



HISTORICALLY PROVEN, FUTURE FACING

Architectural Zinc for
Walls and Roofing

PROGRAM REGISTRATION

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COURSE OVERVIEW

- Architectural zinc cladding and roofing are natural choices for innovative, creative, and forward-thinking architects and designers
- Product combines the qualities of natural beauty, sustainability, ease of workmanship, durability, and low maintenance
- This course explains:
 - The nature of zinc
 - Its abundance in the earth's crust
 - Its multitudes of use in history and in contemporary design
 - Its performance qualities
 - Its proven sustainable credentials
 - The specifiable aspects of zinc for walls and roofs
 - Zinc's stunning aesthetic and versatility as demonstrated in numerous of high-profile case studies

LEARNING OBJECTIVES



© Mark Kempf Photography

Upon completion of this course, the student will be able to:

- Examine the use of zinc for walls and roofs from historic European buildings to contemporary North American designs
- Discuss the specifiable aspects of architectural zinc for a wide range of design goals
- Identify architectural zinc's performance and aesthetic qualities, its natural and accelerated patina process, and how zinc differs from other metals
- Define architectural zinc's proven sustainable qualities
- Discuss several case studies that show how architectural zinc walls and roofing enhance a variety of project applications



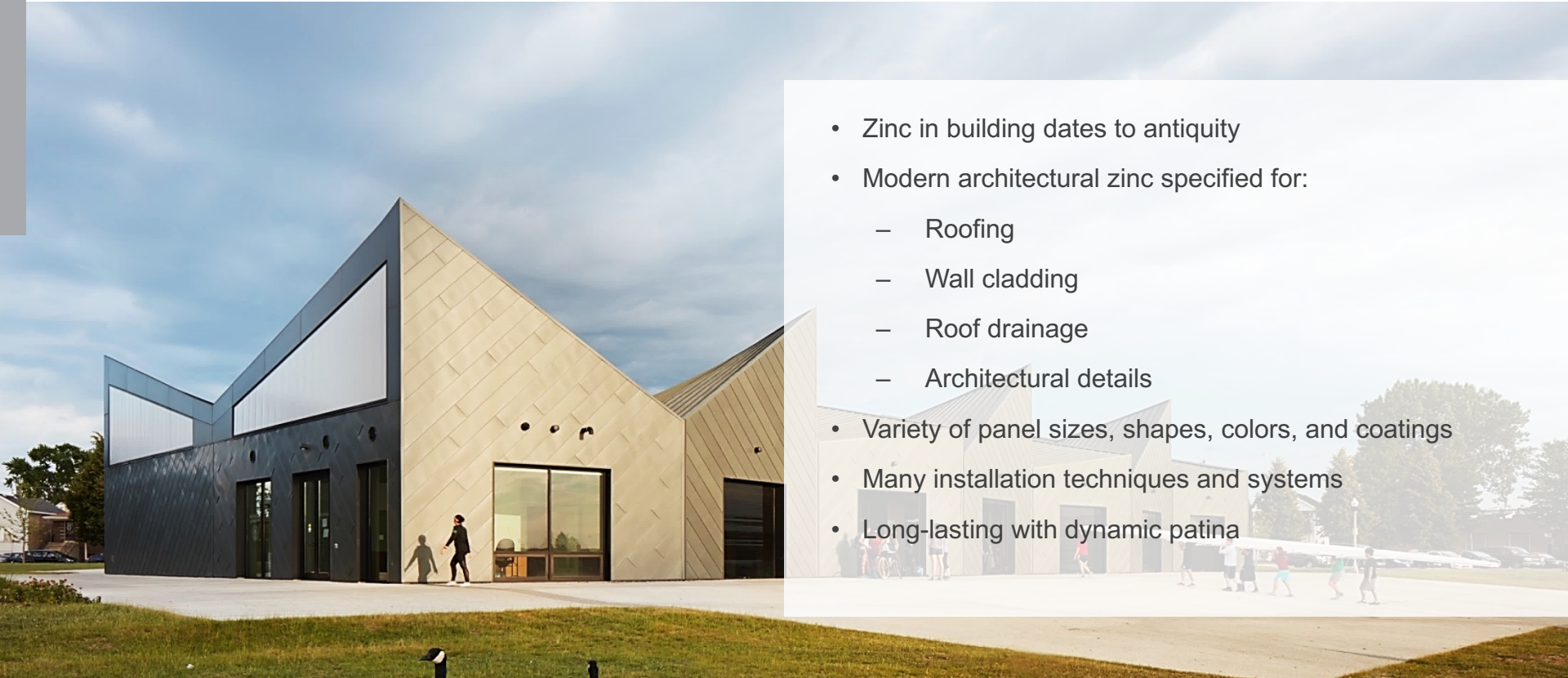
Section 1

INTRODUCTION

INTRODUCTION

© Tom Harris Photography, courtesy of Studio Gang

- Zinc in building dates to antiquity
- Modern architectural zinc specified for:
 - Roofing
 - Wall cladding
 - Roof drainage
 - Architectural details
- Variety of panel sizes, shapes, colors, and coatings
- Many installation techniques and systems
- Long-lasting with dynamic patina




WHAT IS ZINC?

Photo by Mississippi Aquarium

- 24th most abundant element in the earth's crust
- Vital trace element for all life forms
- Zinc alloy used as early as 3000 BC
- Zinc metal produced on large scale in 12th century India
- Zinc electrotechnical properties known by 1800
- Widely used today

ZINC IN BUILDING HISTORY

Photo courtesy of DIALOG

- 
- A photograph of a modern building with a glass facade and a zinc roof. The building is multi-storied and features a prominent glass curtain wall. The roof is made of zinc, which is visible as a dark, textured surface. The building is set against a blue sky with some clouds. In the background, there are other buildings and utility poles.
- Zinc is dense, cost-effective material
 - Easy to form, cut, and fabricate
 - Zinc used widely for Parisian roofs in 1800s during urban renewal
 - 80 percent of roofs in Paris are made of architectural zinc

USE OF ARCHITECTURAL ZINC AROUND THE WORLD

“This natural, dependable metal combines time-tested performance with a timeless appearance that’s been recognized in Europe since the 1800s. The zinc material provides an attractive, evolving patina as it ages over the decades and offers a lifespan that lasts for generations.” — Charles “Chip” McGowan, president of RHEINZINK America, Inc.



COMMERCIAL



- Jackson Laboratory (JAX) for Genomic Medicine in Farmington, Connecticut
- LEED® Gold certified
- Features sustainable, natural zinc from a leading global manufacturer
- 14,000 square feet of architectural blue-grey panels on the exterior façade and the interior walls
- Designed by Centerbrook Architects & Planners in concert with Tsoi Kobus Design

Photo: Robert Benson

EDUCATIONAL

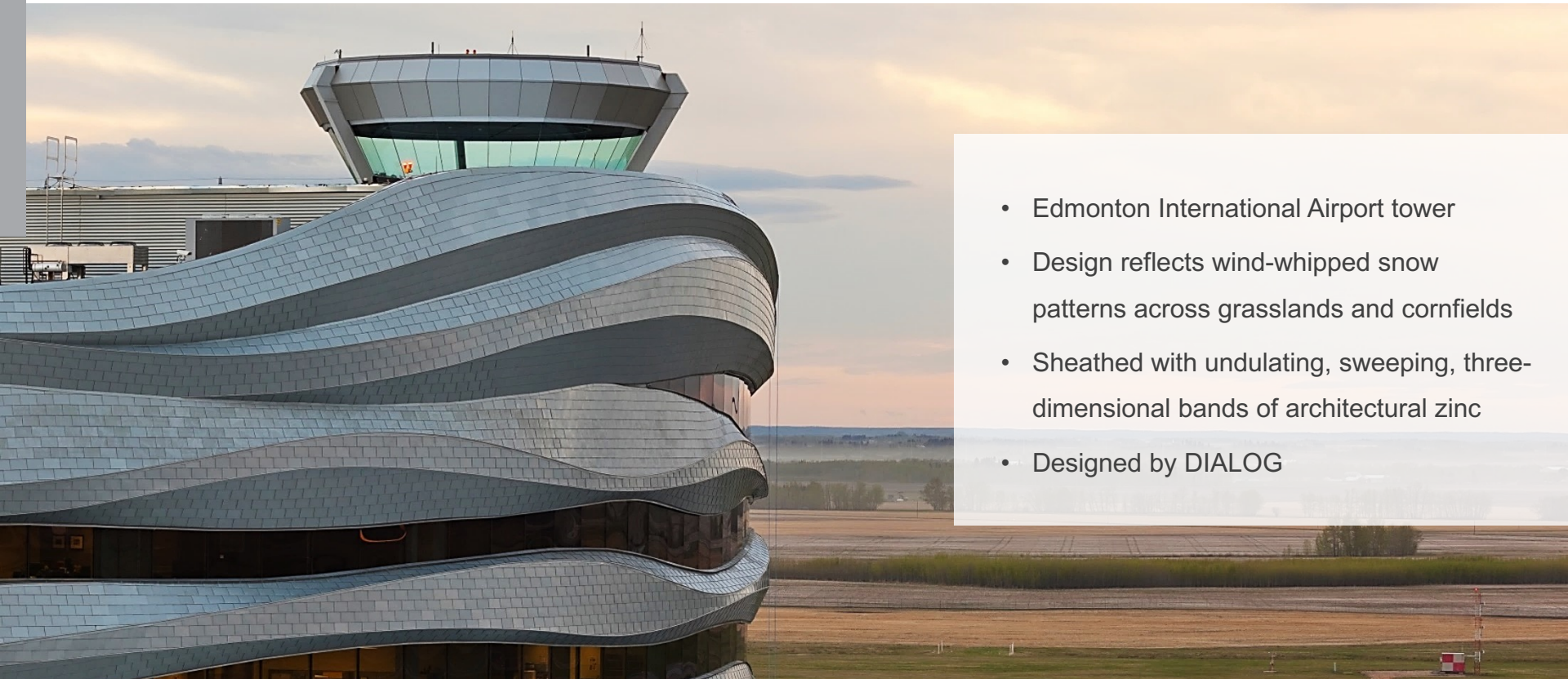


- High Street Residence Hall at Dickinson College in Carlisle, Pennsylvania
- LEED Platinum certified
- Showcases a distinctive and sustainable, architectural zinc cladding system
- Designed by Deborah Berke Partners

Photo: Chris Cooper

MUNICIPAL

Photo by Tom Arban



- Edmonton International Airport tower
- Design reflects wind-whipped snow patterns across grasslands and cornfields
- Sheathed with undulating, sweeping, three-dimensional bands of architectural zinc
- Designed by DIALOG

RESIDENTIAL

- Bézier curved, “dragon scale,” zinc tiled roof
- Home combines modern and traditional styles for an eclectic mix favored in Toronto
- Graphite-grey zinc tiles are processed to accelerate the patina appearance



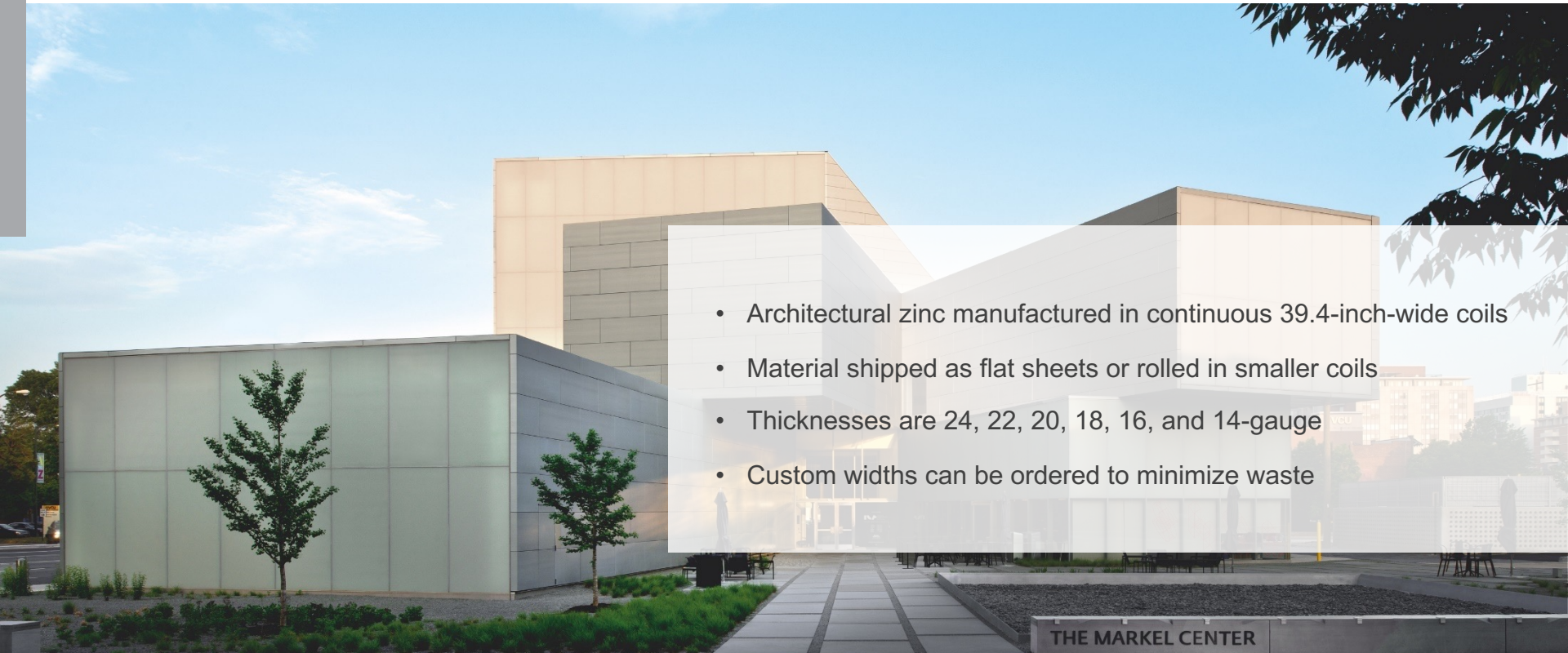


Section 2

HOW TO SPECIFY
ARCHITECTURAL ZINC

WALL PANEL STYLES, SIZES, AND SYSTEMS

© Mark Kempf Photography

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- Architectural zinc manufactured in continuous 39.4-inch-wide coils
 - Material shipped as flat sheets or rolled in smaller coils
 - Thicknesses are 24, 22, 20, 18, 16, and 14-gauge
 - Custom widths can be ordered to minimize waste

THE MARKEL CENTER

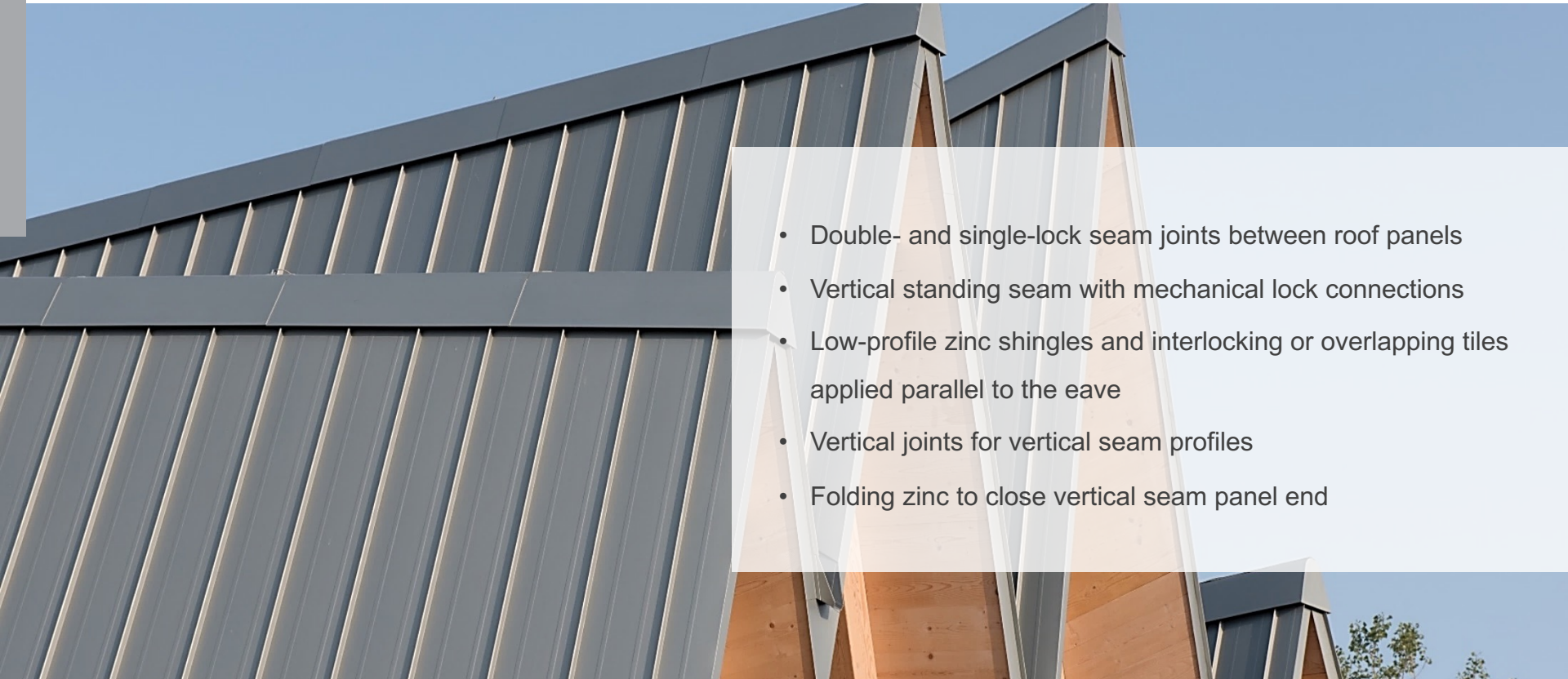
TYPICAL ZINC WALL CLADDING PRODUCT EXAMPLES

- Flat-lock tiles
- Standing seam panels
- Horizontal panels
- Vertical reveal panels
- Corrugated profiles
- Cassette panels
- Perforated panels
- Fabricated panels



TYPICAL ZINC ROOFING PRODUCT AND INSTALLATION EXAMPLES

© Greg van Riel Photography

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- Double- and single-lock seam joints between roof panels
 - Vertical standing seam with mechanical lock connections
 - Low-profile zinc shingles and interlocking or overlapping tiles applied parallel to the eave
 - Vertical joints for vertical seam profiles
 - Folding zinc to close vertical seam panel end

TWO TYPES OF ARCHITECTURAL ZINC

© Curt Clayton Photography

- ASTM B69-21 “Standard Specification for Architectural Rolled Zinc” is the current industry standard
- Standard details Type 1 and Type 2 architectural rolled zinc
- Type 2 has a higher copper composition
- Type 2 has a graphite-grey patina

SELECTING AND COLLABORATING WITH A ZINC MANUFACTURER



- The architectural specifier should qualify zinc manufacturers based on:
 - Material quality
 - Flatness
 - Finish surface
 - Texture
 - Selected panel profile
 - Application system
 - Availability
 - Customer service
 - Technical support

SELECTING AND COLLABORATING WITH A ZINC MANUFACTURER


- Selected zinc material manufacturers should provide:
 - Product data
 - Details
 - Installation instructions
 - Material samples for submittal
- A mock-up may be necessary

Photo by Brian Podnos




ZINC INSTALLATION DETAILS

Photo by John Cole

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- Zinc has high coefficient of thermal expansion
 - Design should allow for movement
 - Caulking is often not required at these critical junctures
 - Lowers initial and lifetime costs
 - Reduces recurring maintenance
 - Best to achieve detail without soldering or sealants

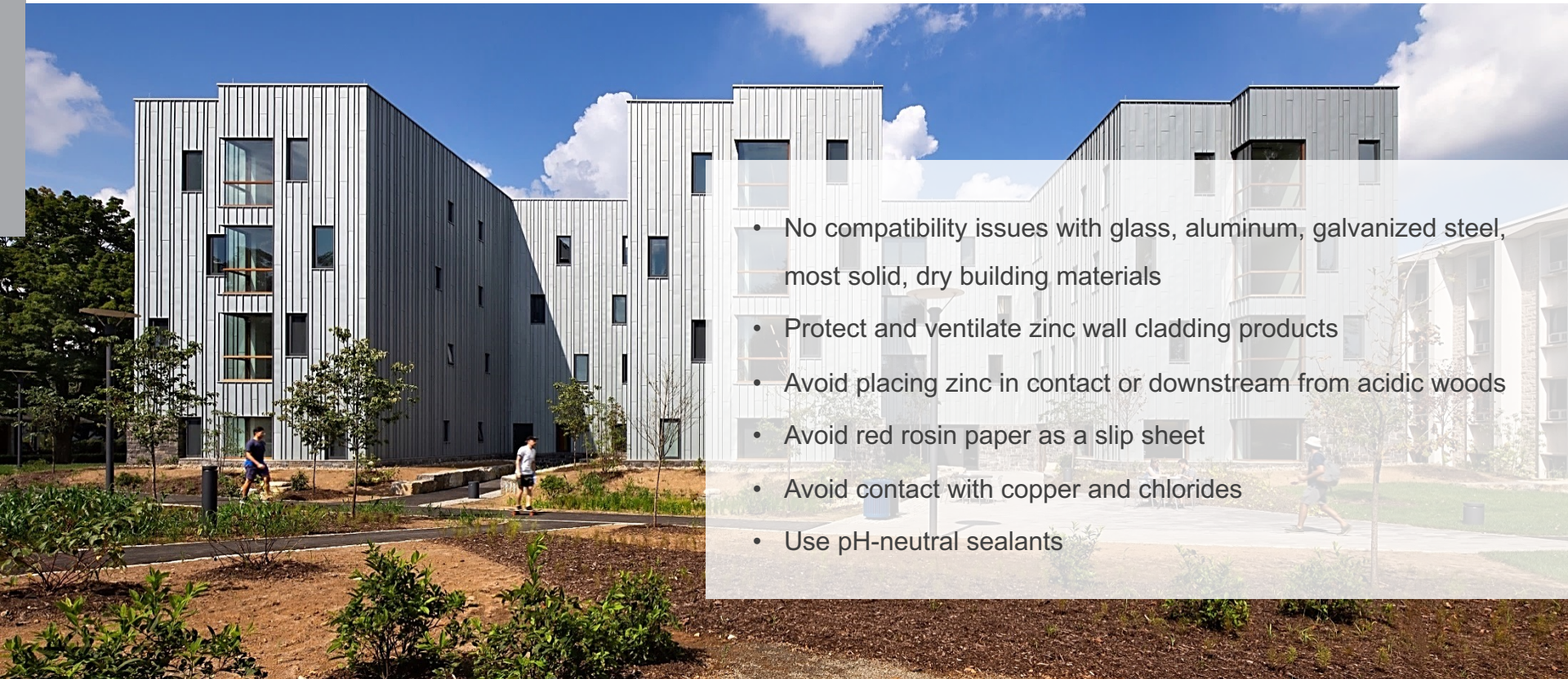
BUDGET-CONSCIOUS SPECIFICATIONS

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- Avoid labor-intensive details
 - Choose panels to optimize width of zinc sheet or coil
 - Limit panel lengths for easier handling, fabricating, and installing

COMPATIBILITY AND LONGEVITY

Photo by Chris Cooper

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- No compatibility issues with glass, aluminum, galvanized steel, most solid, dry building materials
 - Protect and ventilate zinc wall cladding products
 - Avoid placing zinc in contact or downstream from acidic woods
 - Avoid red rosin paper as a slip sheet
 - Avoid contact with copper and chlorides
 - Use pH-neutral sealants



Section 3

AESTHETICS AND THE
PATINA PROCESS

PATINATION AND COLORIZATION

- Zinc starts with a bright surface
- Patina presents a dynamic, evolving, natural look
- Patina provides a protective, “self-healing” layer for long-lasting performance
 1. Zinc combines with water and oxygen to form zinc hydroxide
 2. Zinc combines with carbon dioxide in air to generate a dense outer layer and packed inner layer of alkaline zinc carbonate

Photo by Oleg March



HOW THE PATINA FORMS

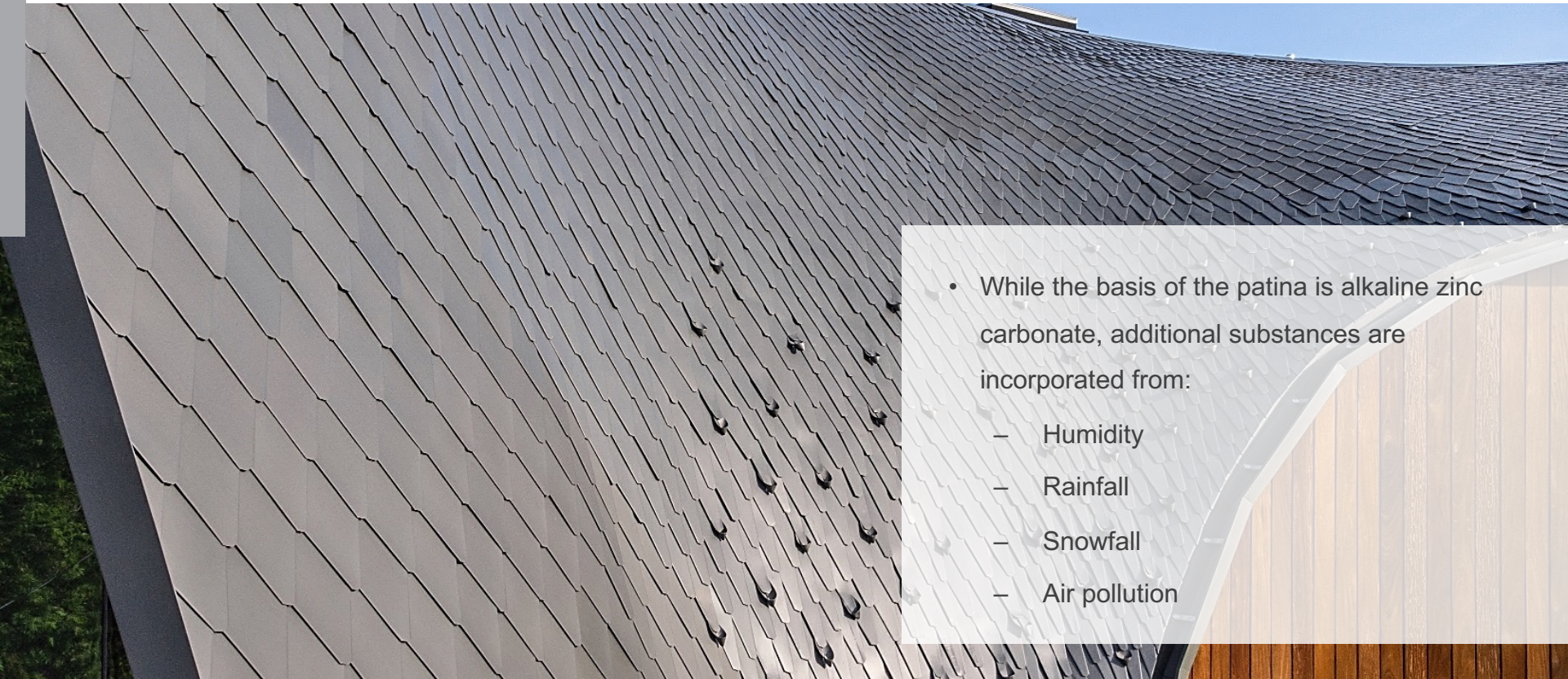
- A process of the gradual growing together of zinc carbonate “freckles”
- Rate for formation related to slope of surface
 - Slower patination on vertical wall
 - Quicker patination on slightly pitched roof
- Patination speed varies between six months and five years
- The natural patina forms to a soft blue-grey or graphite-grey color

Photo by B&B Sheet Metal



PATINA VARIES WITH LOCAL CONDITIONS

© Greg van Riel Photography

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- While the basis of the patina is alkaline zinc carbonate, additional substances are incorporated from:
 - Humidity
 - Rainfall
 - Snowfall
 - Air pollution

COLOR OPTIONS

©Scott Norsworthy

- Pickling
- Phosphating
- Color coating





Section 4

ARCHITECTURAL ZINC'S
PERFORMANCE QUALITIES

VERSATILE

- Can be shaped into a multitude of forms:
 - Geometric
 - Organic
 - Curves

Photo by Mississippi Aquarium



RESILIENT

© Josh Partee Architectural Photographer



GLADYS VALLEY
MARINE STUDIES BUILDING

- Will resist air and water infiltration
- Tested to withstand high winds
- Provides a noncombustible solution

LOW-MAINTENANCE ARCHITECTURAL ZINC

- Low-maintenance and long-lasting performance
 - Does not require paint, varnish, or sealants
 - Runoff is non-staining with no adverse environmental affect
 - Self-healing if scratched

Architect – Booth Hansen; ©Maxime Brouillet



CLEANING GUIDANCE

© Josh Partee Architectural Photographer



- Easy maintenance
 - Wash with clean water twice a year
 - Wash more frequently in dusty conditions
 - Follow the manufacturer's cleaning instructions

- In marine environments
 - Salt can develop on the surface of all metal
 - Salt shows less on lighter colored coatings and surfaces on architectural zinc



Section 5

ARCHITECTURAL ZINC'S
SUSTAINABLE QUALITIES

ABUNDANCE ON EARTH

© Tom Harris Photography, courtesy of Studio Gang

- Zinc not in limited supply
- Zinc resources available for next 700 years



EFFICIENTLY PRODUCED

- One architectural zinc manufacturer now produces its material using 50% less CO₂
- Zinc titanium alloy requires 1/4 to 1/3 the energy of producing:
 - Stainless steel
 - Copper
 - Aluminum
- Minimal emissions with smelting and processing
- Recycled content in architectural zinc products contain up to:
 - 40 percent pre-consumer
 - 10 percent post-consumer

Photo by RHEINZINK



EXCEPTIONALLY LONG LIFESPAN

- Patina on zinc creates protective layer helps mitigate against:
 - Changing weather conditions
 - Long-term corrosion
- When properly designed and installed:
 - A zinc roof will last approximately 75 years
 - A zinc wall will last in excess of 100 years

Photo by Martin Knowles



INFINITELY RECYCLABLE

- Architectural zinc is 100% recyclable
- Does not lose its chemical or physical properties
- In Europe, recycling rate for zinc is more than 90 percent

Photo by Oleg March



SUPPORTING GREEN BUILDING CRITERIA



- Architectural zinc can contribute to green building rating systems such as:
 - LEED
 - Green Globes
 - BREEAM
 - Cradle to Cradle

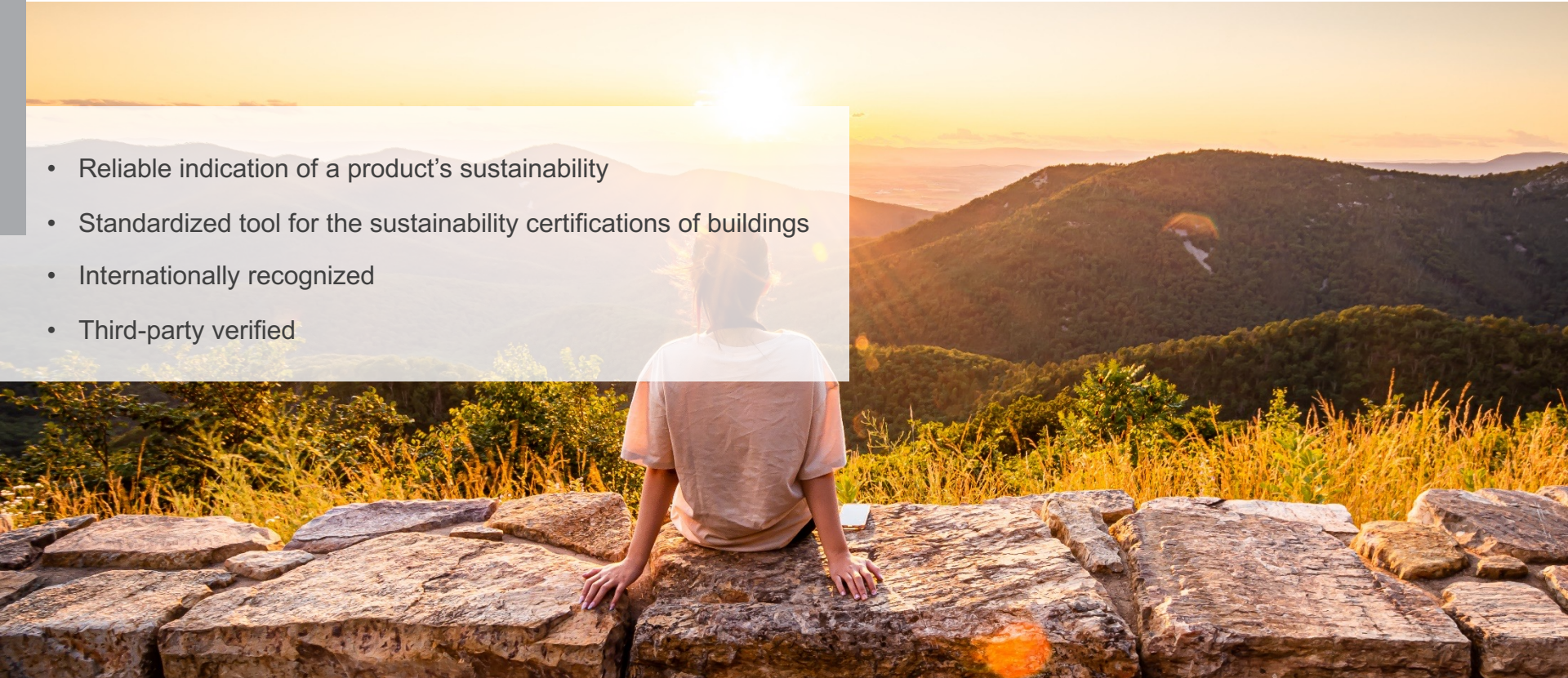
CRADLE TO CRADLE

Photo by John Cole

- Cradle to Cradle Products Innovation Institute
- Considers the entire lifecycle of a product or material
- Products assessed for reuse across five categories:
 - Material health
 - Material reuse
 - Renewal energy and carbon management
 - Water stewardship
 - Social fairness

ENVIRONMENTAL PRODUCT DECLARATION (EPD)

- Reliable indication of a product's sustainability
- Standardized tool for the sustainability certifications of buildings
- Internationally recognized
- Third-party verified



LEED CREDITS

- Architectural zinc products for:
 - Wall and façade systems
 - Roofing systems
 - Rainwater and drainage systems
- LEED BD+C credit categories include:
 - Materials and Resources (MR)
 - Water Efficiency (WE)
 - Sustainable Sites (SS)
- Other LEED programs





Section 6

NOTABLE CASE STUDIES


UNIVERSITY OF IOWA VISUAL ARTS BUILDING

© Mark Kempf Photography

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- The image shows the University of Iowa Visual Arts Building, a modern architectural structure designed by Steven Holl Architects. The building features a complex, multi-level design with prominent cantilevered sections and a facade clad in architectural zinc panels. Some panels are straight, while others are curved, particularly on the vegetative roof and large skylights. The building is set against a clear blue sky, and the interior lights are visible through the windows and skylights.
- LEED Gold certified
 - Walls clad in architectural zinc panels
 - Curved zinc panels used on vegetative roof and large skylights
 - Designed by Steven Holl Architects

ELEANOR BOATHOUSE, CHICAGO

© Tom Harris Photography, courtesy of Studio Gang

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- LEED Silver certified
 - Two-building boathouse reflects movement of rowing
 - Roofing: Pre-patina blue-grey zinc double-lock standing seam panels
 - Exterior walls: Flat-lock tiles in a diagonal installation
 - Designed by Studio Gang Architects

HARRIET TUBMAN UNDERGROUND RAILROAD VISITOR CENTER, MARYLAND



- LEED Silver certified
- Roofing and exterior walls: Pre-patina blue-grey zinc flat-lock tiles
- “The inherent quality (of the zinc) to dull and self-heal was important because it’s a direct parallel to the story. That’s what we were trying to interpret.”
— Chris Elcock, AIA, IIDA, LEED AP, GWWO Architects’ associate principal

Photo by Robert Creamer

CHRIST CHURCH CATHEDRAL, VANCOUVER



- 120-year-old building's original cedar shake roof most recently replaced with asbestos shingles
- Roofing renovation: Pre-patina blue-grey zinc panels with traditional batten seam profile
- “We wanted a durable material that would last forever. ...Plus, it looks contemporary, but is respectful of good Heritage practice.”
– Hugh Cochlin, Architect, AIBC, Principal at Proscenium Architecture + Interiors

Photos: Martin Knowles



Section 7

CONCLUSION

Thank You

This concludes the continuing education unit on **Historically Proven, Future Facing: Architectural Zinc for Walls and Roofing.**

Please take the quiz to receive your credits.

Thank you for your interest in RHEINZINK.

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