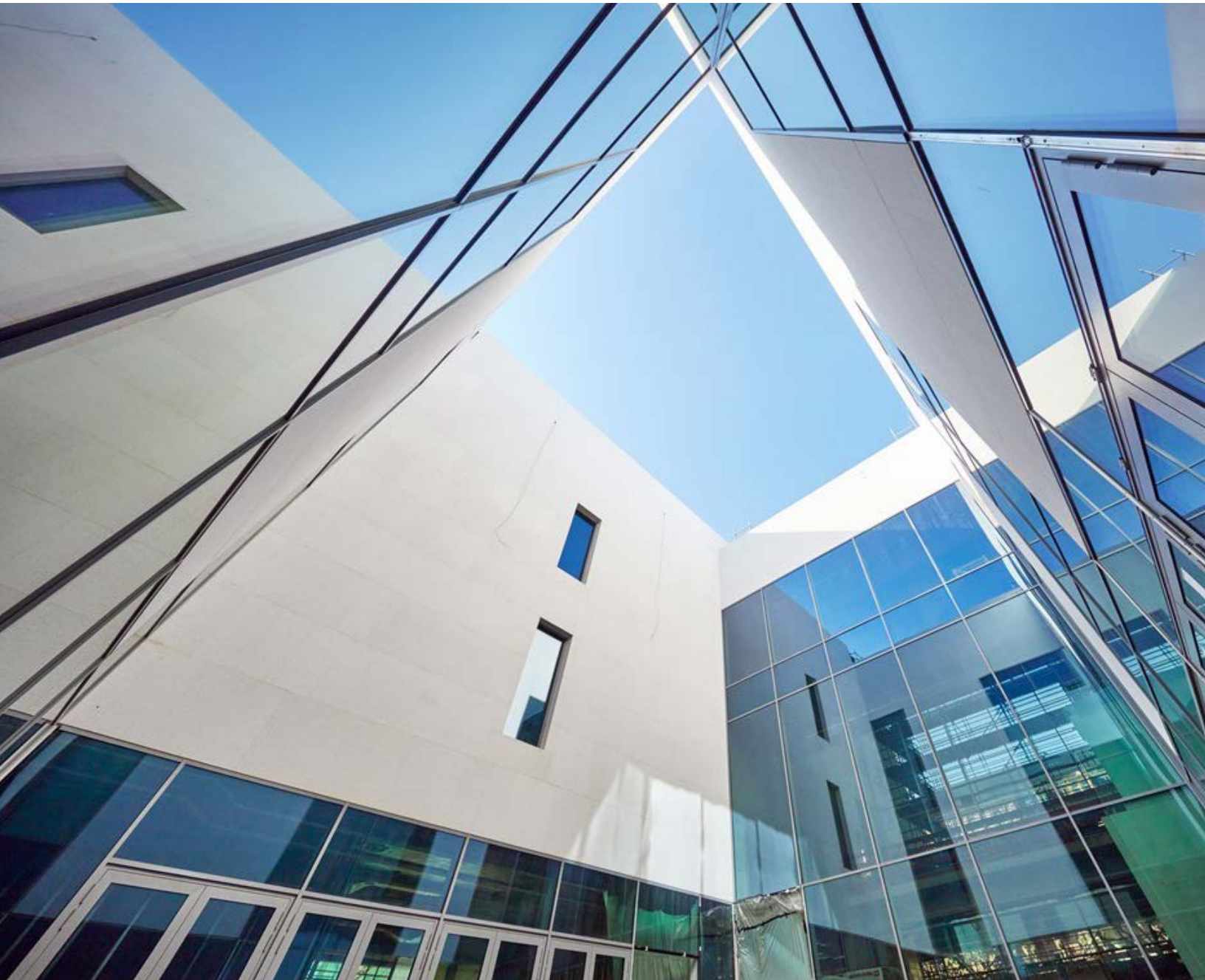
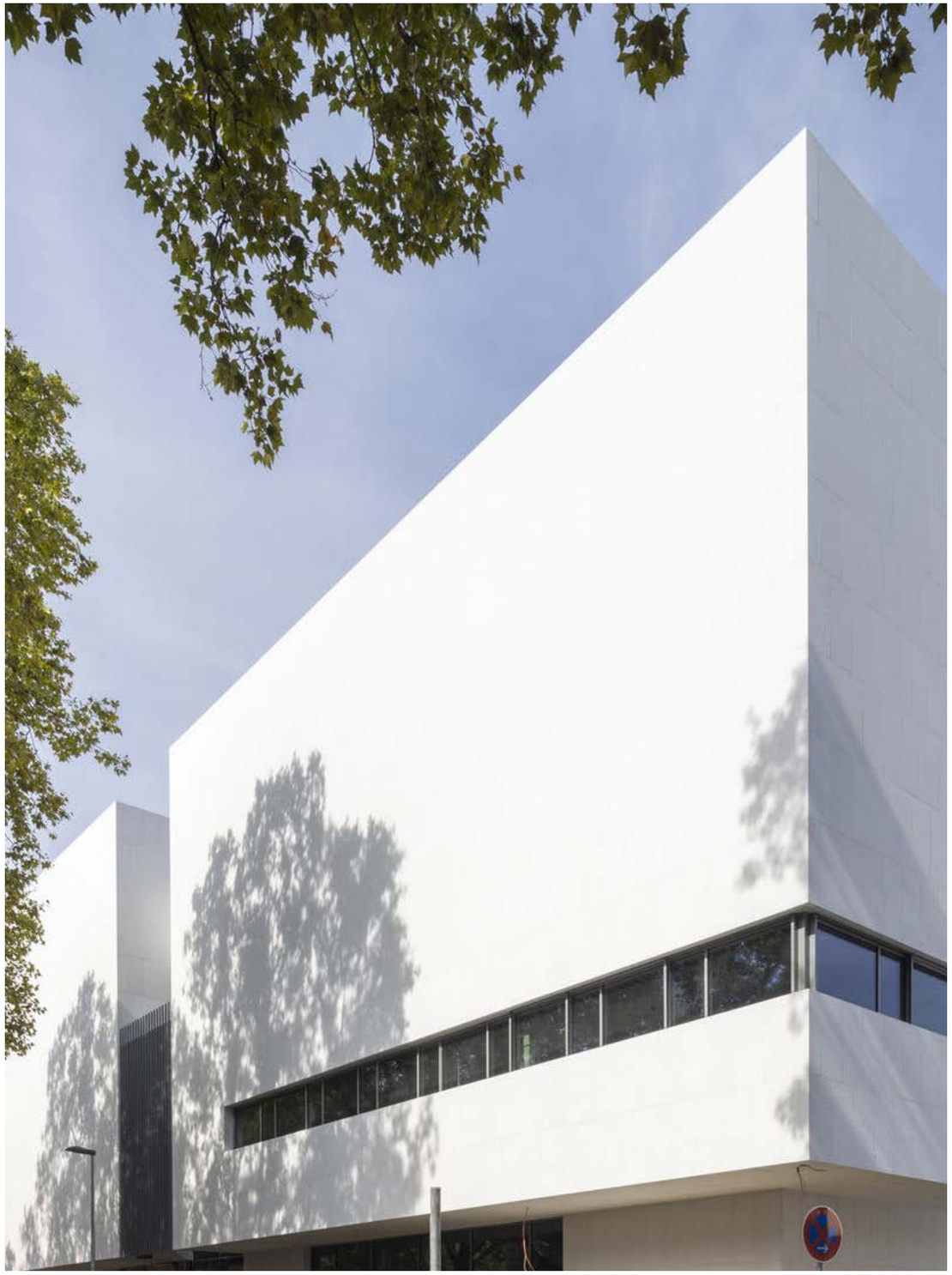
Case Study

POLYCOR
NATURAL STONE

MAKING A MASTERPIECE: THE MUSEUM REINHARD ERNST

COMMERCIAL CASE STUDY OF MUSEUM REINHARD ERNST IN WIESBADEN, GERMANY





Architect: Maki and Associates WEBSITE

Construction Firm: Hofmann Stone WEBSITE

Material source: Quarry in Bethel, Vermont, United States

Material: Polycor Bethel White® Granite, Bush Hammered finish

Applications: Facade panels

Facade Size: 6,000 square meters

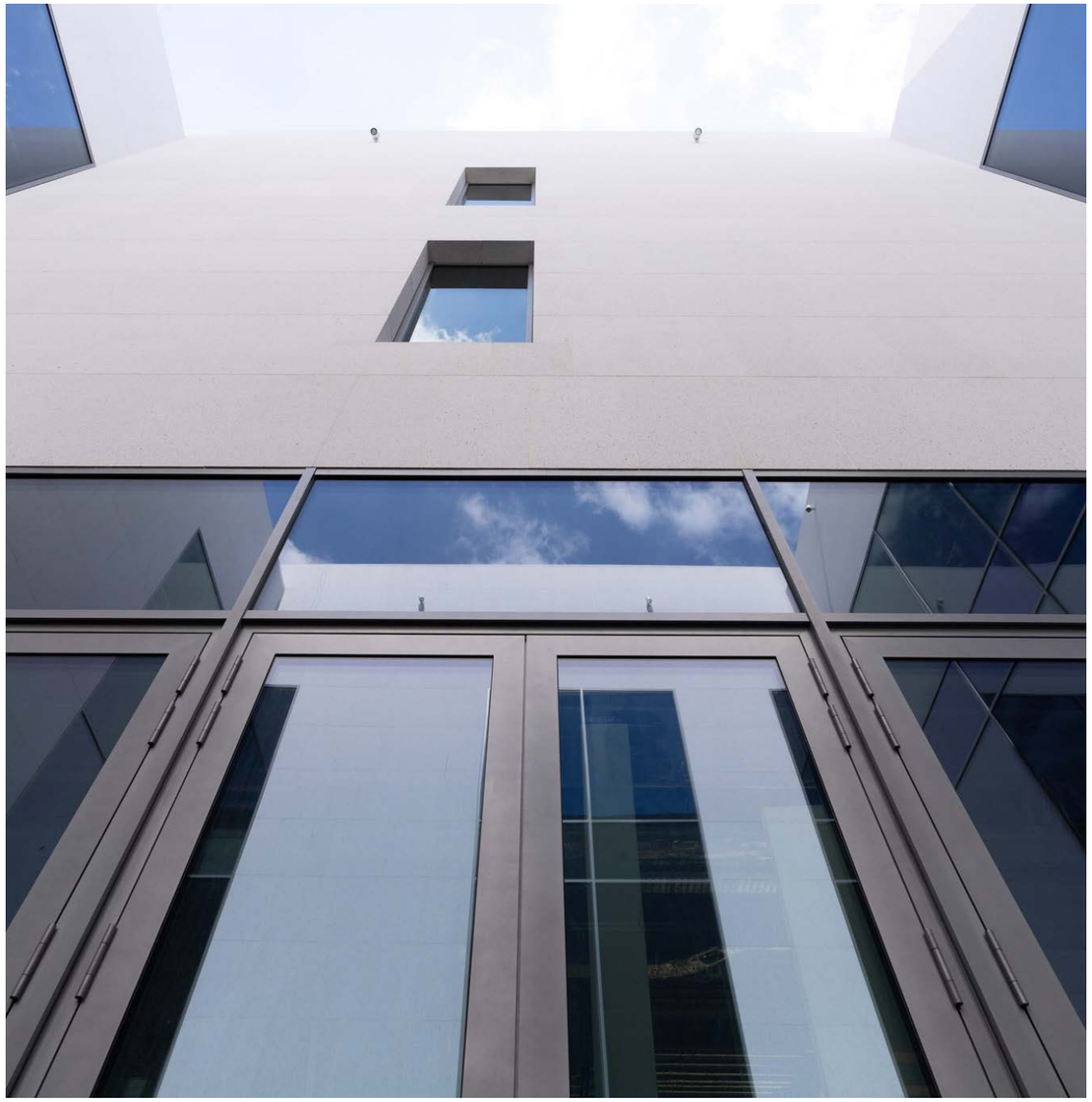
THE PROJECT

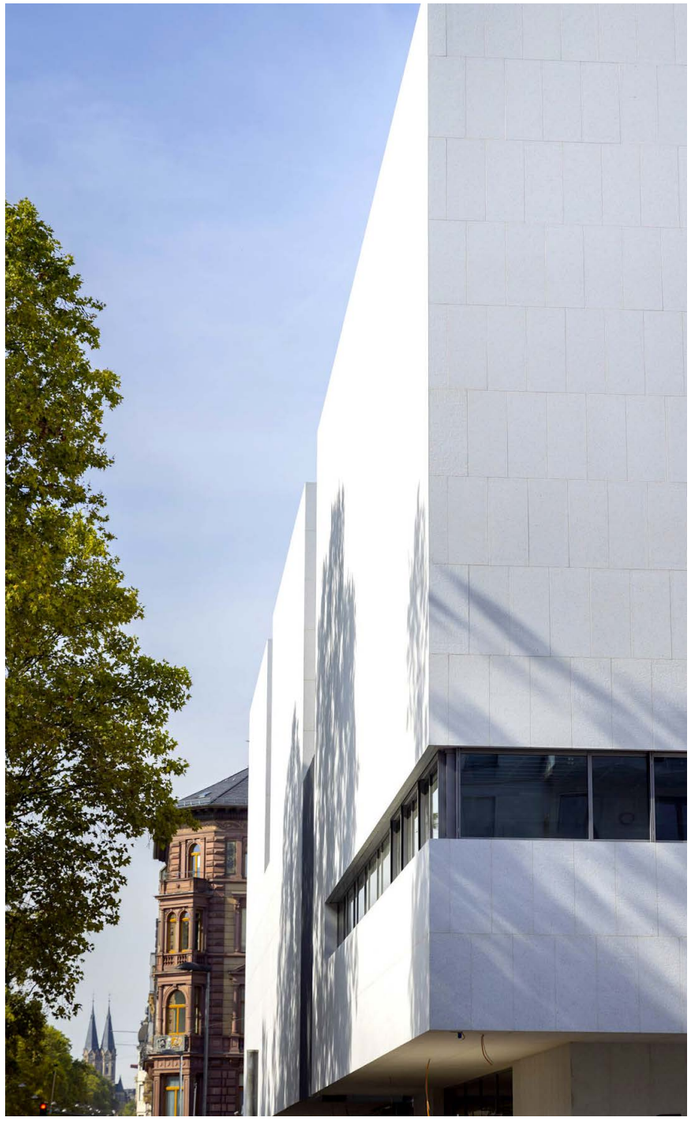
Museum Reinhard Ernst, set to open in 2024, is an architectural marvel designed to house entrepreneur Reinhard Ernst's vast collection of over 860 abstract artworks.

Ernst's vision was clear: to amaze without instilling undue reverence.

THE CHALLENGE

To envision a modern art sanctuary reflecting both the artistic passion of Reinhard Ernst and the intricacies of abstract art.





Resulting from a collaboration that began in 2010 between Reinhard Ernst and renowned Japanese architect Fumihiko Maki, this 8,910 square meter facility showcases a spectacular 6,000 square meter façade crafted from Bethel White® granite.

Quarried in Vermont, U.S., the unique coarse finish of the granite, combined with quartz sand-coated joints, allows the façade to glitter brilliantly in sunlight. Beyond being a visual masterpiece, this structure stands as a testament to their vision: to amaze without instilling undue reverence.

> **It has already been given its nickname by the citizens of the city. They affectionately call the museum the sugar cube.**
>
> **OLIVER KORNOFF**
>
> Founding director of Museum Reinhard Ernst

THE MATERIALS

The façade of a building is more than just a protective shell; it's the face it presents to the world. Every detail, from the materials chosen to the way they're processed and assembled, plays a pivotal role in the building's overall aesthetic and functional value. The 6,000 square meter façade of the Museum Reinhard Ernst project underscores this by marrying meticulous design considerations with craftsmanship of the highest order.

From an architectural perspective, Wiesbaden is a city of stone. Which is why it seemed inappropriate to us to cover the museum in metal or wood. At the same time, we didn't want to use beige or brown stone, but instead convey its own unique character. In consultation with Reinhard Ernst, we therefore selected a very special, brilliant white granite from the United States for the facade.

MICHEL VAN ACKERE

Project manager for the Reinhard Ernst Museum at the architecture firm of Maki and Associates

THE STONE

From the outset, granite stood out as the prime choice for Reinhard Ernst and his architectural team. A core reason underpinning this selection was its unparalleled resilience and durability. While marble, such as the renowned Carrara marble, has been the preferred pick for countless architects, its susceptibility to wear limits its longevity, especially when considering the facades of external structures. When exposed to large temperature variations, Carrara marble suffers from thermal hysteresis, transforming a flat facade piece into a dish-like shape. Over time the marble panels dish outward in a convex manner, resulting in a significant degradation of material strength and becoming significantly weaker in flexural strength. In stark contrast, granite stands strong against time and elements, ensuring that structures retain their majestic appearance for generations.

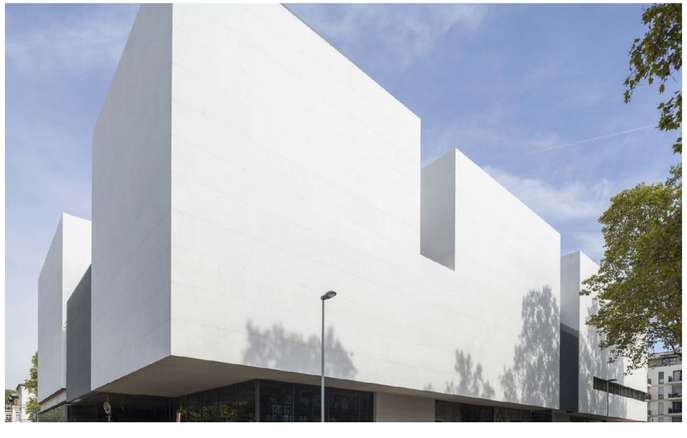
When examined closely, the nuanced differences between granite and marble become evident. Granite exhibits an intricate interlocking crystalline structure, while marble portrays a milkier composition, typically accompanied by more veining. Bethel White® in particular, displays minute taupe grains upon close inspection. However, when viewed from afar, this granite radiates a pure white hue, seamlessly merging the grains and presenting a monolithic appearance.

In terms of both color and structural integrity, Bethel White® is unparalleled. Its durability ensures it remains impervious to typical environmental challenges such as ice, salt, and the freeze/thaw cycles, ensuring longevity even in harsh conditions. This granite's consistency and resilience made it the preferred choice for mammoth projects, such as the Abu Dhabi National Oil Company's facade, which demanded 3,500 cubic meters of this granite over four years.

BETHEL WHITE® GRANITE

Granite was our favorite from the beginning.

REINHARD ERNST



Lastly, Michel van Ackere from Maki and Associates emphasized the integration of historical aesthetics into the project. Bethel White® granite not only mirrors the hue and essence of the lime sandstone of neighboring buildings but also promises enhanced durability, striking a harmonious balance between historic reverence and modern architectural innovation.

WHY BETHEL WHITE®?

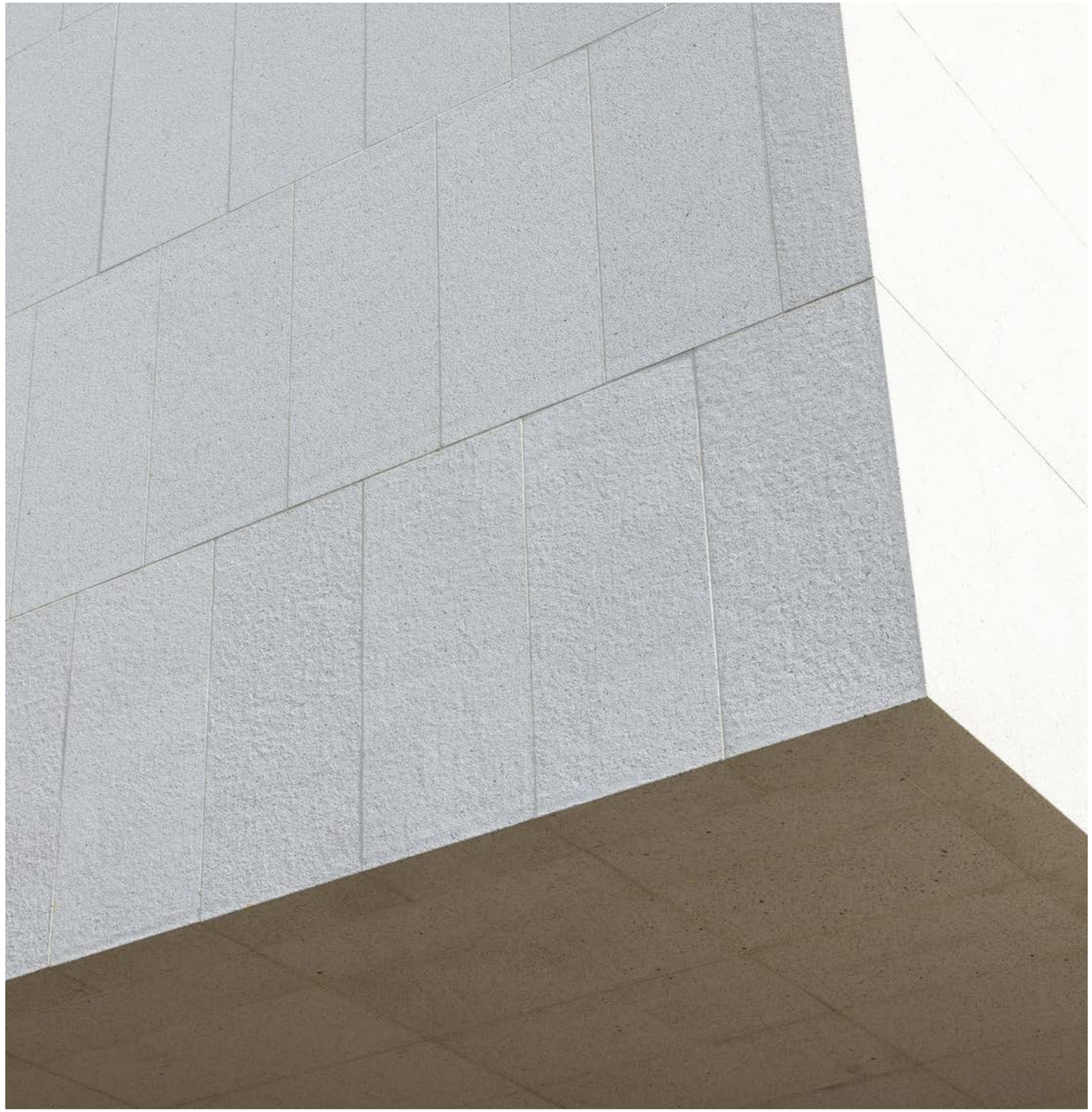
Among the plethora of granites available worldwide, the selection boiled down to just two options that met the desired brightness criterion: Brazilian granite and Bethel White® from Bethel, Vermont. Eventually, the allure of Bethel White®'s distinctive luminosity in sunlight and its slightly brighter hue made it the chosen material, rendering it more visually captivating than its Brazilian counterpart.

Bethel White® granite, excavated from the quarries of Bethel, Vermont, boasts the unmatched ability to retain its pristine white color, irrespective of weathering. Unlike other granites that darken due to high iron content oxidation, Bethel White® remains resolutely unblemished.

White granite was difficult because, in the end, we only found two granites that met our requirements for brightness.

Bethel White® is a little brighter still and looks far more beautiful in the light.

REINHARD ERNST
Project manager for the Reinhard Ernst Museum at the architecture firm of Maki and Associates



The choice of Bethel White® granite for the Museum Reinhard Ernst project not only delivered an aesthetic marvel but also met sustainable quarrying practices. The Bethel White® granite quarry's certification under the ANSI/NSI 373 standards is a testament to Polycor's adherence to responsible use of natural resources, fair labor practices, and meaningful social initiatives. This certification provides architects and builders with the confidence that their selected stone has been produced in an environmentally conscious and socially responsible manner. Polycor's achievement of NSI-373 certifications for the Bethel White® granite quarries is a nod to their commitment towards a greener, more sustainable future.

Granite, as a facade material, not only brings durability and aesthetic brilliance but also has a sustainable edge over many other materials. The sustainability of granite, as illustrated in this project, goes beyond its long lifespan as indicated by its lifecycle analysis. As Johannes Georg Hofmann of Hofmann Stone highlighted, nature gifted this stone 400 million years ago, and it requires minimal energy for transport and processing, especially when compared to other facade materials. This significantly reduces its environmental footprint.

SOURCING THE STONE

The journey of the Bethel White® granite, from its extraction to its final installation, is a meticulous process marked by precision and dedication. A significant instance of this was when geologists from the Hofmann company meticulously selected 49 blocks, amounting to 320 cubic meters of granite weighing over 1,000 tons, a whole year and a half prior to the stones' scheduled installation.

Following its transcontinental voyage, the granite arrives at Werbach Gamburg. Here, the massive blocks are expertly processed into facade slabs, primed for installation. When these slabs finally reach their destination, they require at least two stone setters to ensure their accurate placement on the facade. In this intricate process, precision invariably trumps speed. Each slab, each cut, and each position is a testament to a journey that spans millions of years in formation, yet just a few months from quarry to finished facade installation.

We were able to look at the slabs on site and then also decided there how we would process the surface. For example, that we don't sand the surface as usual, but rather bushhammer it. That means it will be slightly roughened. This makes it even brighter in the sun and less sensitive to dust and dirt.

REINHARD ERNST

From the port in the U.S., it takes five weeks to get to us at the production plants, and it is delivered by ship and by barge. The close location to the ports the USA is also ideal, because the CO2 footprint is much lower with ship transport than with truck transport. Someone can say, nature gave us this stone 400 million years ago. We only have to use energy for transport and formatting and that is very low.So even if you take that in, America-transport distance, that still does better than brick, than other common facade materials.

JOHANNES GEORGE HOFMAN

Hofman Stone Company

SUSTAINABILITY

Michel van Ackere from Maki and Associates provided a unique perspective on the sustainability aspects of the project. While Germany's strict building codes already emphasize sustainability, further measures were integrated into the museum's design to enhance its eco-friendly stance. Key sustainable features include:

NATURAL LIGHTING

By maximizing the amount of natural light entering the museum, there's a reduced need for artificial lighting, saving energy.

SOLAR PANELS

The museum's roof is equipped with solar panels, tapping into renewable energy and further minimizing its carbon footprint.

HOT SPRING WATER HEATING

An innovative approach to heating, this reduces the dependency on traditional energy sources.

GREEN INITIATIVES

Both roof greening and planting greenery around the building not only beautify the space but also contribute to local biodiversity.

NATURAL MATERIALS

The extensive use of natural materials, such as the Bethel White® granite, underscores the museum's commitment to sustainability.

Furthermore, van Ackere emphasizes the social component of sustainability. The architectural excellence, coupled with high-quality materials, ensures that the building establishes a long-lasting bond with its community, encouraging care and maintenance for years to come.

The process of quarrying natural stone produces high yields and little excess material because the stone is close to the surface. This differs from the mining of metals and ore, where large amounts of earth must be removed to extract very little quantities. Also, underground quarrying, which has been perfected for generations, reduces land use and is a practice that Polycor continues to implement at several quarries. In addition, few consumables are needed to extract natural stone. In contrast with other building materials, Polycor specifically focuses on sourcing the highest grades of natural stone so that a white granite like Bethel White®, for instance, doesn't require dyes or chemical alteration to achieve its bright color.

Manufacturing natural stone is so simple that it can be summarized by a single action - cutting. Cutting a larger piece of stone into smaller pieces is what produces the finished product. The beauty of natural stone products lies in the mineral structure that geologic forces created so there are no chemicals mixed with the finished products. Therefore, they are inherently a non-emitting source of VOCs. Recycling water is recirculated several times throughout the manufacturing process and is essential for achieving the ANSI-373 Standard certification. There is a large variety of sizes and finishes that can be produced from natural stone. Design teams can help reduce additional levels of energy consumption by specifying low embodied carbon finishes such as bush hammered and waterjet for the stone. Implementing 3D software to lay out designs onto available stone blocks helps utilize the most stone and reduces waste throughout the transformation process. Embracing the natural variation and character in the stone also allows for more usable material in the end as well.

The natural stone products, as well as excess process materials resulting from the extraction and transformation phases, can all be reused or recycled into aggregate for roads, landscaping products, and even furniture at the end of their usage. In short, natural stone can be reused and recycled or upcycled multiple times during its lifecycle. Nevertheless, even if natural stone ends up in a landfill, there will be no toxic chemicals seeping into the earth as the material degrades. It simply returns to the earth, cradle to grave.

As the largest quarrier in the world, Polycor is committed to becoming carbon neutral by 2025.

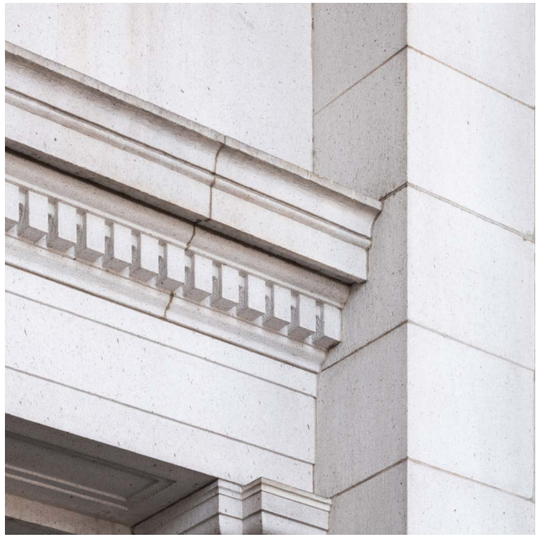
OTHER FACADE PROJECTS FEATURING BETHEL WHITE® GRANITE

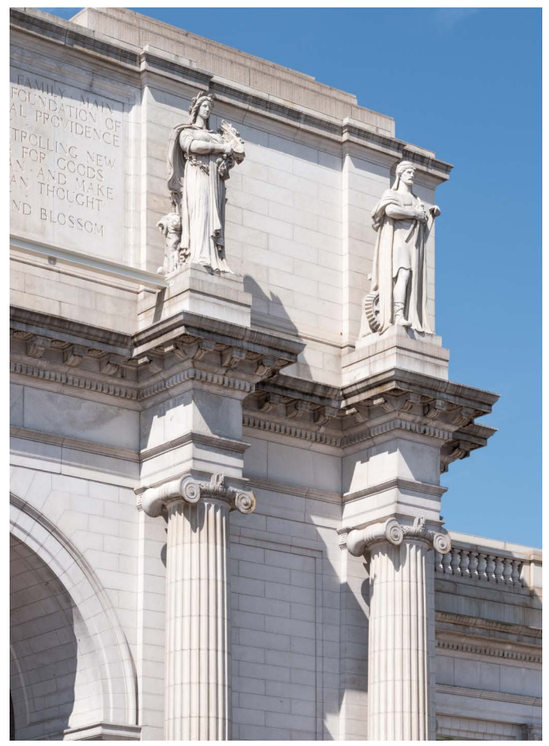
UNION STATION

Washington, D.C.

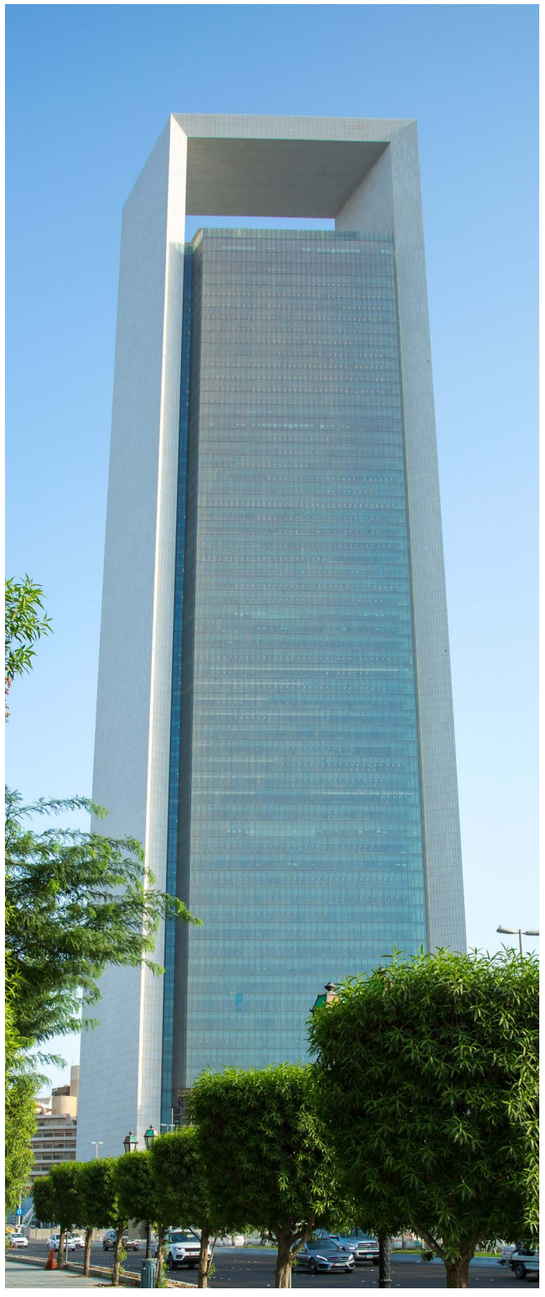
If you are leaving Washington, D.C. you might be doing so via Union Station, the capital's impressive train station. Originally opened in 1908 after a three year building project, the Beaux-Arts design, with grand statues, majestic arches, dramatic staircases, and a lovely plaza was truly remarkable. It was also built with Bethel White® granite and still stands as one of the most famous uses of the stone for a railway infrastructure project.

At the outset of the building project European stone masters were brought in. One of them carved a small statue of a young woman with flowing hair tumbling over her shoulders, wearing a rippling garment and flowers cradled in her arms. The statue was carved to prove that granite could hold the edges required to make the fine detail needed in the huge tableaux. Not only did it prove its worth at the time, but it continues to do so up to this day having lost no detail over a century later.





OTHER FACADE PROJECTS FEATURING BETHEL WHITE® GRANITE [continued]

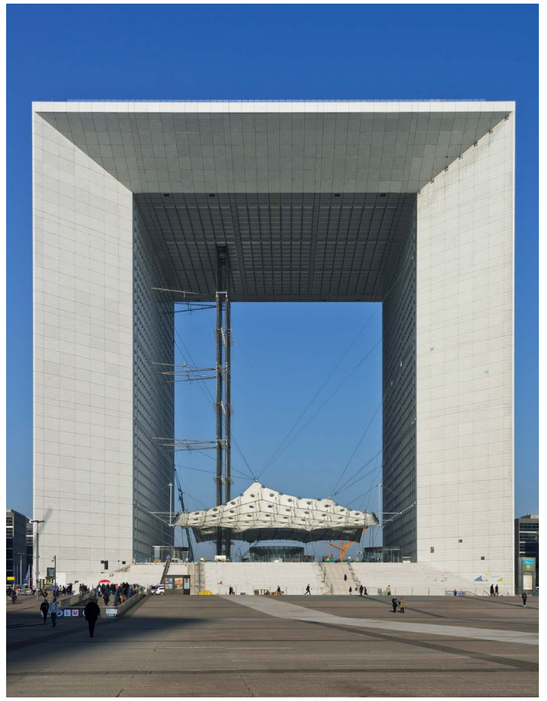


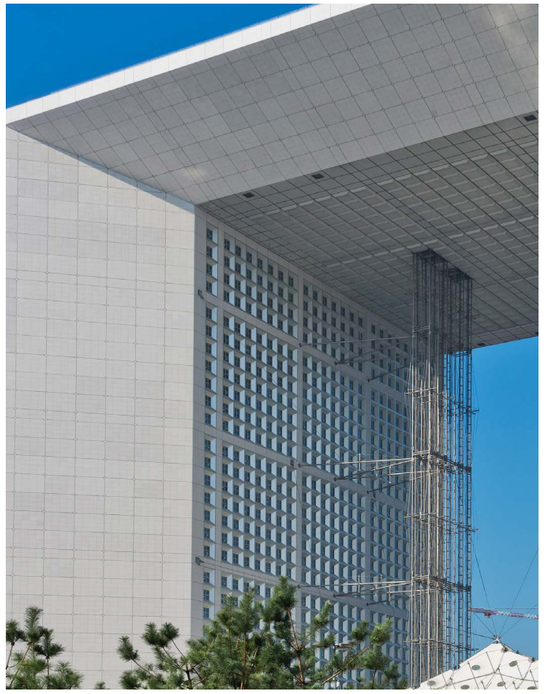
ADNOC BUILDING

Abu Dhabi, United Arab Emirates

A true white color and purity of appearance were key to selecting Bethel White® granite for the facade of the Abu Dhabi National Oil Company (ADNOC). So was the quarry's ability to supply the large quantities of granite required over the course of three years while maintaining consistency during the project. As the second tallest building in Abu Dhabi, the 342 meter tall tower has 74 floors and overlooks the Arabian Gulf. The scale of the project required 3,500 cubic meters of quarried stone, or approximately 1,000 granite blocks, for the massive facade. It is the highest building in the world with a granite-clad exterior facade. Due in part to the inclusion of the certified sustainable granite, the project earned LEED Gold certification.

While white granite was originally specified by HOK, it wasn't until the in-person site visit at the quarry in Bethel, Vermont with the architect, stone consultant, and senior management from the ADNOC team that Bethel White® was finally awarded the spec. The client was searching for the high-end purity of the Bethel White® and was very particular about the quality, requiring very minimal inclusions and no movement in the stone. Polycor's quarry teams were very careful to ensure that all of the blocks came from the same general area of the quarry to preserve a consistent color match throughout the facade panels.





GRANDE ARCHE DE LA DÉFENSE

Paris, France

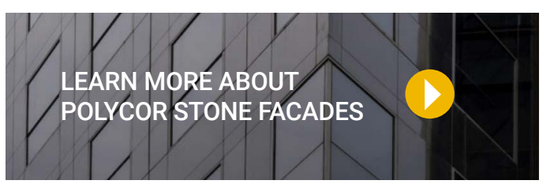
The coolly minimalist Grande Arche de la Défense was designed by Danish architect Johan Otto von Spreckelen. Appearing like a giant door frame that opens on to the world, it is indeed impressive—and expansive. It's a granite and glass 110 meter (361 ft) tall hollow cube that's big enough to fit Notre-Dame Cathedral in its archway. The strikingly sparse structure contains 35 floors of restaurants, office and event spaces. Originally clad in Italian White Carrara, the marble panels began exhibiting hysteresis (warping of the marble panels) shortly after completion which spurred the hunt for a replacement stone that would weather the elements. The architectural teams found a natural choice in the flawless character, even grain and purity of color of Bethel White® granite, quarried in Vermont. The hard-wearing granite became the basis of a €192 million renovation to replace the Carrara marble exterior with granite panels - a change that was not visible upon completion due to the whiteness of the granite and its similarity in tone to the original marble, yet exceedingly more durable.

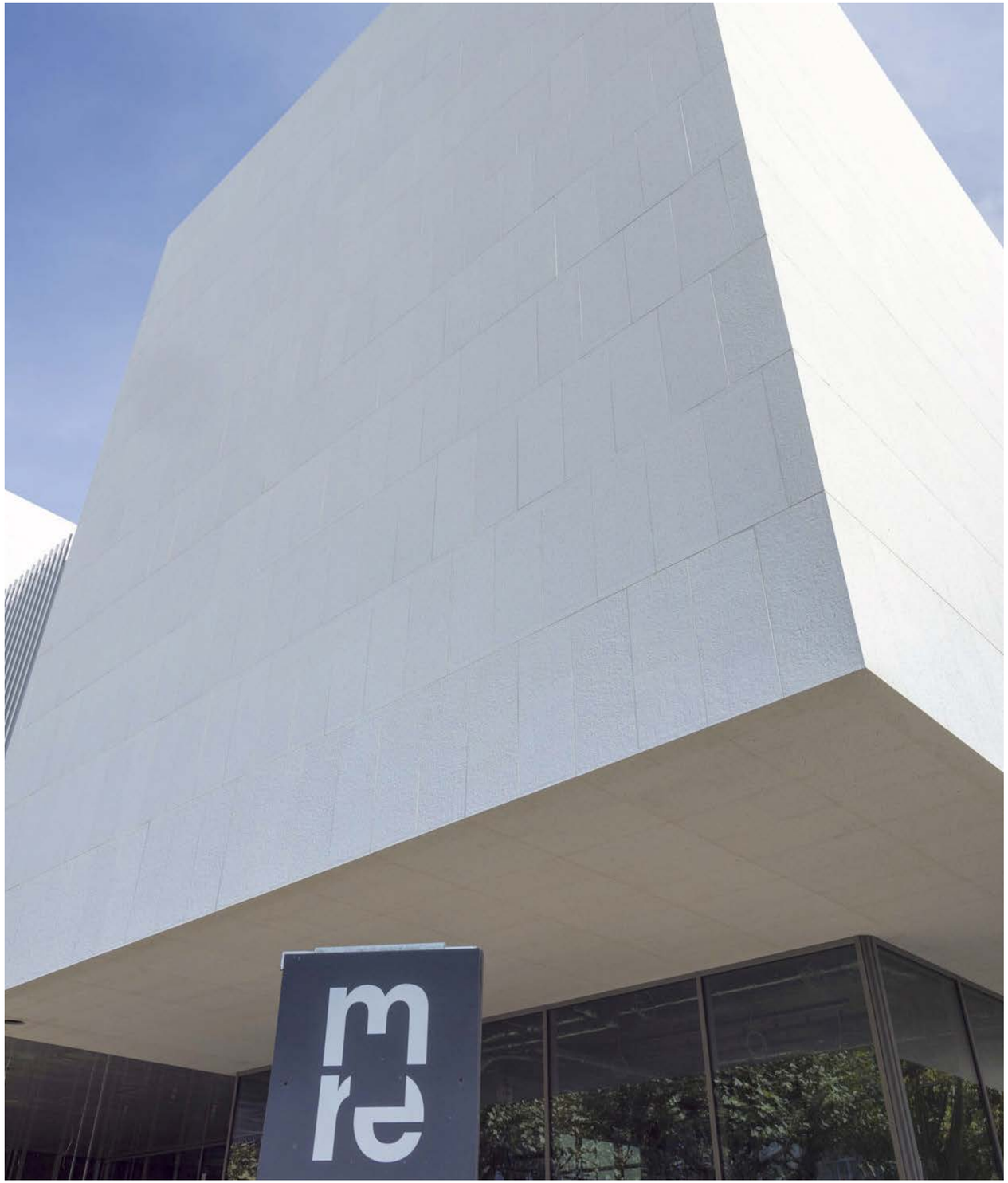
LOOKING FORWARD

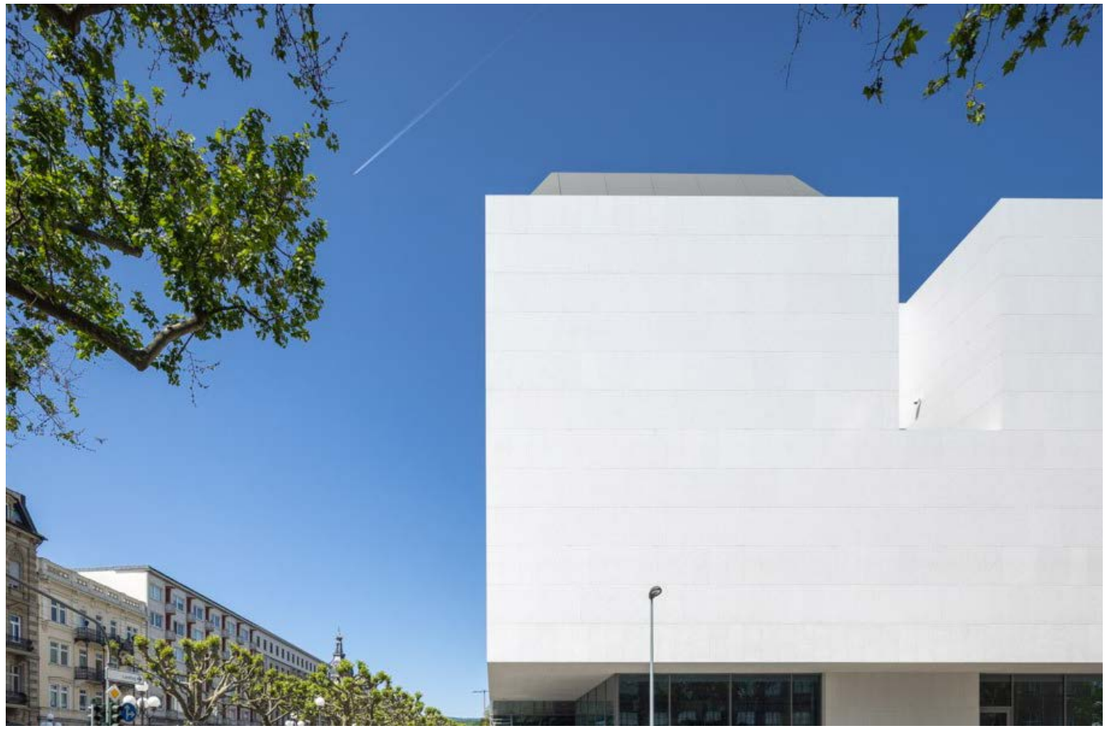
The journey of the Ernst Museum Foundation's granite facade is nothing short of a masterclass in architectural innovation, resilience, and sustainability. From the cold depths of the Bethel White® granite quarry in the Green Mountains of Vermont to the bustling streets of Wiesbaden, the story is an intricate tapestry of collaboration, expertise, and passion. This facade is not just a testament to the beauty and durability of natural stone but also serves as a beacon highlighting the intricate dance between art, architecture, and nature.

Furthermore, the project showcases how architectural excellence can be achieved without compromising on sustainability or aesthetic appeal. The deliberate choices made at each phase, from material sampling, to sourcing and selection, to finishing touches, emphasize the importance of thoughtful, sustainable design in the modern world.

For future architects, builders, and visionaries, the Museum Reinhard Ernst stands as a shining example of what is achievable when art, science, and nature converge. As urban landscapes continue to evolve, it is our collective responsibility to ensure that our creations not only stand the test of time but also coexist harmoniously with the environment. It's not just about building structures, but legacies – ones that future generations can look back on with pride, admiration, and inspiration.







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Contact Us

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Our natural stones are quarried and processed in the U.S., Canada, and France

carbon neutral 2025