



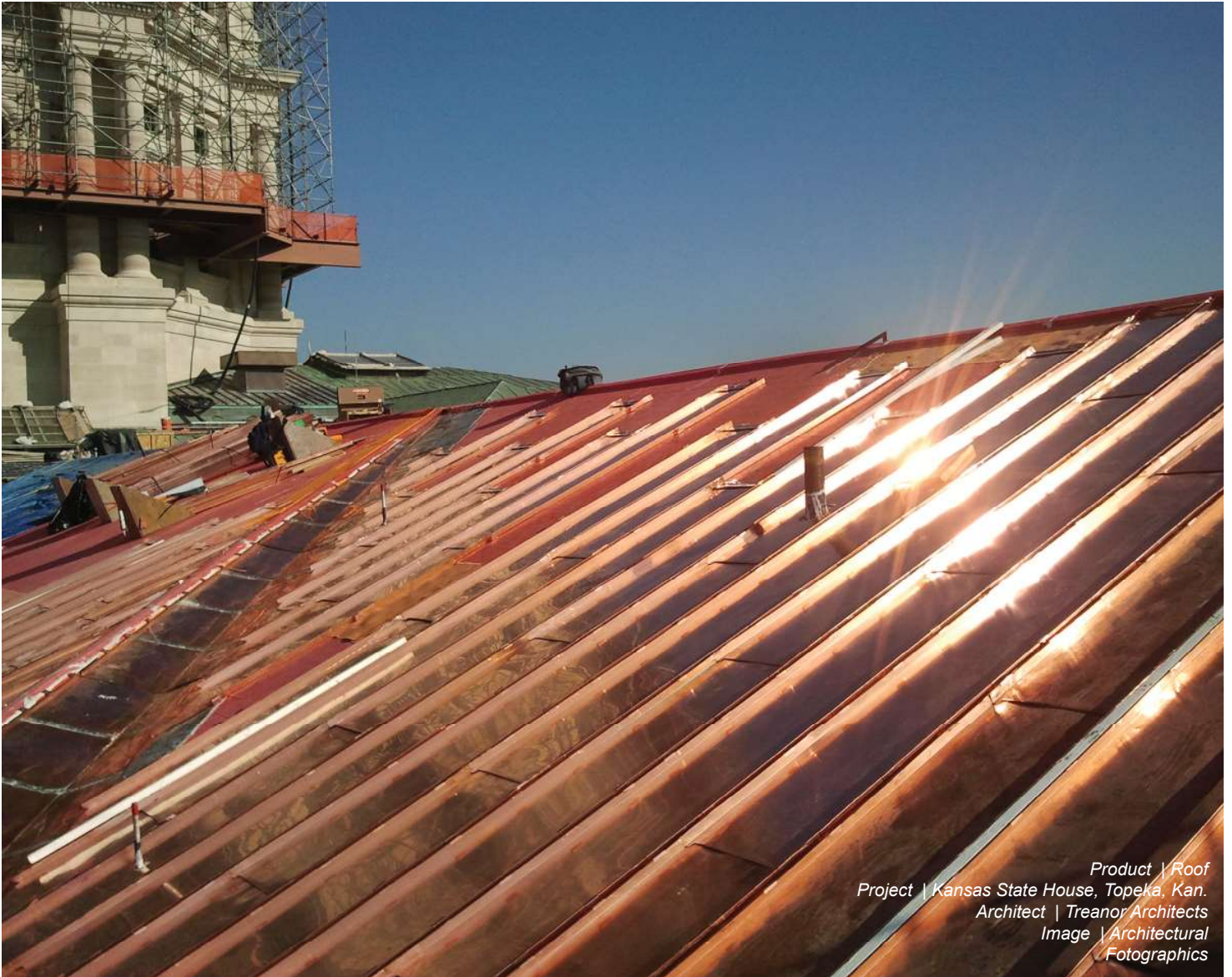
Achievements In Copper

Inspiration for Cladding, Roofs,
and Custom Fabrication



Copper Development
Association Inc.

Copper Alliance



Product | Roof
Project | Kansas State House, Topeka, Kan.
Architect | Treanor Architects
Image | Architectural
Fotographics

Copper: A Tradition of Proven Performance

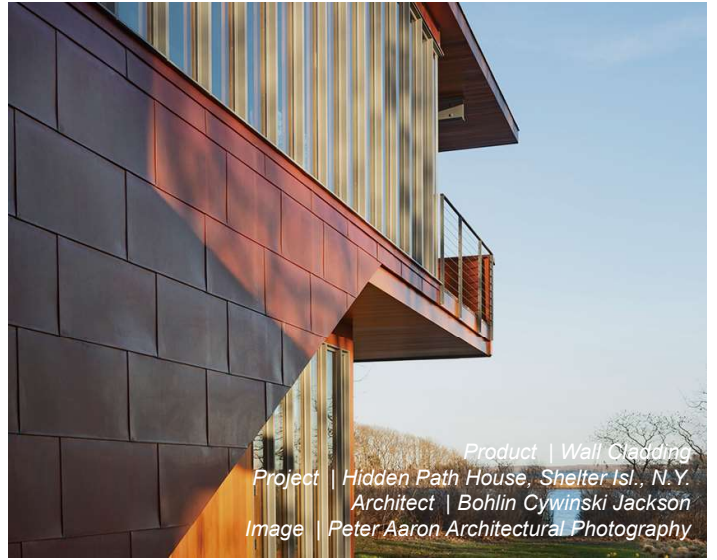
Key Architectural Characteristics

Architects and builders have long used copper to form beautiful roofs, walls, and other elements that last for centuries. These construction professionals are still finding new ways to take advantage of copper's strength and adaptability whether restoring historic buildings or creating innovative designs.

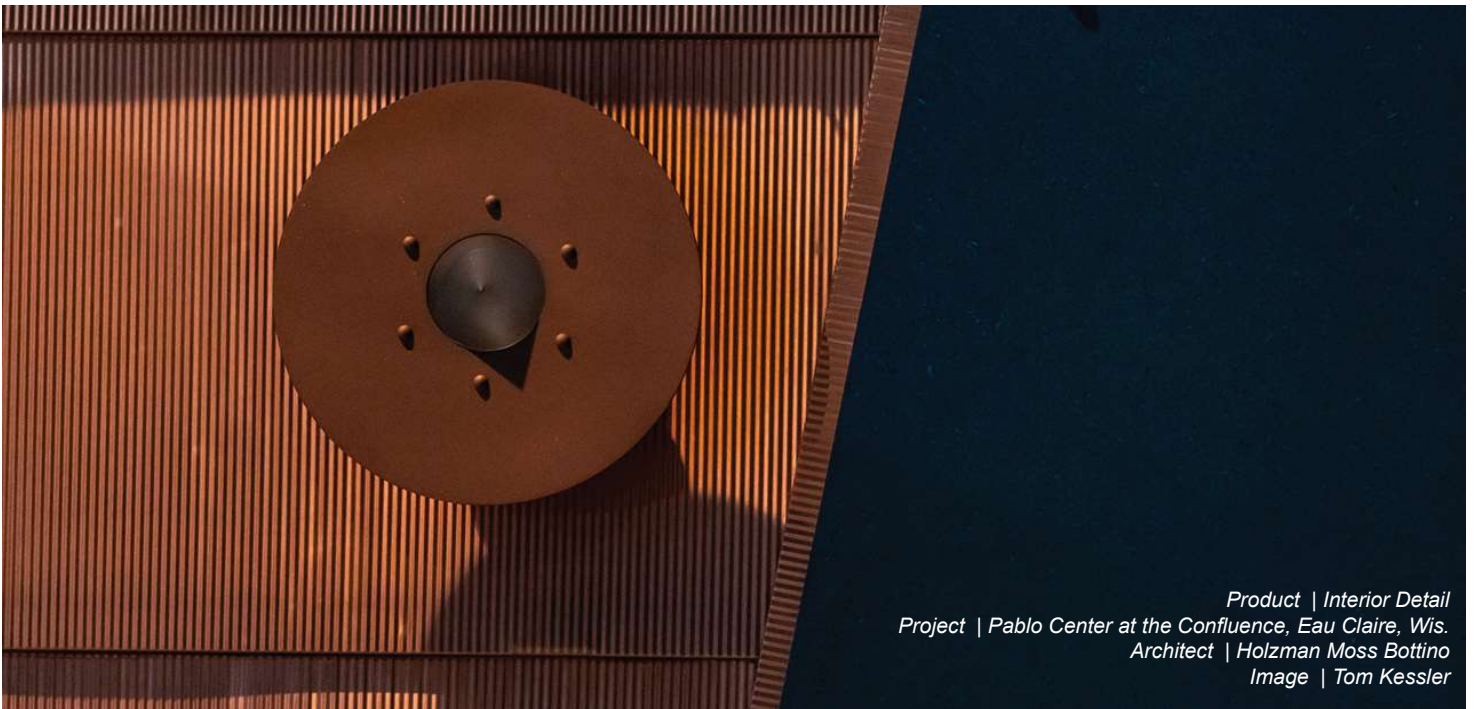
Beyond its aesthetic and historical appeal, copper remains one of the most high-performing materials in the industry, offering natural corrosion resistance, resilience and reparability. Copper also shines for its workability, with malleability and ductility that can form monolithic planes, soaring domes, challenging geometries, and intricate designs.



Product | Column Capital
Project | Filling Station, Buffalo, N.Y.
Architect | Frank Lloyd Wright



Product | Wall Cladding
Project | Hidden Path House, Shelter Isl., N.Y.
Architect | Bohlin Cywinski Jackson
Image | Peter Aaron Architectural Photography



Product | Interior Detail
Project | Pablo Center at the Confluence, Eau Claire, Wis.
Architect | Holzman Moss Bottino
Image | Tom Kessler



Product | Wall Cladding
Project | Biomedical Sciences Partnership Building, Phoenix, Ariz.
Architect | CO Architects
Image | Timmerman Photography



Product | Roof
Project | St. Andrew's Church, Vancouver, B.C.
Architect | Ryder Architecture
Image | Michael Sherman Photography

Wall Cladding



Overview

The compelling aesthetics and formability of copper, brass, and bronze make them favored materials for façade systems and wall cladding.

Copper and its alloys enable a wide range of innovative and historic designs for various building elements: from monolithic flat and curved surfaces to intricate designs and perforations. Its inherent strength, corrosion resistance, resilience, and reparability ensure copper-clad exteriors will perform for decades in a wide range of conditions.

Panelized and rainscreen façades may be custom prefabricated offsite to meet project requirements, selected from a range of manufactured systems, or field formed from sheet material at a building location.

Project: Pierre Peladeau Amphitheatre at CHUM, Montreal, Ont. Image by Adrien Williams.

Custom Engineered System

Pierre Peladeau Amphitheatre at CHUM

The Pierre Peladeau Amphitheatre opened in 2021. A signature element of the Centre Hospitalier de l'Université de Montréal (CHUM) megahospital, copper panels envelop the structure, blending opaque with semi-transparent perforated rainscreen panels to preserve the intimacy of the interiors while maintaining a connection with the surrounding environment.

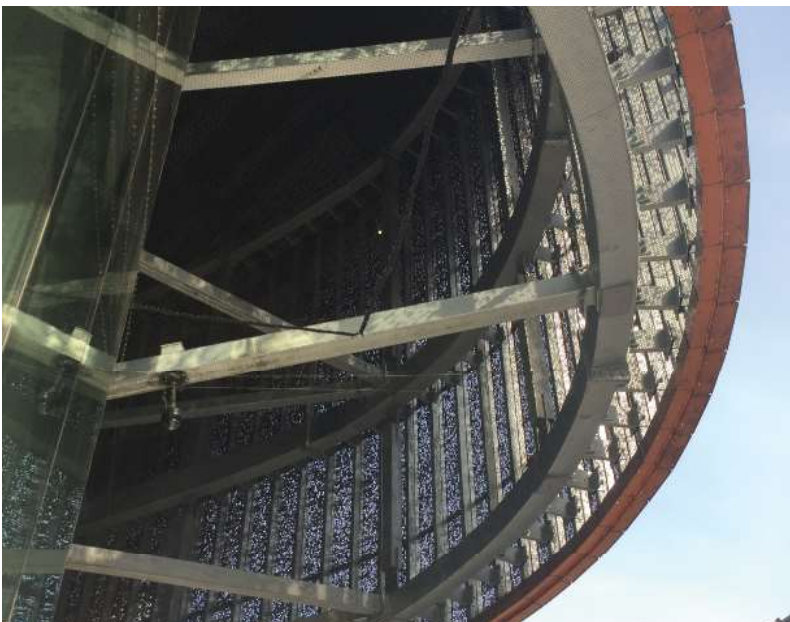
The system features 3,500 panels, each of which typically measures about 2 feet wide by 7 feet long (600 mm x 2200 mm). Panels mount to 2-3/4-inch (70 mm) stainless-steel members at each panel joint. A grid of 5-inch (~125 mm) Z bars spaced horizontally at about 48 inches (~1200 mm) supports the panels, which weigh only 45 to 80 pounds (20-37 kg) each.



Amphitheatre façade and soffits opposite.



View of hospital entrance from Rue St-Denis.



Support structure for cladding system.

Project Details

Product:

Solid and perforated copper panels

Architect:

Jodoin Lamarre Pratte architects

Menkes Shooner Dagenais LeTourneux Architects

CannonDesign and NEUF Architects

Fabricator/Installer:

Clermont Ltée

Top image by Adrien Williams.
Middle and bottom images by Nicolas Srepel.



Day and evening views of plaza façade. Image by Robert Benson Photography.



Detail of pre-patinated cladding panels. Image by Robert Umenhofer Photography.

Flat Seam Cladding

K-12 School, Holbrook, Mass.

The Boston suburb of Holbrook built a new facility to unify its preK-12 educational facilities. The building features copper panels along its entire front elevation, nearly half its exterior surface. The cladding includes over 11,500 interlocking panels formed of 18- to 24-ounce copper, which was pre-patinated to achieve the distinctive green-hued finish. Flat-seam systems are easy to form and adaptable to complex shapes, while making economical use of material. The school achieved LEED Gold status for its sustainable characteristics.

Architects: Flansburgh Architects

Contractor: Consigli Construction



School entrance. Image by Robert Benson Photography.



Product | Horizontal Flat Seam
Project | Dallas Holocaust and Human Rights Museum, Dallas, Texas
Architect | OMNIPLAN
Images | Jason O'Rear



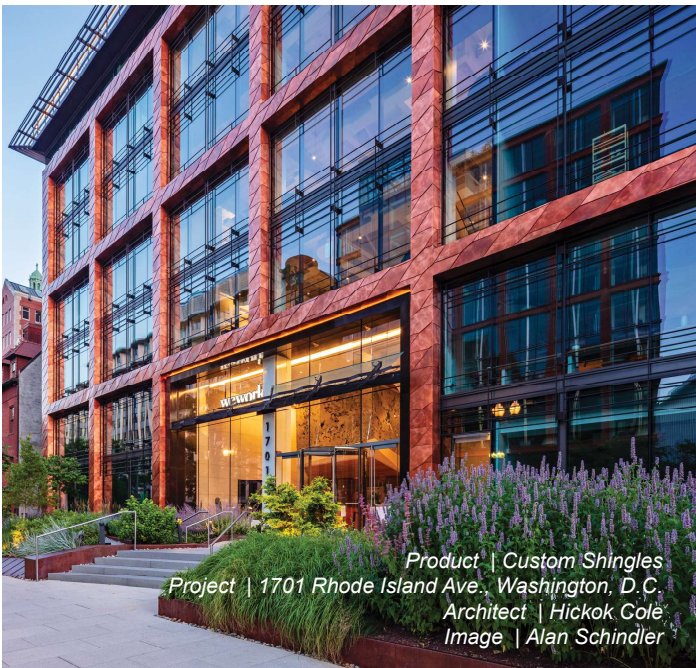
Project | Dallas Holocaust and Human Rights Museum



Project | Dallas Holocaust and Human Rights Museum



Product | Standing Seam Cladding
Project | Havergal College, Toronto, Ont.
Architect | Diamond Schmitt
Image | Tom Arban



Product | Custom Shingles
Project | 1701 Rhode Island Ave., Washington, D.C.
Architect | Hickok Cole
Image | Alan Schindler



Product | Flat Seam Cladding
Project | St. Joseph the Worker Day Chapel, Ogden, Utah
Architect | Sparano + Mooney
Image | Jeremy Bitterman and Scott Moses

Roofs



Overview

Copper's resilience and resistance to the elements epitomize an ideal roofing material. Properly designed and installed, a copper roof can last for centuries. Unlike many other metals, copper requires no painting or finishing and very little maintenance. Natural weathering creates a protective patina in response to environmental conditions.

Copper's formability makes it a strong choice for domes and vaulted forms. Malleability and formability offer advantages when adapting to challenging flashing conditions.

Common copper roofing systems include standing-, batten-, flat-, and horizontal-seam styles.

*Project: Lupton Hall, Farmingdale, N.Y.
Image by Marko Bistakis.*



81,000 square foot copper roofs.

Batten Seam Roof

Lupton Hall, Farmingdale, N.Y.

The Prairie School design of this landmark on the campus of Farmingdale State College includes a distinctive batten-seam style copper roof system. The original unventilated, uninsulated roof suffered from damage due to water and ice dams. Upgrading the structure required the team to address a complex geometry – including dormers, gutters, ridgetop, roof valleys and louvers – that posed challenges for fabrication and installation. The workability of copper facilitated architectural detailing, maintaining the roof’s architectural character while restoring its structural integrity.



Built-in gutter system.

Project Details

Product:
Batten seam roofing

Architect:
Hoffmann Architects + Engineers

Contractor:
Allcon, San Sebastian, B&B Sheet Metal

Images by Marko Bistakis



Prairie Style chevron dormer.



Courthouse cupola.



Detail of decorative roof element.



Detail of railing and roof.

Batten Seam Roof

Cascade Cty. Courthouse, Great Falls, Mont.

After 115 years of exposure in a tough environment, roofing on the Cascade County Courthouse needed replacement. The new batten-seam style roofing system combined authentic panels 42-inch (1,067 mm) length panels fabricated from heavy-duty 20-ounce copper. The lower section of the main roof and pocket areas feature both fully soldered flat seam 20-ounce copper roof panels and built-in copper water diverters to direct water flow to an internal drain system. For the tower dome, original panels were used as templates to form a complex array of flat-locked 20-ounce copper panels. Custom tooling helped form challenging ogee-shaped copper trim to re-clad areas of the dome's cylindrical base.

Architect: A&E Architects

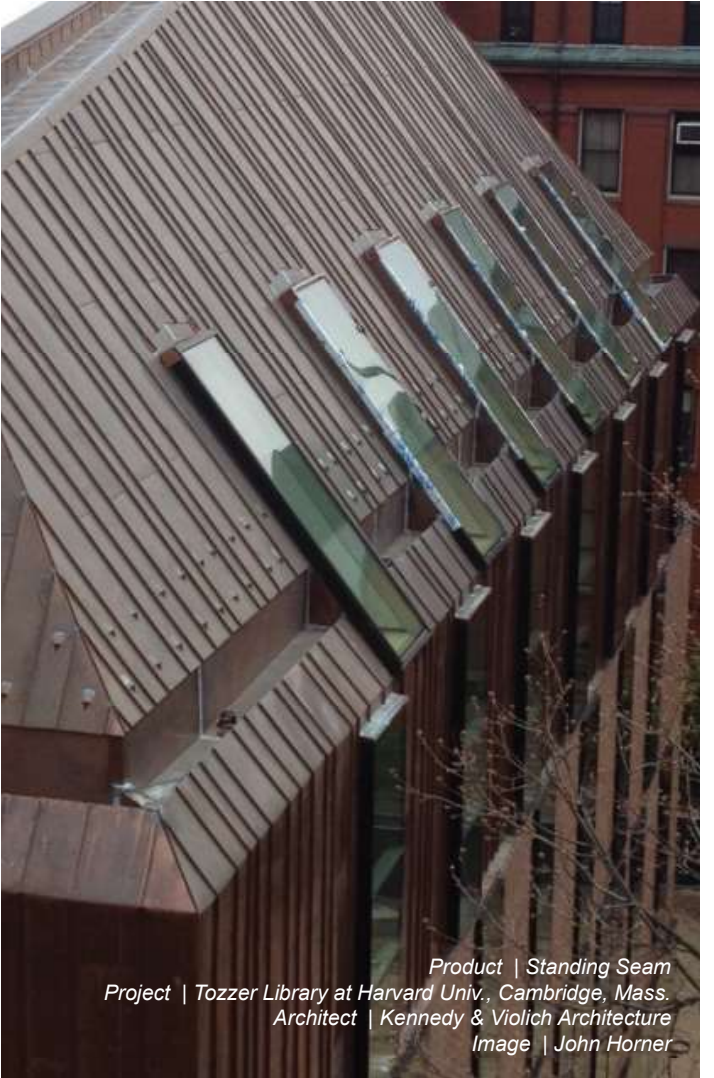
Images: Steve Wolff



Product | Standing Seam Roof
Project | Private Residence, Lookout Mtn., Tenn.
Architect | McLaughlin & Associates
Image | Philip Waites



Product | Flat Seam Shingles
Project | Private Residence, Holladay, Utah
Architect | Mark Christian Design
Image | David Daniels of Dav.d Photography



Product | Standing Seam
Project | Tozzer Library at Harvard Univ., Cambridge, Mass.
Architect | Kennedy & Violich Architecture
Image | John Horner

Custom Fabrication

Overview

For architectural detail, smooth curves and adaptability, few materials can match the extraordinary workability of copper.

Copper's natural resistance to the detrimental effects of humidity, temperature and other environmental conditions also ensure elements fabricated from this material will last decades, if not centuries. After all, many of humanity's oldest metal artifacts are made of copper.

Copper is a primary option for many decorative architectural elements, including cornices, plinths/pilasters, bas-reliefs, corbels, rosettes and many others.

*Project: Reserve Roastery, New York, N.Y.
Image by Tex Jernigan | ARKO.*



View of vessel and roaster.



Detail of copper vessel.

Project Details

Product:
Custom copper elements

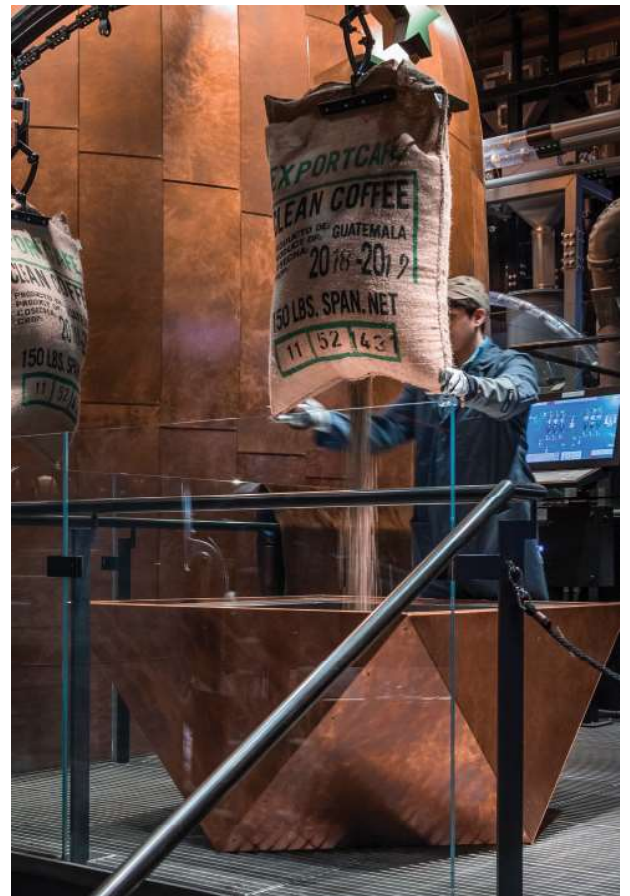
Contractor:
A. Zahner Company

Images by Tex Jernigan | ARKO

Reserve Roastery

New York, N.Y.

An international coffee retailer created a new flagship "Reserve Roastery" inside a Raphael Viñoly-designed building sited in the Meatpacking District of New York City. The interior showcases a 30-foot (9 m) copper-clad vessel called the Cask that sits as a centerpiece of the space. Meant to store coffee beans as they rest after roasting, this striking architectural element features curved copper panels that wrap its exterior. Collaborating with the client's designers, the fabrication team developed a series of custom patina options for the copper panels, including one with quinic acid, a substance that derives from coffee beans. The result incorporates a mechanical hammered finish to echo the artisanal nature of the beverages and food prepared at the store. Copper pipes and ornaments are also used in other areas of the interior, becoming a unifying design element that evokes the industrial history of the location.



Custom patinated panels in Dirty Penny finish.

Custom Copper-Alloy Panels

Senate of Canada, Ottawa, Ont.

The Senate of Canada upgraded and restored the former Union Train Station in Ottawa. The project transformed part of the station's soaring main waiting room into meeting spaces framed out by opposing walls of bronze wall panels. Measuring 45 feet (14 m) in length and 20 feet (6 m) in height, the panels illustrate the beauty and scale of Canadian landscapes with images of mountainous landscapes. The fabrication team created these images using half-tone images rendered with perforation that flows across the panels. They then employed a multi-step patination process to achieve the desired hue and sheen.

Architect: Diamond Schmitt

Fabricator: MCM 2001

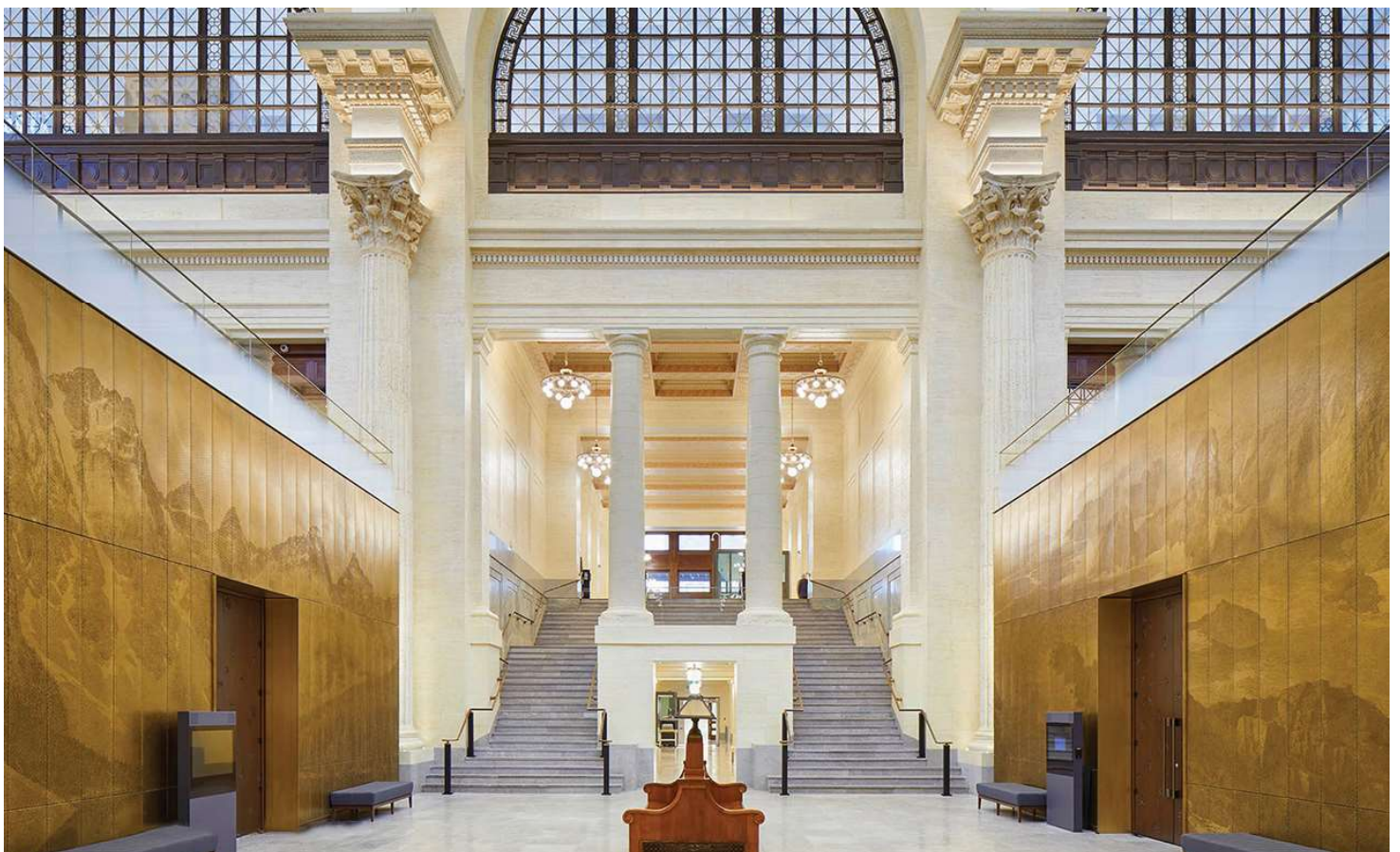
Images: Tom Arban



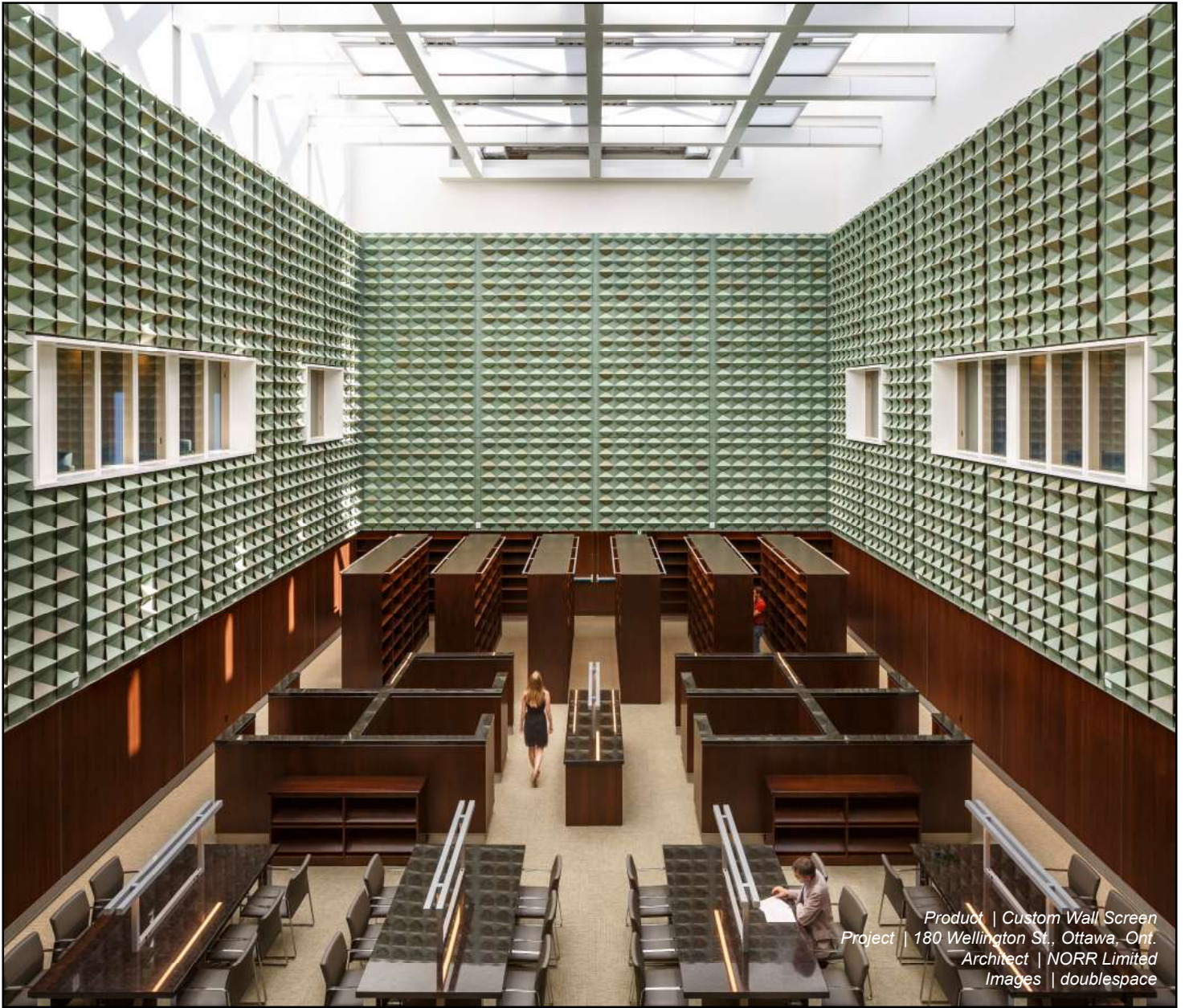
Detail of brass panels.



Custom-perforated design.



Panels in atrium.



Product | Custom Wall Screen
Project | 180 Wellington St., Ottawa, Ont.
Architect | NORR Limited
Images | doublespace



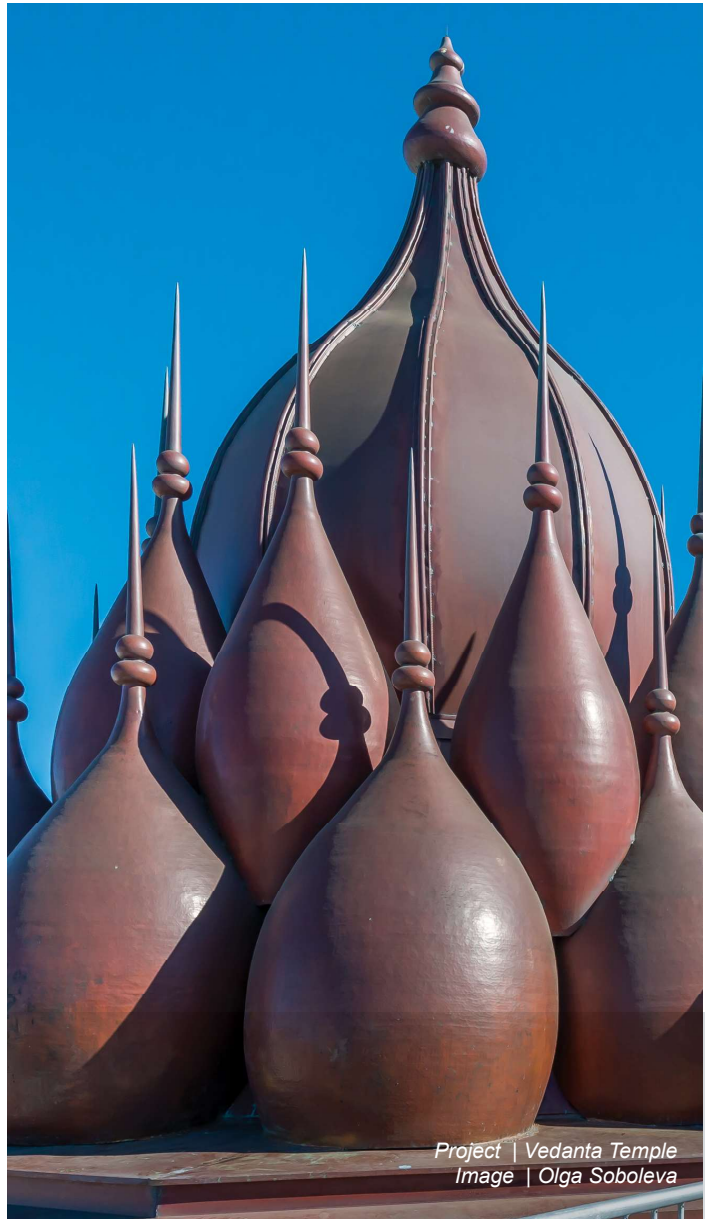
Project | 180 Wellington St.



Product | Hand-forged domes and ornamentation
Project | Vedanta Temple, San Marcos, Calif.
Contractor | Hans Liebscher Custom Copper Works and Sheet Metal
Image | Olga Soboleva



Product | Complex Architectural Detailing
Project | Steeple Square, Dubuque, Iowa
Architect | Jeffrey Morton
Image | Durable Restoration

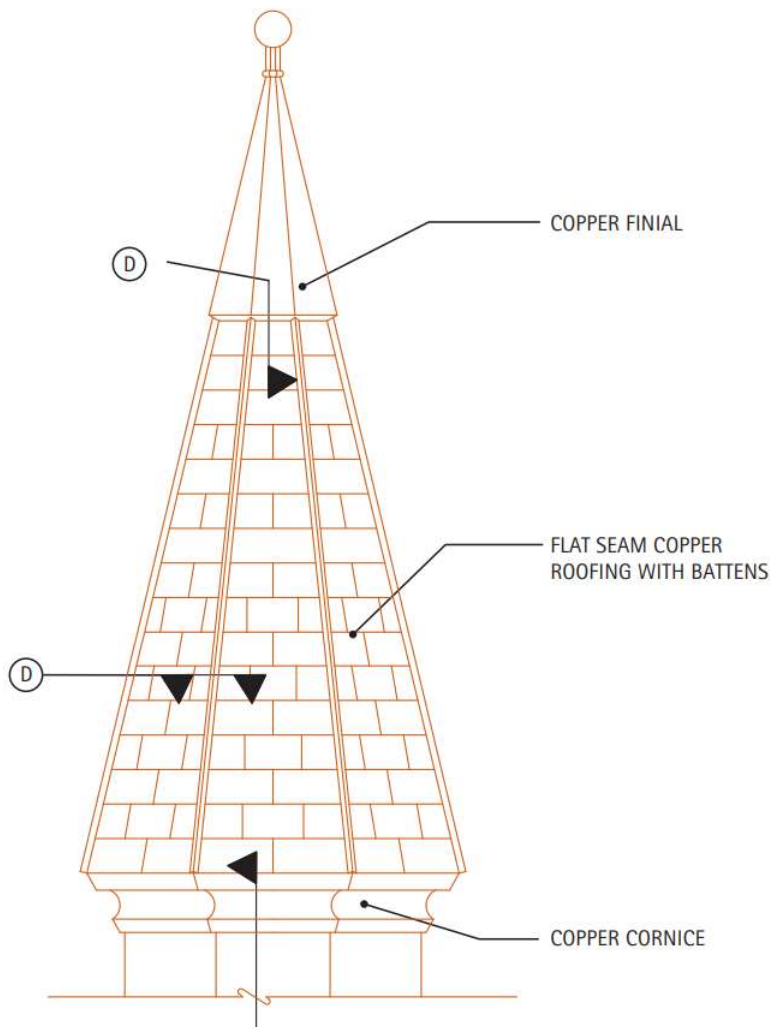
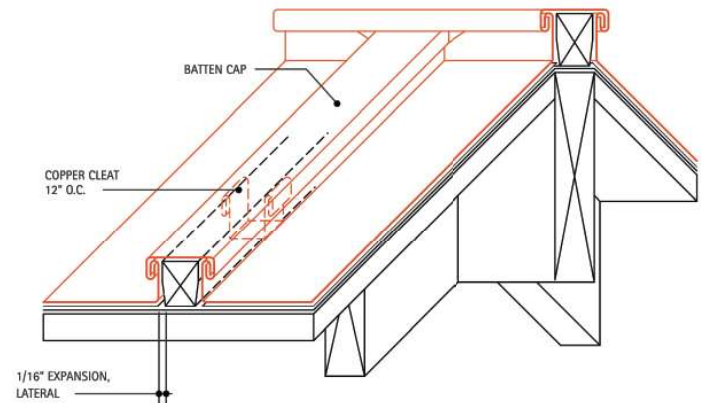
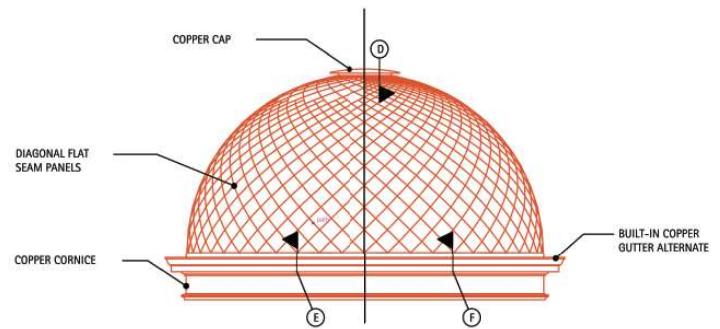


Project | Vedanta Temple
Image | Olga Soboleva

Resources for Architects, Engineers, and Contractors

The Copper Development Association maintains an extensive library of technical resources supporting the selection and use of copper, brass and bronze in construction.

CDA technical experts can assist designers, specifiers, and installers with questions related to detailing or installing architectural copper systems. Offering document review sessions and individualized technical consultation, this service assists design and building teams in creating high-performing and long-lasting installations of copper and copper alloys.



Key Resources Include

- Characteristics of copper alloys
- Finish designation system
- Basic seam joinery and thermal expansion considerations
- Roof system drawings and details
- Flashings, copings, gutters and downspouts
- Wall cladding systems and related detailing
- Approaches for domes, spires and vaults
- Roof and wall system performance testing
- Extensive library of award-winning projects with examples of both common and exotic copper and copper-alloy architectural applications
- Maintenance and repair

NACIA Awards

The North American Copper in Architecture Awards (NACIA) program celebrates outstanding use of copper and copper alloys in architectural applications. Since 2008, the NACIA program has recognized projects that highlight craftsmanship, attention to detail and architectural vision. Judges select projects in three different categories:

- New Construction
- Renovation/Restoration
- Custom-Fabricated Ornamental Applications



North American
Copper in Architecture Awards™

Cu Copper Development
Association Inc.
Copper Awards

Learn more at copper.org



Image | Tom Arban



Image | C & L Popjan

About CDA

Copper Development Association Inc. (CDA) is a U.S.-based, not-for-profit association of the global copper industry, bringing together the North American copper and copper alloy semis fabricators and global copper mining and production industries. CDA is committed to promoting the proper use of copper materials in sustainable, efficient applications for business, industry, and the home.

More information at www.copper.org

