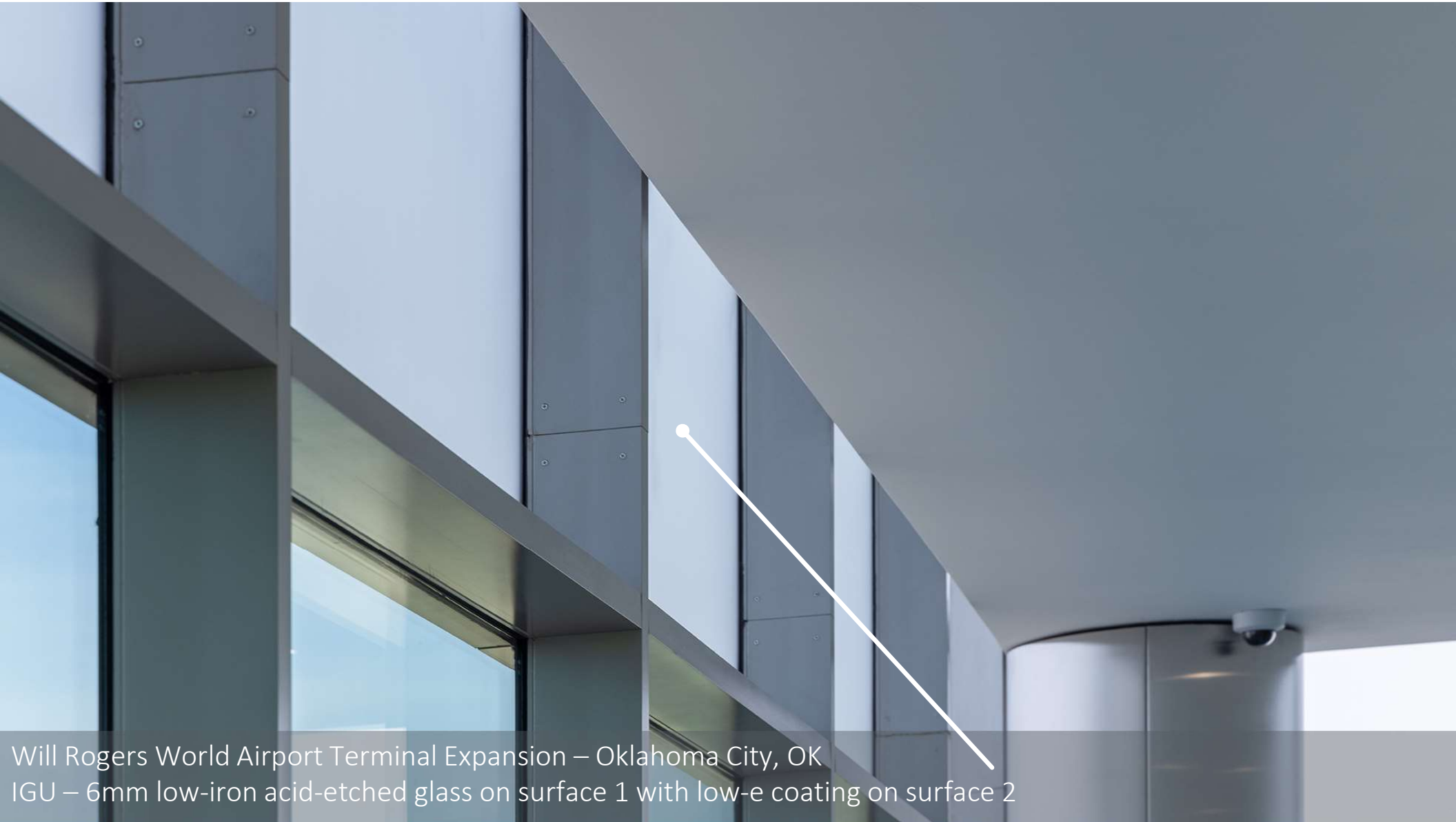


UNIVERSITY OF IOWA HEALTH CARE

University of Iowa Health Care - Iowa City, IA
IGU – 6mm clear acid-etched glass on surface 3, low-e coating on surface 2



Will Rogers World Airport Terminal Expansion – Oklahoma City, OK
IGU – 6mm low-iron acid-etched glass on surface 1 with low-e coating on surface 2

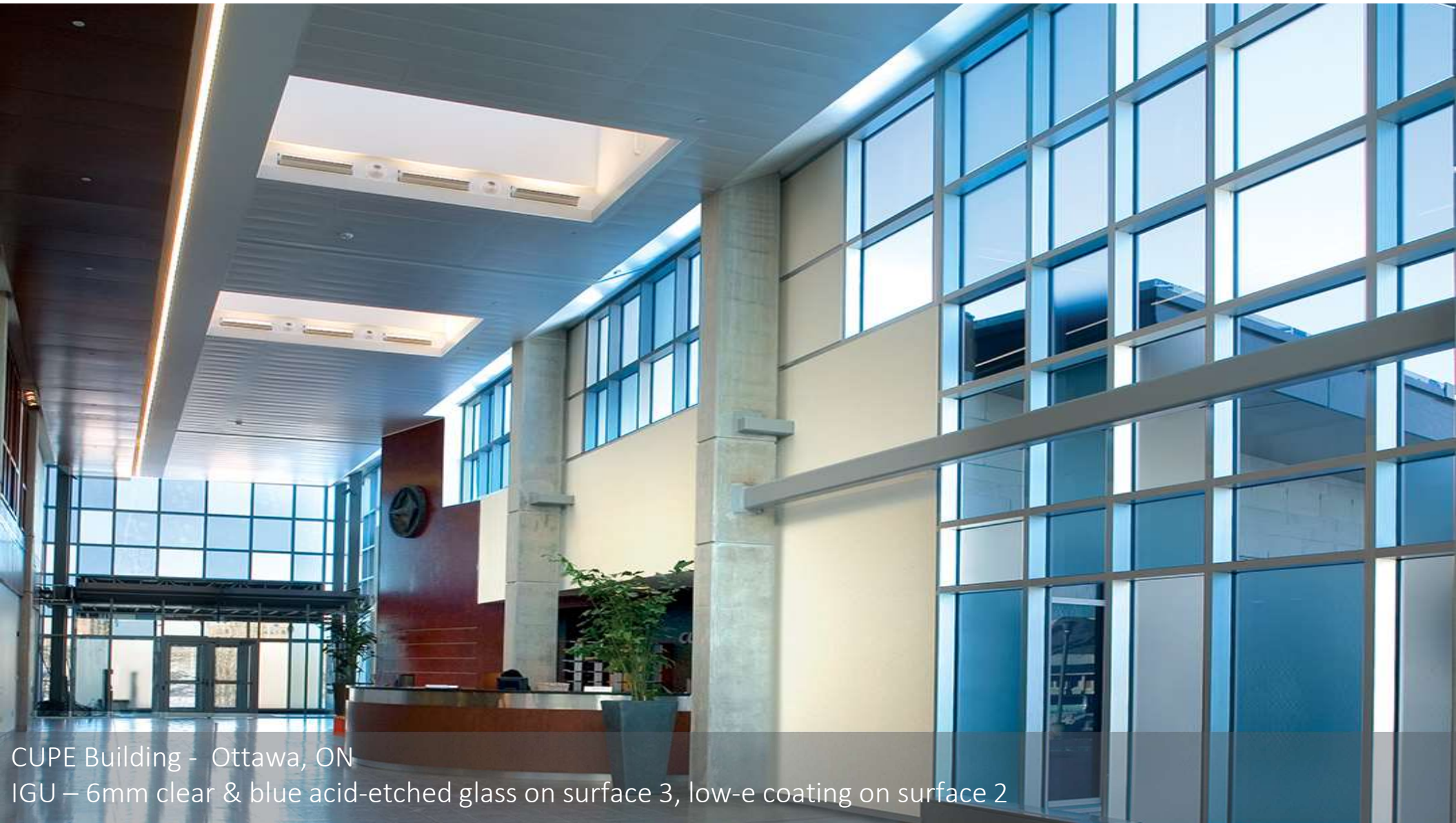


Will Rogers World Airport Terminal Expansion – Oklahoma City, OK
IGU – 6mm low-iron acid-etched glass on surface 1 with low-e coating on surface 2



CUPE Building - Ottawa, ON

IGU – 6mm clear & blue acid-etched glass on surface 3, low-e coating on surface 2



CUPE Building - Ottawa, ON
IGU – 6mm clear & blue acid-etched glass on surface 3, low-e coating on surface 2



3711 SCIENCE CENTER

Wexford Science + Technology - Philadelphia, PA – LEED® Silver
6mm low-iron acid-etched glass on surface 2



National Institute of Scientific Research (INRS) - Laval, QC

IGU – 6mm low-iron acid-etched glass on surface 1, low-e coating on surface 3

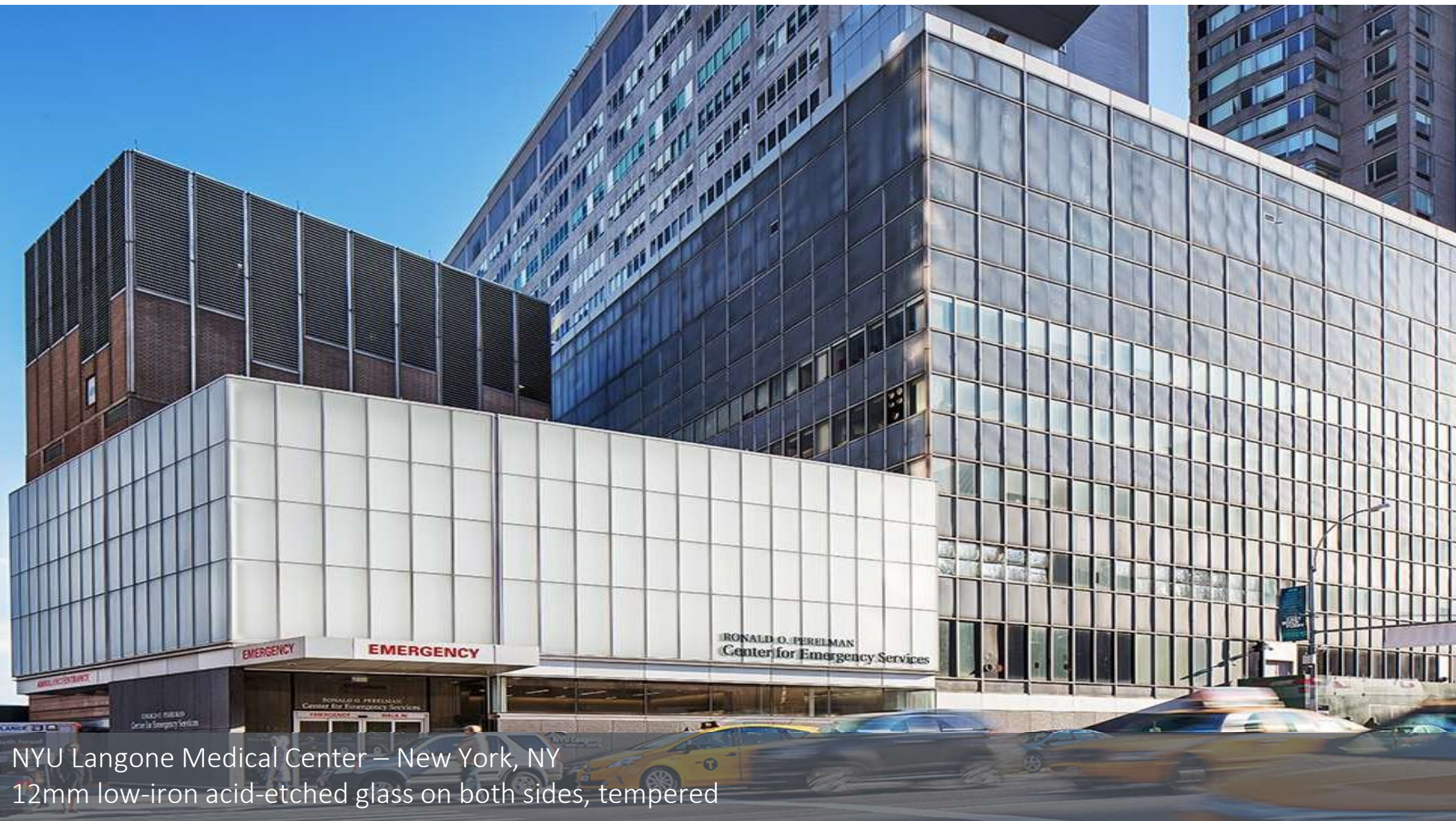
Before

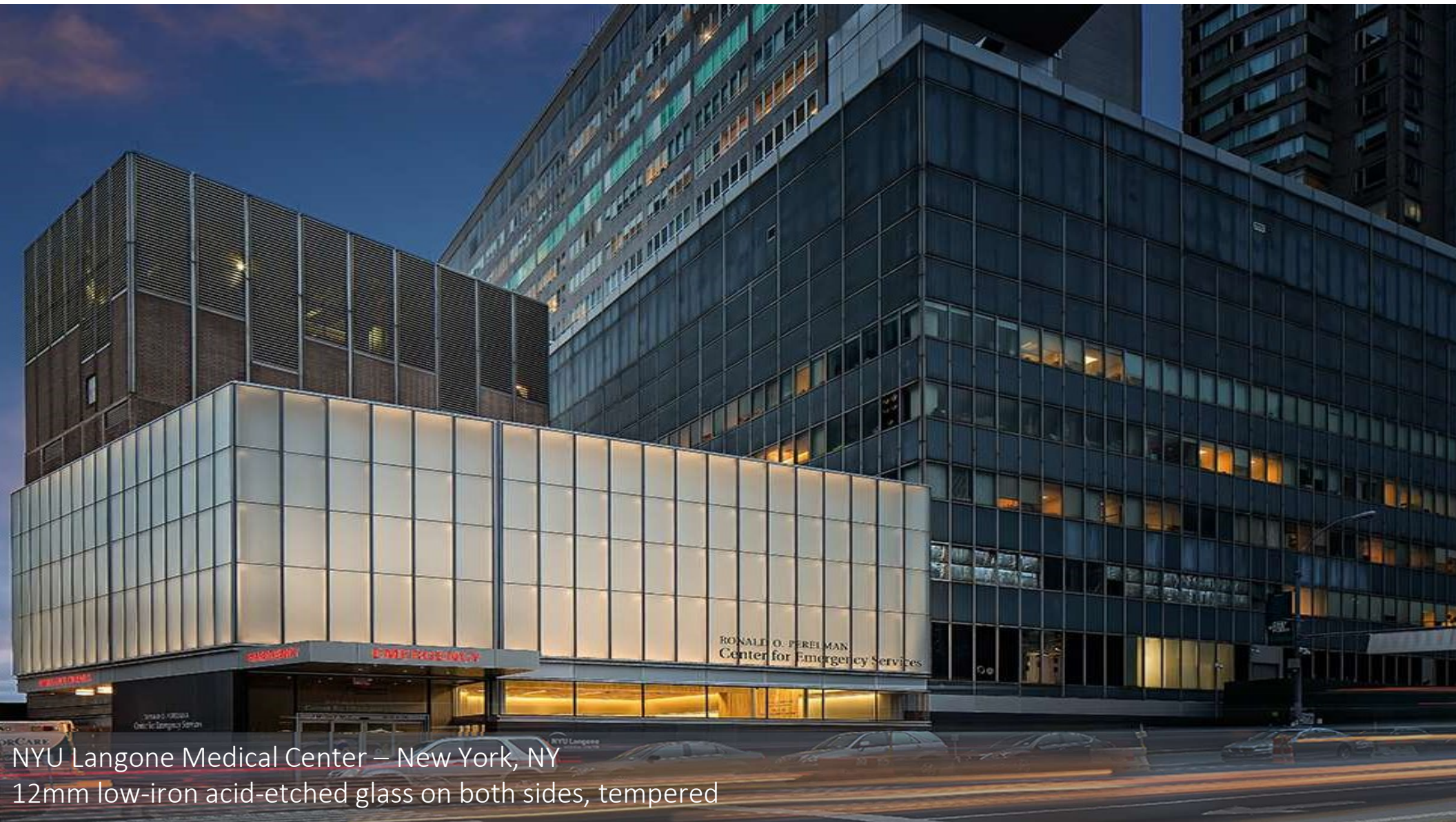


After

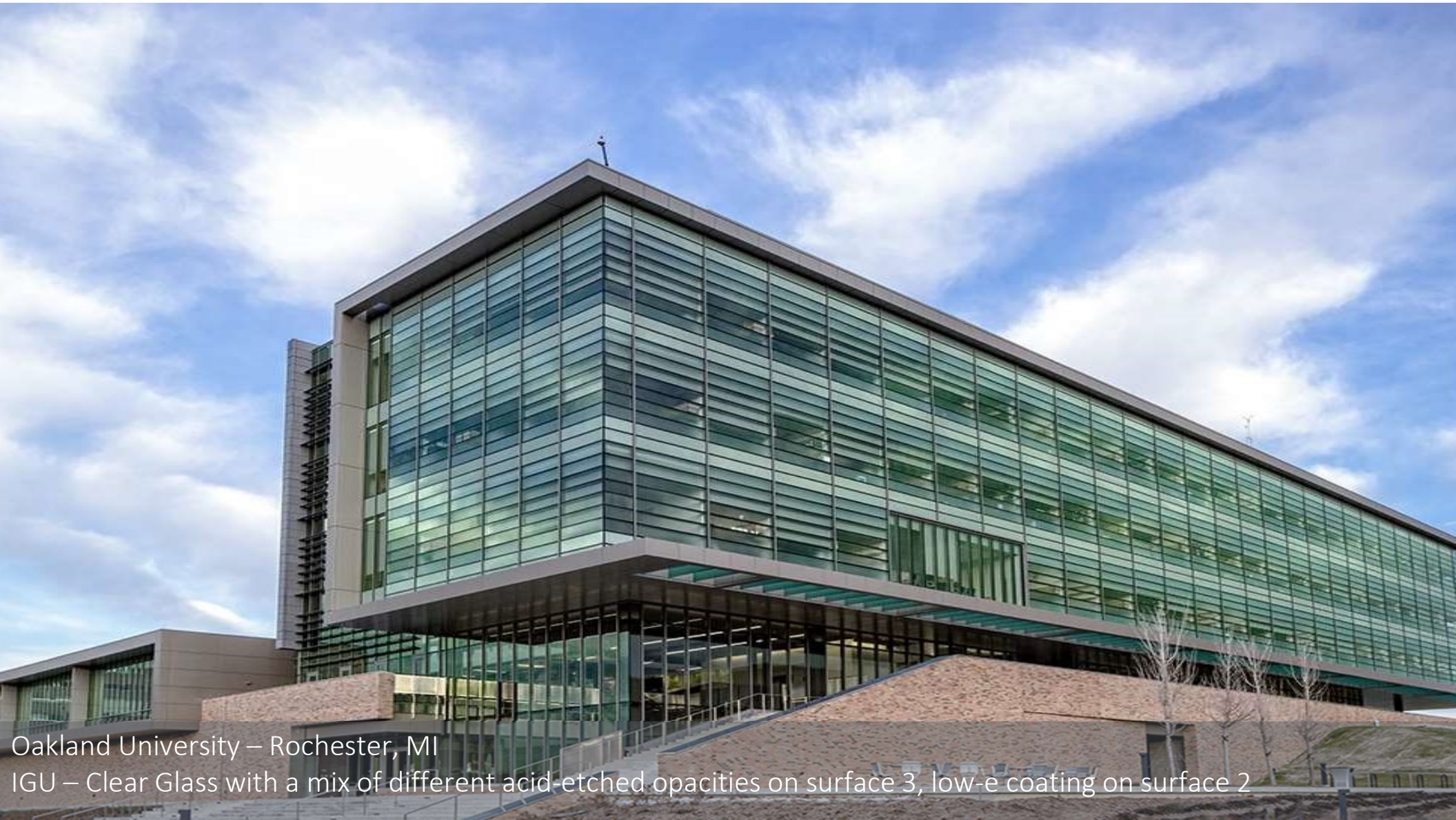


579 5th Avenue – New York, NY
6mm low-iron acid-etched glass on surface 1, laminated with white interlayer



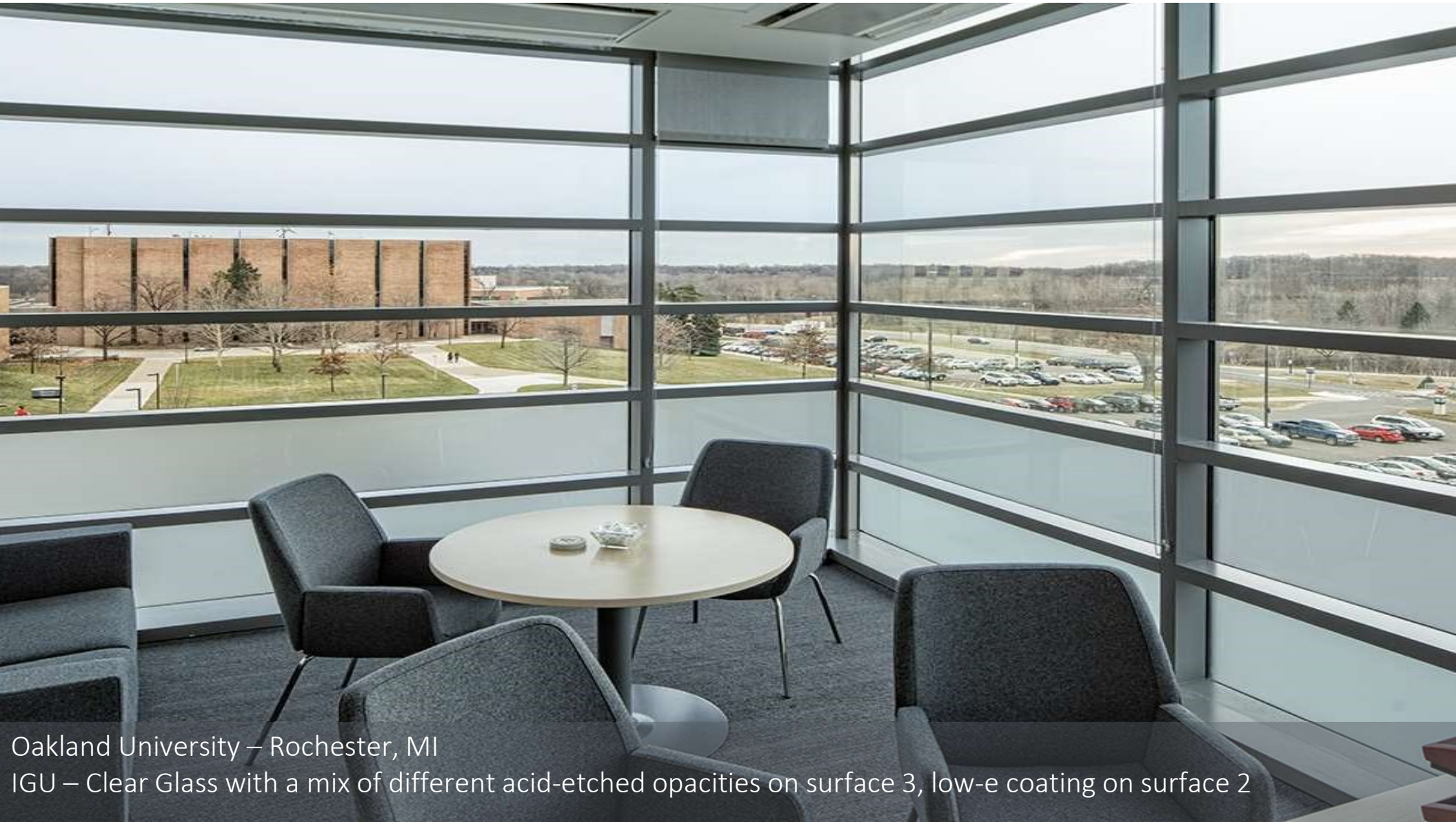


NYU Langone Medical Center – New York, NY
12mm low-iron acid-etched glass on both sides, tempered

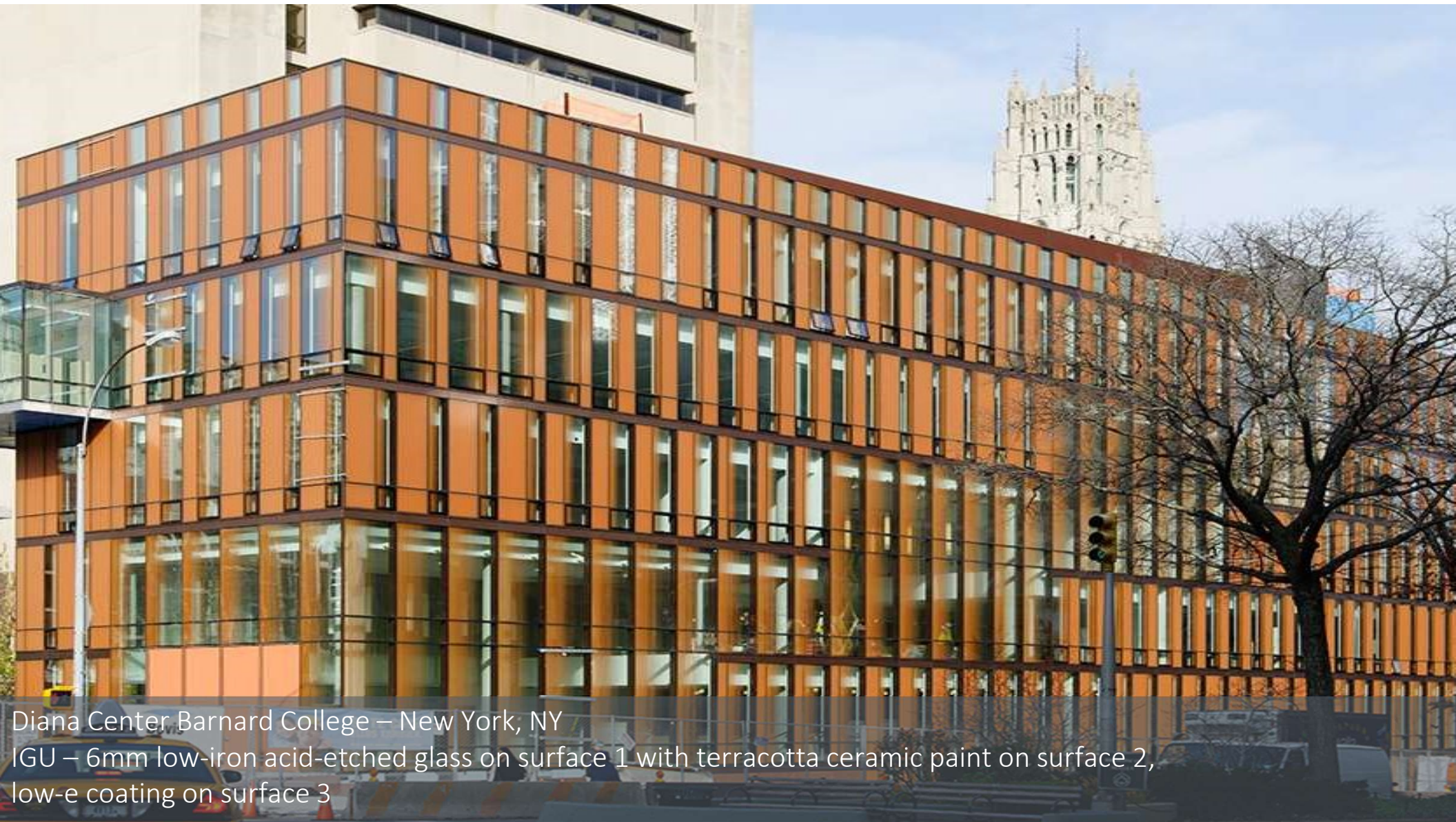


Oakland University – Rochester, MI

IGU – Clear Glass with a mix of different acid-etched opacities on surface 3, low-e coating on surface 2



Oakland University – Rochester, MI
IGU – Clear Glass with a mix of different acid-etched opacities on surface 3, low-e coating on surface 2



Diana Center Barnard College – New York, NY
IGU – 6mm low-iron acid-etched glass on surface 1 with terracotta ceramic paint on surface 2,
low-e coating on surface 3



H & M Store – Toronto, ON
8mm low-iron acid-etched glass on surface 1, 2, 3 & 4



KRISHNA P. SINGH CENTER FOR NANOTECHNOLOGY

University of Pennsylvania – Philadelphia, PA
IGU – 6mm low-iron glass with acid-etched stripes on surface 1



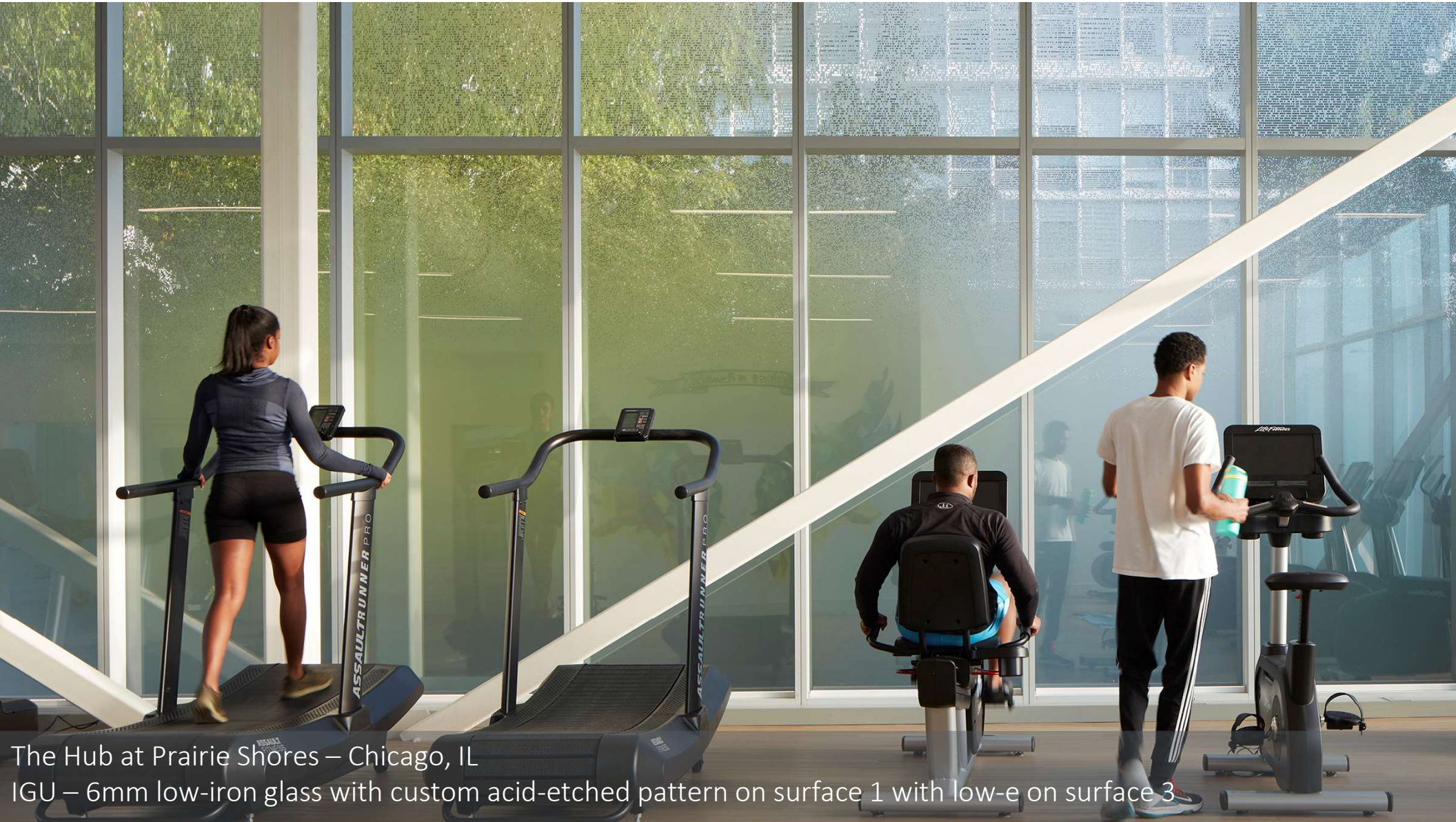
University of Pennsylvania – Philadelphia, PA
IGU – 6mm low-iron glass with acid-etched stripes on surface 1



University of Pennsylvania – Philadelphia, PA
IGU – 6mm low-iron glass with acid-etched stripes on surface 1



The Hub at Prairie Shores – Chicago, IL
IGU – 6mm low-iron glass with custom acid-etched pattern on surface 1 with low-e on surface 3



The Hub at Prairie Shores – Chicago, IL

IGU – 6mm low-iron glass with custom acid-etched pattern on surface 1 with low-e on surface 3



ABB Canada Campus – Montreal, QC
IGU – 6mm low-iron acid-etched glass on surface 2, low-e on surface 3



ABB Canada Campus – Montreal, QC
IGU – 6mm low-iron acid-etched glass on surface 2, low-e on surface 3



First Commonwealth Federal Credit Union – Allentown, PA
IGU – 6mm low-iron acid-etched glass on surface 2, low-e on surface 3



First Commonwealth Federal Credit Union – Allentown, PA
IGU – 6mm low-iron acid-etched glass on surface 2, low-e on surface 3

A blurred background of an office interior. In the foreground, a laptop is open on a desk. Behind it, a large window with a grid pattern looks out onto a cityscape. The overall color palette is dominated by blues and greys, with a soft, out-of-focus aesthetic.

ACID-ETCHED PRODUCTS & LEED®

RELEVANCE OF ACID-ETCHED GLASS & MIRROR PRODUCTS TO LEED®

- Building Product Disclosure and Optimization
Environmental Product Declaration (EPD)
(1 point)

Report describing a product's potential environmental impacts, according to the life cycle assessment criteria and in conformity with ISO protocol 14025.

- Building Product Disclosure and Optimization - Material Ingredients
Health Product Declaration® (HPD®)
(1 point)

A declaration that includes a complete list of a product's ingredients and their associated effects on health.

RELEVANCE OF ACID-ETCHED GLASS & MIRROR PRODUCTS TO LEED®

- Low-Emitting Materials
 - Product Category Calculation (1-3 points)
 - Glass is a non-emitting source
- Daylight
 - Design to maximize daylight (1-3 points)
- Innovation
 - Bird Collision Deterrence (1 point)

The background of the image shows a whiteboard with several architectural sketches. At the top, there are four small, simple line drawings of building facades. Below these, there are larger, more detailed sketches of building structures, some with blue and green highlights. A green tree is sketched in the lower-left area. Several white markers with blue, black, and green tips are scattered across the whiteboard. A semi-transparent grey rectangle is overlaid in the center, containing the text.

ACID-ETCHED GLASS & MIRROR SPECIFICATIONS



SURFACE FINISH

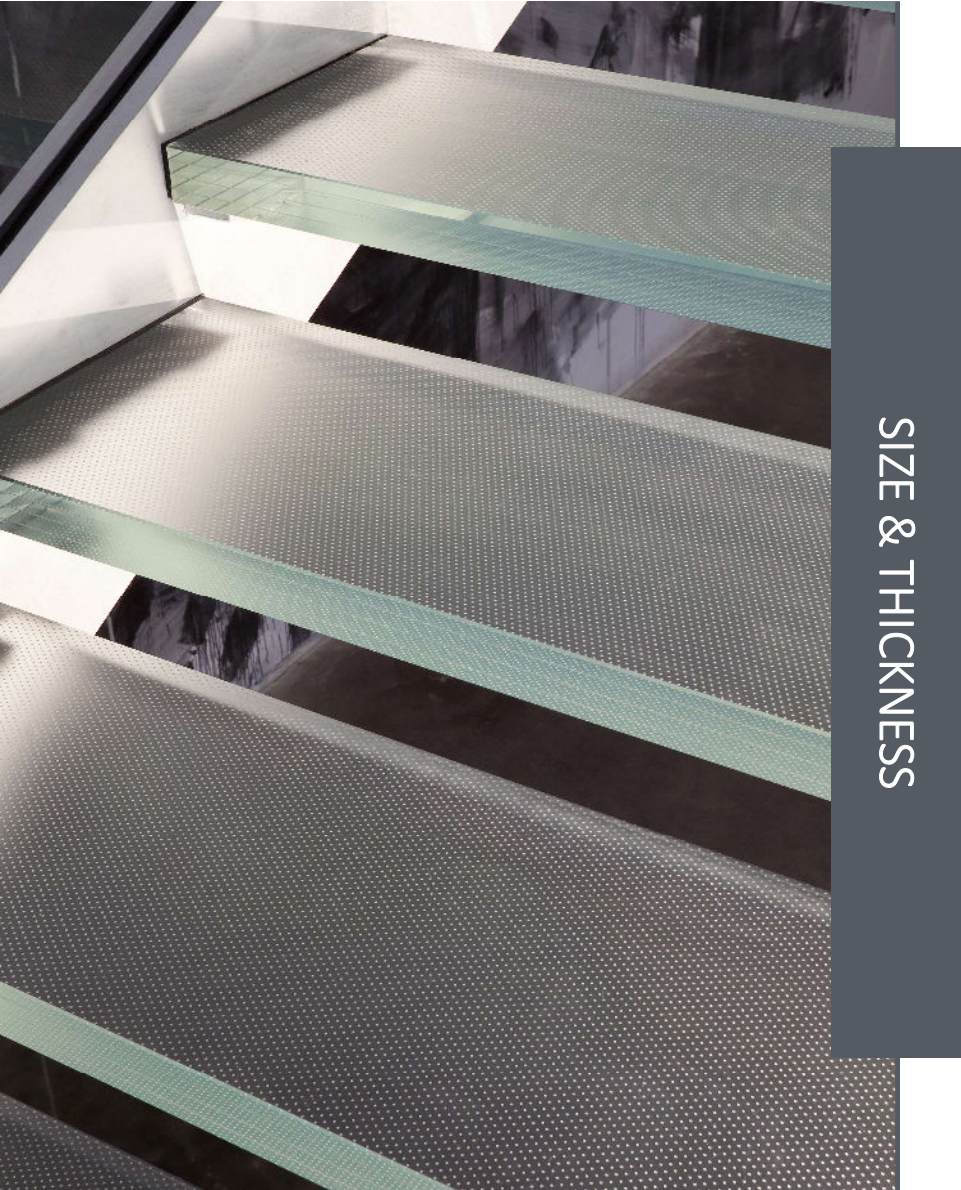
IMPORTANT ISSUES TO CONSIDER WHEN WRITING ACID-ETCHED GLASS OR MIRROR SPECIFICATIONS

- Impacts on level of translucency & visual appearance
- Single-sided or double-sided etch
- Gloss measurements to support finish selected and consistency

IMPORTANT ISSUES TO CONSIDER WHEN WRITING ACID-ETCHED GLASS OR MIRROR SPECIFICATIONS

- Not all tinted and ultra-clear glass are made the same
- Impacts on glass performance and visual appearance
- Different acid-etch finish combined with a different glass substrate will render varied appearance





SIZE & THICKNESS

IMPORTANT ISSUES TO CONSIDER WHEN WRITING ACID-ETCHED GLASS OR MIRROR SPECIFICATIONS

- Availability dependent on surface finish selected
- Availability dependent on glass substrate selected

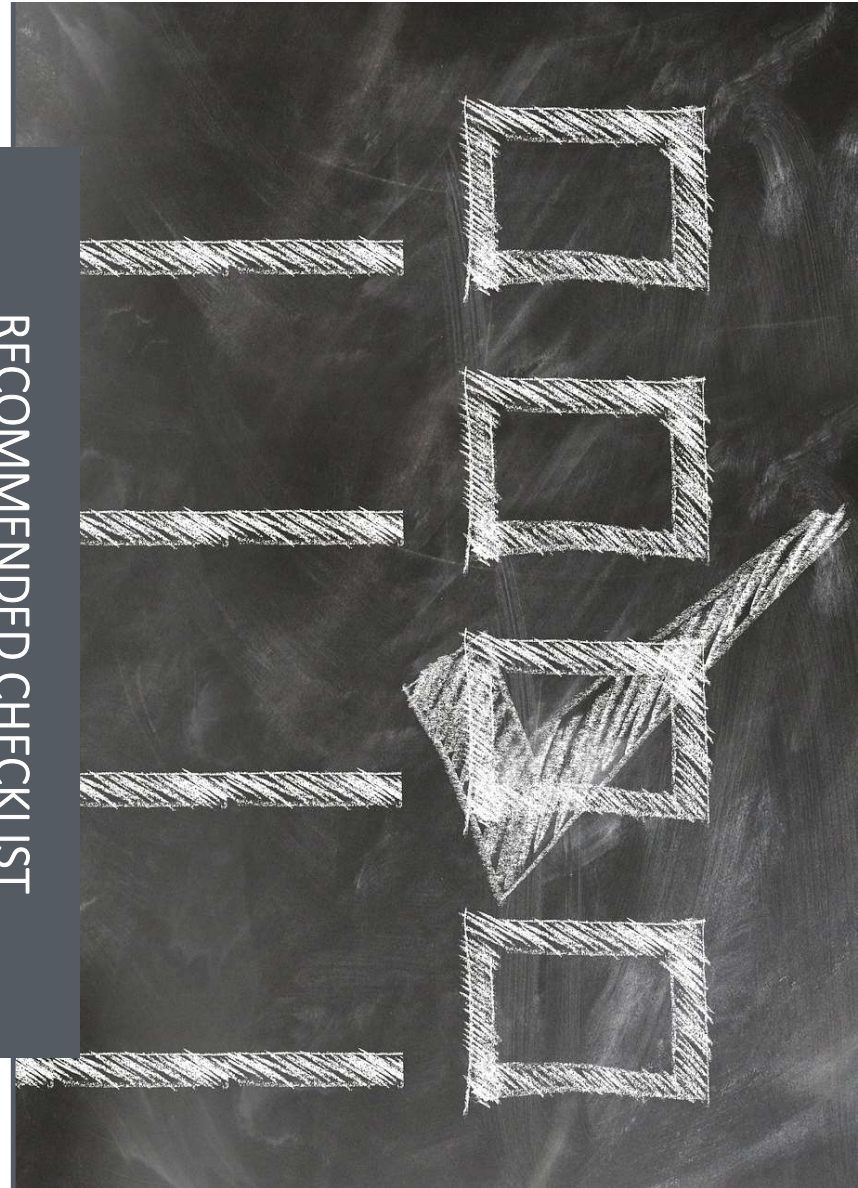
IMPORTANT ISSUES TO CONSIDER WHEN WRITING ACID-ETCHED GLASS OR MIRROR SPECIFICATIONS

- Name of manufacturer & product brand name
- Glass thickness
- Substrate (glass or mirror)
- Tint (clear, ultra-clear, blue, black, bronze, grey, etc.)
- Type of acid-etch finish (name of the finish)
- Etch on 1 face or 2 faces (glass)

Ask for 3-part specifications

Coordinate specifications with glass schedules

RECOMMENDED CHECKLIST



NORTH AMERICAN GLASS STANDARDS

Acid-etched glass products should be made from selected float glass which conforms to standards accepted by the glass industry in North America :

- ASTM C1036 Standard Specification for Flat Glass; Quality : Q3 - Stock Sheet
- To preserve the quality of the glass specified, a warranty meeting the above standards should be requested

This concludes The American Institute of Architects
Continuing Education Systems Course

WALKER

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