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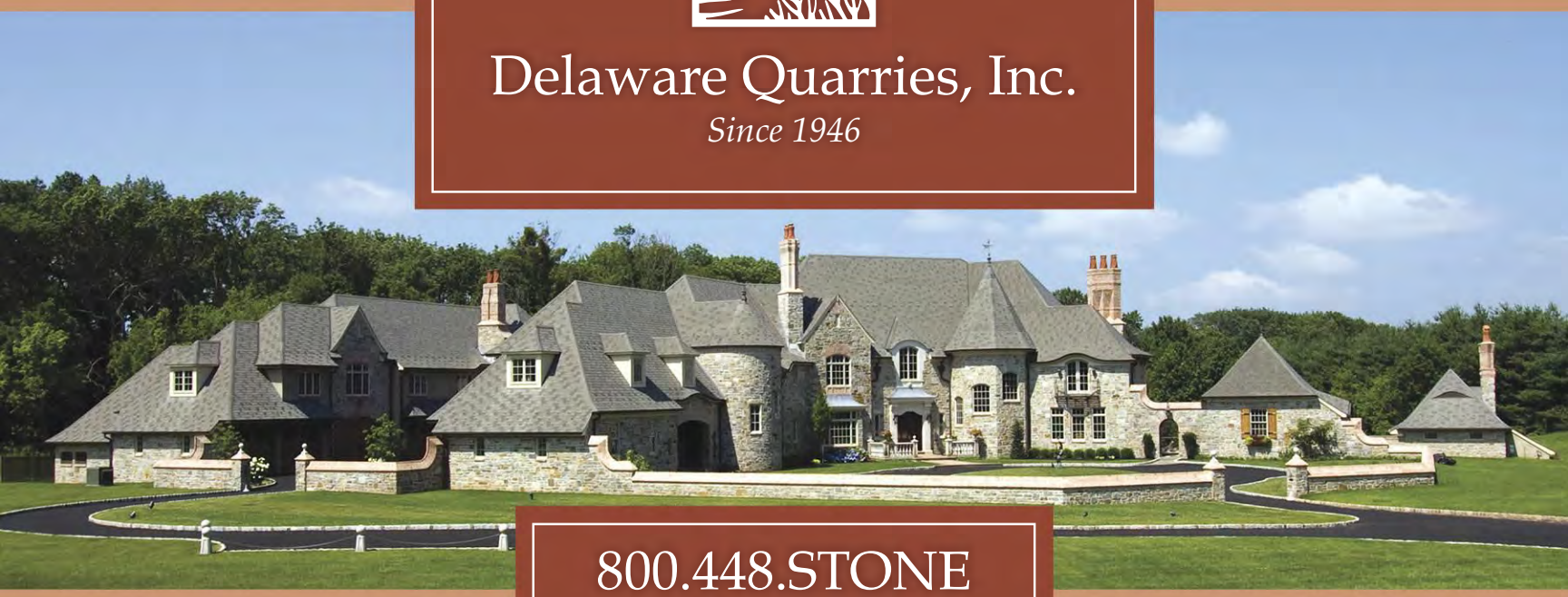

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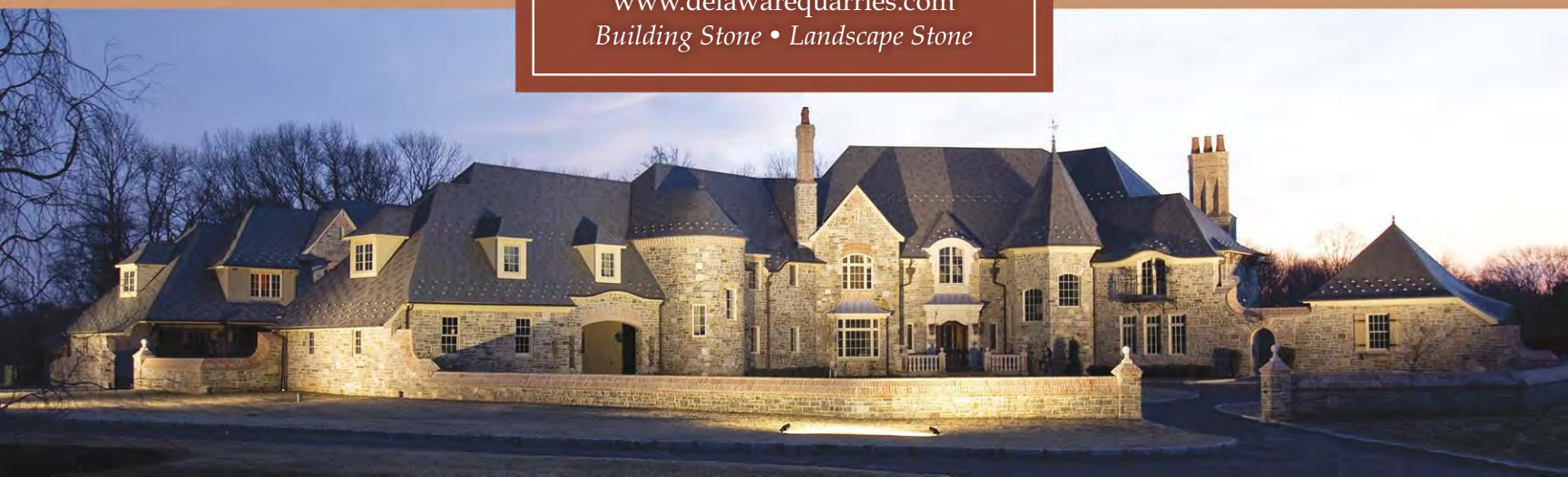

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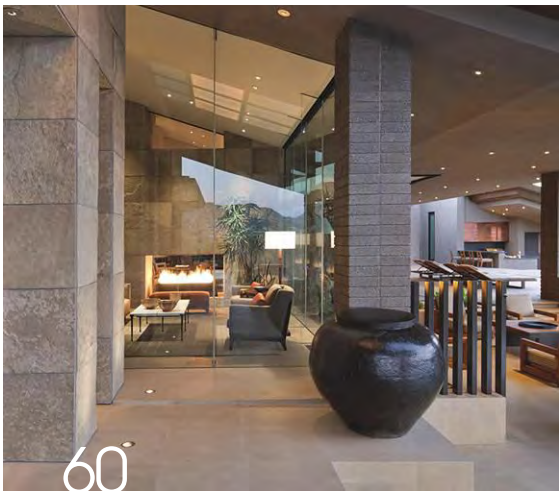

IN EVERY ISSUE

ON THE COVER

With a great appreciation for the heritage of traditional sacred architecture, a Mid-Atlantic couple was influenced by the Porziuncola of St. Francis near Assisi, Italy, to build their own family chapel. Teamwork and shared motivation for the 702-square-foot project by all involved resulted in the project taking just 19 months. To learn more about the inspiration and design, turn to page 8.

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You are probably aware of the merging of the Marble Institute of America (MIA) with the Building Stone Institute (BSI). What you might not be aware of is the new dynamic this brings to our industry and the improved resources that are being made available to our members and to the design community. With combined staffs and a larger budget, the new organization is able to increase its efforts with education, safety, standards, and testing of natural stones.

We continue to host the Pinnacle and Tucker Design Awards programs. The Pinnacle Awards will be presented January 30 at The International Surface Event in Las Vegas to MIA+BSI member companies whose projects' beauty, creativity, ingenuity, and craftsmanship exemplify professional mastery in the use of natural stone in commercial and residential applications. The Tucker Design Awards will be presented February 25 at the Tobin Center for the Performing Arts in San Antonio, TX to honor those who have achieved excellence in design through the incorporation and use of natural stone in building or landscape projects.

I mention these two awards to bring into focus the role the MIA+BSI plays in our industry. I am in awe of the talents you as designers show each year at these awards and am equally in awe of the skills the craftsmen demonstrate in the execution of these projects. What is always obvious is that the winning projects take both great design and flawless execution to be recognized as the best of the best.

The merger of the MIA+BSI will improve its reach as the leading authority in the world when it comes to education for the stone trades and the design community on the use and applications of natural stone. The combined organizations will continue to embrace our mission to promote the use of natural stone and will strive to improve support for the outstanding design community with which we have the pleasure to work.

With admiration,

Jon Lancto
2017 MIA President
Big Fish Consulting, SC

NATURAL STONE EDUCATION

Visit MIA+BSI: The Natural Stone Institute and review the natural stone educational opportunities at:

The International Surface Event (TISE) StonExpo/Marmomac in Las Vegas January 29 - February 1, 2018. www.intlsurfaceevent.com

COVERINGS in Atlanta, May 7-9, 2018. www.coverings.com

MIA+BSI online resources available anytime: www.naturalstoneinstitute.org/resourcelibrary

NEXT ISSUE

A showcase of natural stone projects selected from among the MIA+BSI 2017 Pinnacle Awards and 2018 Tucker Design Awards winning entries.

Building Stone MAGAZINE

Building Stone magazine is published for
MIA+BSI: Natural Stone Institute: P.O. Box 419, Chestertown, NY 12817;
Phone: 518-803-4336; Fax 518-803-4338;
www.naturalstoneinstitute.org
www.buildingstonemagazine.com
Email: info@naturalstoneinstitute.org

Published by BNP Media
210 Route 4 East, Suite 203, Paramus, NJ 07652 USA
Phone: 201-291-9001; Fax: 201-291-9002;
www.bnpmedia.com

Publisher: David Madonia
Publishing Manager: Melanie Kuchma
Editors: Jennifer Richinelli, Jason Kamery & Heather Fiore
Production Manager: Jenny Allen-Wise
Advertising Sales: David Madonia, Janelle Minghine & Steve Smith
Art Director: Shannon Shortt

Cover and BSI pages designed by Declare Creative Services.
PO Box 124, Glens Falls, NY 12801;
518-796.4500 www.declareservices.com

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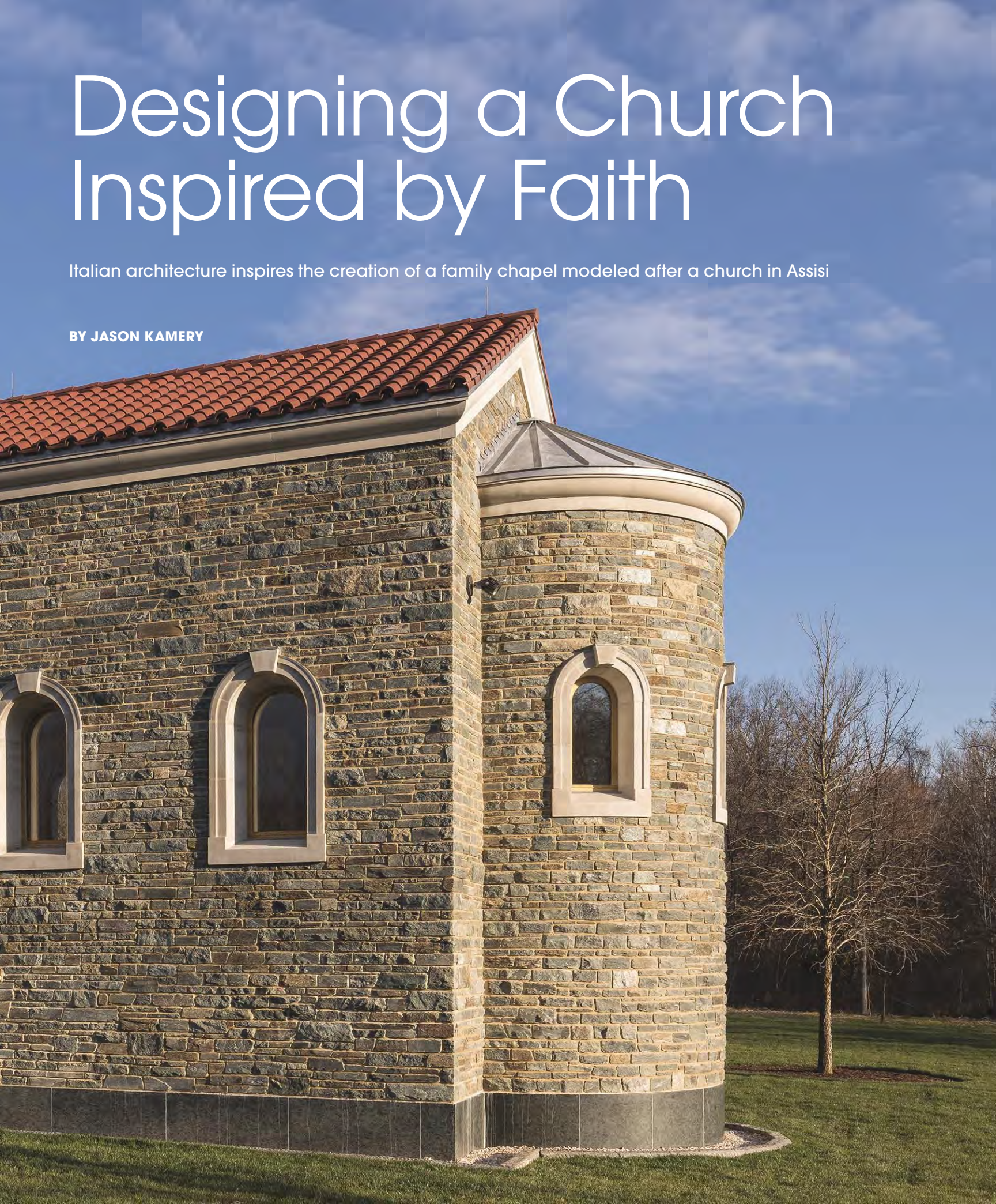
Designing a Church Inspired by Faith

Italian architecture inspires the creation of a family chapel modeled after a church in Assisi

BY JASON KAMERY



The church features a simple floor plan, consisting of a traditional basilica layout with a narrow nave and a raised sanctuary with an apsidal end.

After being influenced by the Porziuncola of St. Francis near Assisi, Italy, a married couple with a great appreciation for the heritage of traditional sacred architecture dreamed of a family chapel on a rural site in the mid-Atlantic region. The basic plan of the church was their starting point, and further refinements, rooted in classical architecture and timeless design expression, conveyed the dignity and sanctity the clients were seeking.

"The building concept and design, and therefore the construction material selection and detailing, was driven by a desire for permanence, durability and authenticity," said Jim O'Brien, president of O'Brien & Keane Architecture. "In all

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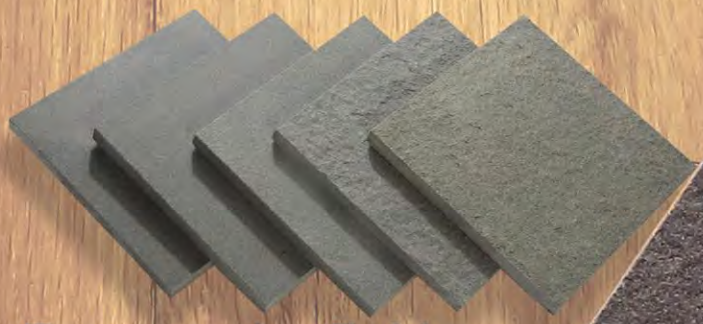

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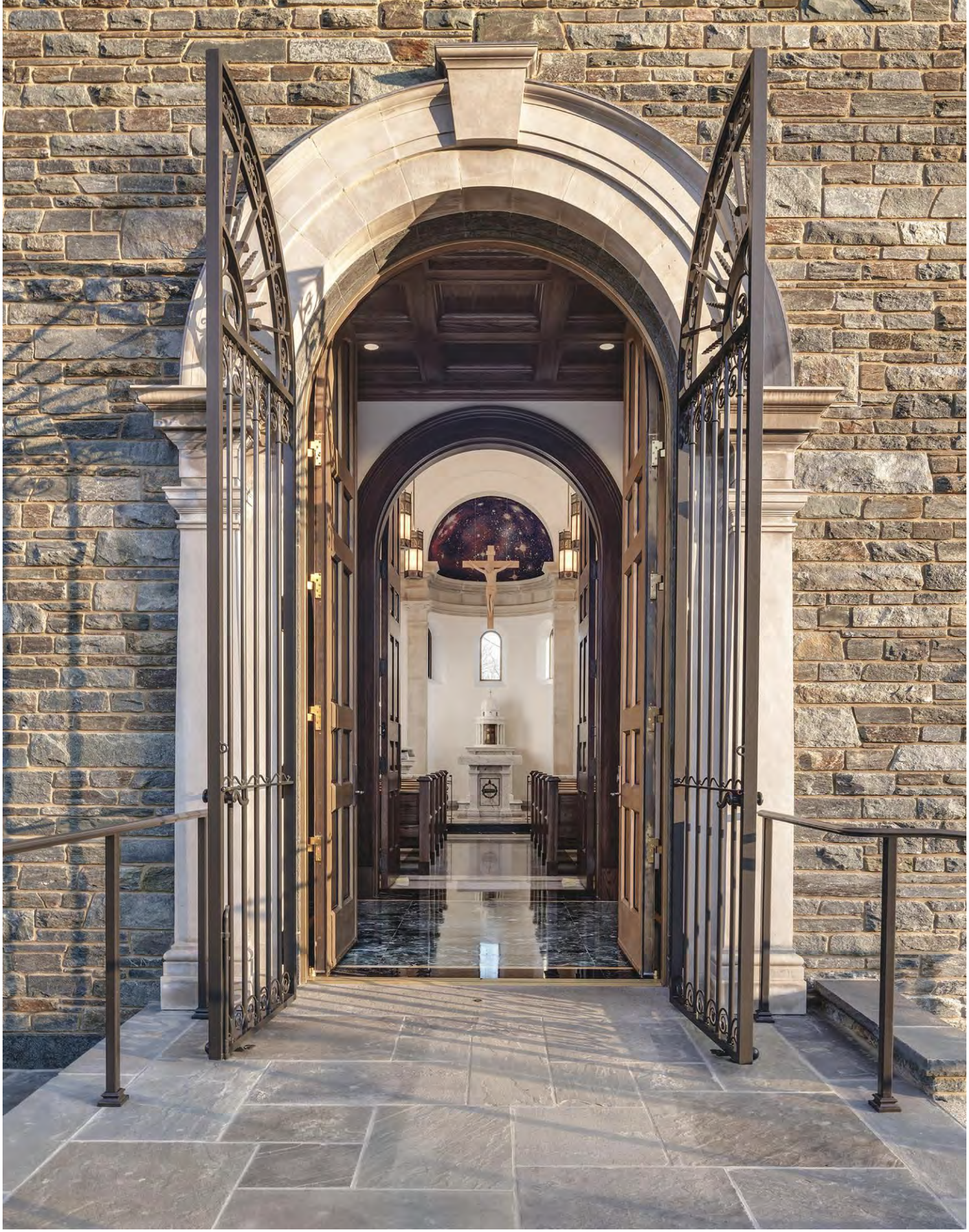

The overall area of the church measures 702 square feet, excluding the 24-inch-thick masonry walls.

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One enters the nave through a vestibule, or narthex, from the outdoors. Two utility rooms flank the narthex.

cases, the building materials were to be natural and left uncovered and uncoated. There is no paint used on the project. The water-shedding and flashing systems are designed to work without sealant joints, and the only sealant used on the building is at the window and limestone junction. To meet this challenge, the clear choice for the primary building material, exterior and interior, was natural stone, coupled with great care in detailing."

The church features a simple floor plan, consisting of a traditional basilica layout with a narrow nave and a raised sanctuary with an apsidal end. One enters the nave through a vestibule, or narthex, from the outdoors. Two utility rooms flank the narthex. The overall area of the church measures 702 square feet, excluding the 24-inch-thick masonry walls. "Stone serves a variety of purposes on this project," said O'Brien. "The coarse texture of the fieldstone helps relate to the rustic surroundings and the regional building language. The limestone serves to bring refinement and elegance, and tie the interior to the exterior. The marble elevates the interior to the level desired to mark the space as sacred." The fieldstone was installed by Vachino Masonry, located in Parkton, MD. Other stone used in the project includes Bianco Carrara, Botticino Classico, Port Laurent, Giallo Siena and Verde Alpi.

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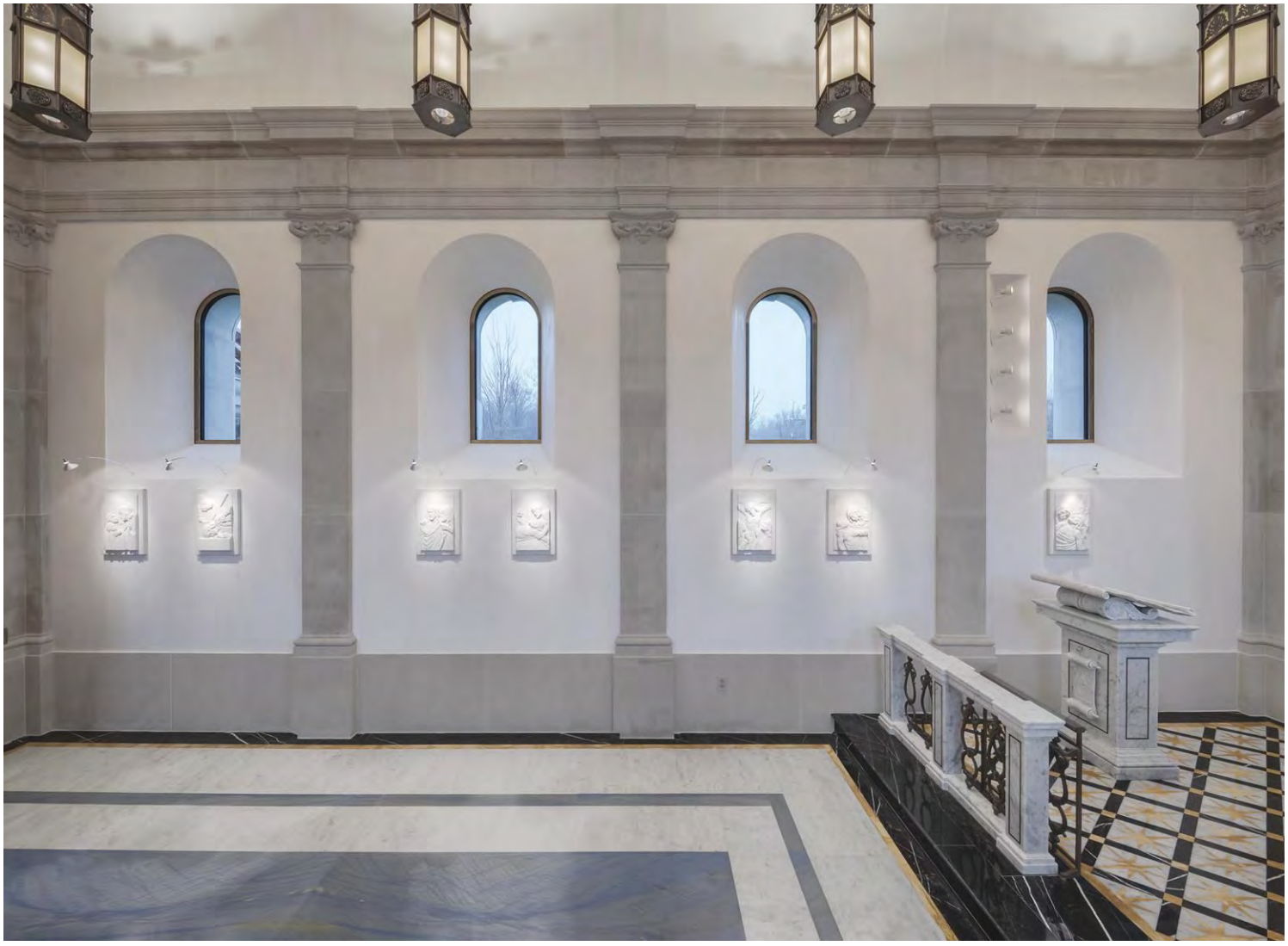
In the nave, four large slabs of Azul Macauba are arranged in a diamond book-matched pattern.



Indiana Limestone, procured from Rugo Stone of Lorton, VA and Bybee Stone Company of Ellettsville, IN, trims the windows, doors and eaves.

According to O'Brien, Bianco Carrara and Botticino Classico are ideal marbles for shaping and carving because of their soundness, consistency and beauty. The Giallo Siena and Port Laurent were chosen for the altar because of their color harmony with the Bianco Carrara. The Verde Alpi, used in the narthex, seemed an ideal counterpoint to the rich wood ceiling in that space.

In the nave, four large slabs of Azul Macauba are arranged in a diamond book-matched pattern. The service room flooring is a mosaic by Architectural Ceramics, installed by DJac Marble and Tile, located in Grasonville, MD, using polished Botticino Classico, Montevideo and Kays Green marble. The marble other than that used in the service-room flooring was supplied by Roberto Pagliari of Roberto Pagliari SC, SASA, located in Sarzana, SP, Italy.

Exterior walls are faced with fieldstone native to the region, and rest on a base of honed green Vermont granite supplied by Charles Luck Stone Center. The granite was installed by Woody Masonry of Edgewater, MD. Indiana limestone, procured from Rugo Stone of Lorton, VA and Bybee Stone Company of Ellettsvile, IN, trims the windows, doors and eaves. According to Will Bybee, president of Bybee Stone, the interior caps were some of the most detailed work done on the project. "The couple showed us the pictures of the caps they wanted us to replicate and while the final design doesn't look exactly the same, it was a starting-off point, as they changed their minds on a few design details," said Bybee. "This is something that we do on a regular basis for clients."

Bluestone paves the entry court of the church, which is surrounded by seat-height walls, constructed of fieldstone with bluestone copings supplied by Tri-State Stone Supply of Bethesda, MD. French drains that flow rainwater away from the building are formed with river gravel, contained by stone curbs reclaimed from a small town in France. Set upon a matching base, the interior

In the sanctuary, custom liturgical furnishings also designed by the architect serve to provide the necessary accommodations for the religious rites intended for the chapel.

walls are decorated with limestone pilasters and carry a matching entablature. Limestone creates one unified architectural expression between the interior and exterior. "If you want a good masonry product, I think Indiana limestone is your best option," said Bybee. "This is perfect for what Indiana limestone can be used for. Also, with any kind of unique design, I think it's unsurpassed."

To continue the trend of keeping the building as natural as possible, the interior wall surface in the chapel is a traditional plaster, left unpainted. The interior flooring throughout is a 2-centimeter-thick marble, set on a deep mortar bed and polished in place, without grout joints. According to O'Brien, colorful marble was chosen to contrast with the neutral tones of the limestone and plaster. The blue Azul Macauba, the yellow Giallo Siena and the green Verde Alpi were used to contrast the limestone and plaster.

In the sanctuary, custom liturgical furnishings also designed by the architect serve to provide the necessary accommodations for the religious rites intended for the chapel. These are primarily rendered in Bianco Carrara. Using a composition of colorful marbles based on the instruments crucifixion, the altar's decoration is in low relief. The ambo contains a trio of variations on the scroll motif, and the tabernacle design is conceived as an idealized miniature Tempietto. "I feel like the stone selected itself, as each material is so comfortable with what we are asking of it," O'Brien went on to say. "The fieldstone is essentially what

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"The limestone seems to me to be the natural go-to carving stone for this sort of work. The same holds true for the Bianco Carrara," said Jim O'Brien.

one finds in the ground nearby. The limestone seems to me to be the natural go-to carving stone for this sort of work. The same holds true for the Bianco Carrara. As for the flooring, the white/gray/yellow/black palette is hard to resist for the sanctuary pattern, and the blue of the Azul Macauba serves to recall the color so often associated with Our Lady."

According to O'Brien, probably the biggest challenge-within-the-challenge was the fieldstone installation. "The rest of the stone was shop-fabricated and came to the site ready for installation, certainly not easy, but there was little guesswork after all the planning and engineering," he said. "It took a great deal of stamina and concentration, as well as onsite artisanship, on the part of the masons, to install the fieldstone so consistently and to a well-defined standard over such a long period.

"The only real difficulty with sourcing the material was with the Azul Macauba," the architect went on to say. "This is not a super-common material, and in particular, slabs with a good deal of blue are hard to find. Roberto knew when he found these slabs that he had hit the jackpot. It was his suggestion to use the slabs whole, rather than in smaller pieces. This notion of using the slabs as they had come from the earth was very appealing (to me), based on the guiding principle that a church building should convey a sense of permanence. The 'forever' of our faith, our spirit and our Creator should be reflected in the building. So we turned to Creation itself to find the best means of expression."

Teamwork and shared motivation for the project by all involved resulted in the project taking just 19 months, from April 2014 through November 2015. "We had the luxury of working with an outstanding general contractor and project superintendent whose expectations and standards were so high, there was never much fault to find," said O'Brien. "They supervised every move and worked side by side with the craftsmen at all times. They mocked-up virtually everything. I can't say enough great things about the contractor, Winchester Construction. Their

dedication and passion for quality is unsurpassable and such kind and generous people. I'm so grateful to have them as teammates. They completely coordinated the work of the suppliers and installers, all of whom brought their A-game to the job. Roberto Pagliari, who supplied and fabricated the marble, is a dear friend and also the consummate expert and professional. I've learned so much from him. He introduced Booms Stone Company, who installed the marble."

The common thread among all project participants is great happiness to have been able to be part of the work. "This is the kind of project that comes along once in a lifetime," said O'Brien. "I believe that God will meet us wherever we are, but to build a place with that intention, on such an intimate and personal scale, is a very loving act of devotion. Our client certainly charted this course. To be able to participate was a great privilege, and at the same time the work carried a good deal of responsibility to do it justice. So that responsibility and not letting this opportunity get by us became real motivating challenges. The solution seemed to be found by embracing each design decision and questioning if we had the best approach. We were so fortunate to be part of a wonderful team that shared that common mindset. Everyone involved seemed to get caught up in the work and it brought out the best in everyone." ■

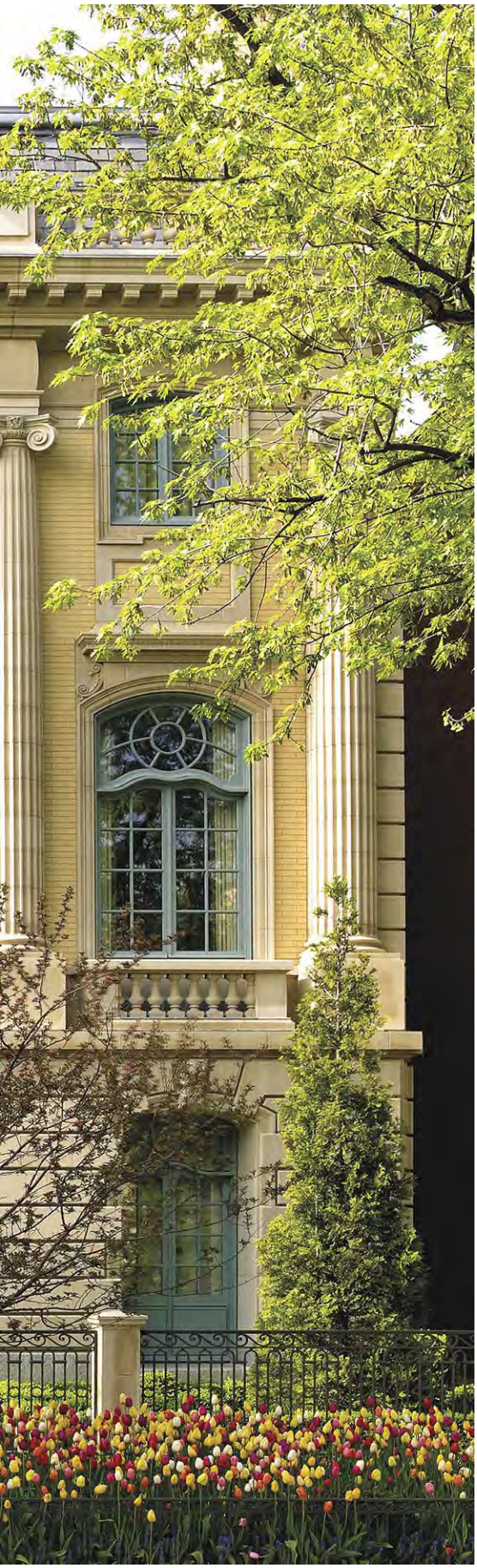
Private Chapel
Mid Atlantic

Architect: O'Brien & Keane, Arlington, VA

General Contractor: Winchester Construction, Millersville, MD

Stone Supplier: Charles Luck Stone Center, Jessup, MD (Granite); Tri-State Stone Supply, Bethesda, MD (Fieldstone); Bybee Stone Company, Ellettsville, IN (Limestone); Rugo Stone, Lorton, VA, (Limestone); Roberto Pagliari SC, Sarzana, SP (Marble); Architectural Ceramics, Rockville, MD (Mosaic)

Stone Installer: Woody Masonry, Edgewater, MD; Vachino Masonry, Parkton, MD; Rugo Stone, Lorton, VA; Booms Stone Company, Redford, MI; DJac Marble and Tile, Grasonville, MD



Replicating turn-of-the-century architecture

Indiana limestone played a crucial role in meeting the design requirements for a newly constructed residence in the heart of Chicago

BY JENNIFER RICHINELLI

Photos © Tony Soluri Photography

Working with a young couple, with a growing family, to build their dream home in downtown Chicago, the design team at Liederbach & Graham, Architects LLP had several factors to consider. The couple desired a new house that would give the impression it had stood there since the turn of the last century. It was imperative the chosen building materials could endure Chicago's harsh winter conditions, as well as the durability required for pets and young children. Additionally, they wanted the character of the home to reflect the husband's love of sailing. With those criteria in mind, the design team selected a palette of Standard Buff Indiana limestone, granite and slate.

A palatial residence in Chicago, IL, features an Standard Buff Indiana limestone exterior, including many carved details such as columns and balustrades.

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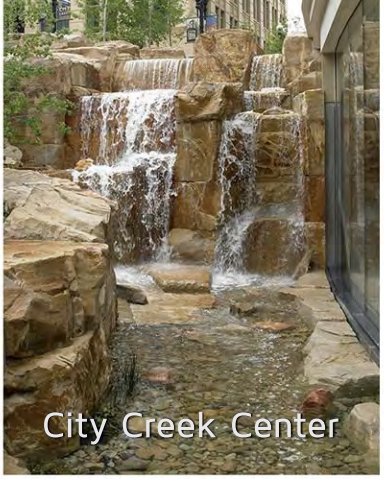
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A planer was used to plane the circular shape of the column and the flutes.

"The husband's childhood spent in Europe and an abiding interest in sailing influenced the character and decorative program of the details," explained Michael Graham, principal of Liederbach & Graham Architects LLP in Chicago, IL. "We were asked to design a house built to last, with practical durable interior finishes which would hold up to the demands of four active children. Dimensional stone was selected throughout for its beauty and durability in a cold climate."

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A serene setting was created in a glass-covered garden area with a fire pit made from Indiana limestone.

The residence, which encompasses 16,600 square feet of living space, plus a six-car garage, features an exterior dressed with cut Indiana limestone. Thicknesses of the material, which was supplied by Independent Limestone Company of Bloomington, IN, range from 5 to 27 inches, and the limestone was complemented by Buff Norman Hebron brick on a base of Greene County Carolina granite, supplied by The North Carolina Granite Corporation of

The Indiana limestone palette carries to the home's wine cellar, which features a rough-cut accent wall complemented by surrounding brick walls, as well as limestone flooring.


550

Aside from their aesthetic value, Indiana limestone and Greene County Carolina granite were chosen for the home's exterior facade for their ability to withstand the harsh winter climate of Chicago.

Mount Airy, NC. The roof is constructed of Semi-weathering Grey Vermont slate — provided by Evergreen Slate Company in Granville, NY. The slate, which had thickness from 3/4 of an inch at the eaves to 3/8 of an inch at the ridge, was selected for the gentle variation it possesses as it oxidizes over time.

"We chose limestone elements on the exterior facade for durability and because they take carving beautifully," said Project Architect Erica Weeder. "Indiana limestone was oriented with natural bed horizontal. The building meets the ground with granite selected for its salt resistance and impermeability to moisture to better weather our hard Chicago winters.

"Our clients followed our lead in the stone selection," Weeder went on to say. "They appreciated the regional character of the Indiana limestone, which is frequently used in downtown Chicago."

CARVING THE LIMESTONE

At the front of the residence, six fluted Indiana limestone columns are supported on 27-inch-deep solid stone. The column capitals are a variation on Ionic with a ship's anchor motif at the center. "We took the liberty of reversing the arrows on the egg and dart echinus to reflect the desire that the arrows of the owner's fortunes always point up," explained Weeder.

The rusticated Indiana limestone base is 26 inches deep and the fluted columns measure 26 inches in diameter and 25 feet tall. "Galloy & Van Etten, family owned for more than a century, fabricated the

Poiseul Jaune French limestone with Petit granite flows throughout the formal areas of the residence's ground floor.

cut stone for us," said Weeder, adding the design team provided full-scale drawings of the carved elements.

"We fabricated all the limestone for the entire project," said Tom Van Etten, president of Galloy & Van Etten, Inc. "This includes sills, jambs, headers, arches, belt courses, balustrades, columns, cornice, coping, panels, quoins and piers. All of the stone was cut on its natural bed (horizontal grain), so the stone sits on the building just as it was in the quarry. Thus, you can see the natural grain of the stone. Also, all the stone on the first floor is load bearing."

According to Van Etten, each column shaft took 80 hours to carve and each cap was completed in 120 hours. In total, Galloy & Van Etten's shop devoted 1,200 total labor hours for the columns.

To fabricate the columns, the limestone block was first cut on a block saw and then the stone was sawn into long bars for the planer to work with, explained Van Etten. The planer was able to shape the circular columns and their flutes. A saw was then used to cut the column to its final height. Finishing touches included using an air hammer and chisel to cut the entasis and finish the flutes.

Fabrication of the cornice posed an exceptional challenge due to its scale and the complexity of the pieces. "Each piece needed to be 13 feet in length to span from column to column, and they were 5 feet in depth x 1 foot, 4 inches in height," explained Van Etten. "Each piece weighed 14,000 pounds. After slabbing on the block saw, each piece went to the CNC machine, then to a planer, then to the saw and finally to a cutter for the dentils and carvings."

To reflect the homeowner's love of the sea, a compass was waterjet cut on the master bath stone floor and a port hole was placed in the wall.


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The Indiana limestone pieces were all cut on their natural bed (horizontal grain) at Galloy & Van Etten, Inc.'s fabrication shop.

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Skilled craftsmen were essential to creating the intricate carving of each piece.

According to Weeder, the design team monitored the fabrication of the limestone pieces closely. The entire process was finished in 10 months.

"We visited Galloy & Van Etten several times to view the stone during fabrication, especially for the carving of the ornaments," she said. "A maquette of the column capital was carved up at full scale in maple. Mock-ups of the carved elements were essential to get clarity and legibility when viewed in direct sunlight. Undercuts and shade and shadow were all studied and finessed at full scale."

"This is the best architect I've ever worked with," said Van Etten. "They know exactly what they want, and have a great understanding of and appreciation for natural stone. The full-size mock-ups allow the opportunity to view the details, and make changes as needed. This cannot be done on drawings."

INTERIOR FINISHES

Stone was used extensively throughout the interior design as well. The mix of a variety of unique materials makes for a stunning and luxurious living space. The home even includes a wine cellar where Standard Buff Indiana limestone furnishes a wall and the floor. The rough-cut texture of the golden-hued limestone, paired with brick, creates an Old World Tuscan aura.

"The clients traveled to Italy to select specific slabs, including a fossil stone and pink onyx incorporated in the master baths," said Weeder. "Poiseul Jaune French limestone with Petit granit cabuchons were used throughout the formal areas of the ground floor and repeated at the sills of the French doors throughout. A fine antique Rouge Rubane marble fireplace in the library is accompanied by a new hearth. After months of searching, we were delighted to find a slab of this rare stone which matched the original perfectly."

Echoing the husband's love of sailing, globe motifs were incorporated into the design of the window transoms. Rolling waves appear in the fence, gate and four-story interior stair, as well as the trim on the 3-foot-tall bronze lanterns flanking the door. "(Additionally), Neptune's image graces the door knockers and nickel silver sea monsters form the handles for the window hardware in his master bath," said Weeder. "His shower window is a nickel-plated porthole and the floor of the bath features a compass rose."

From design to completion, the project duration was approximately two and a half years.

"Our client reports that his sense of daily delight in his home remains undiminished." ■

Private Residence
Chicago, IL

Architect: Liederbach & Graham Architects LLP, Chicago, IL

Stone Fabricator: Galloy & Van Etten, Chicago, IL

Interior Stone Fabricator: Illinois Granite and Marble, Elk Grove Village, IL

Stone Producers: Evergreen Slate Company, Granville, NY (Semi-weathering Grey Vermont slate); Independent Limestone Company, Bloomington, IN (Standard Buff Indiana limestone); The North Carolina Granite Corporation, Mount Airy, NC (Greene County Granite)

Interior Stone Supplier: Jay Sackett & Associates, Skokie, IL (Poiseul Jaune French limestone, Petit granit cabuchons and Rouge Rubane marble)

Historic stone reimagined for campus courtyard

The new Sawyer Library at Williams College brings together century-old Georgian red brick and limestone with Vermont's textured green-gray slate, creating a cohesive, timeless design

BY HEATHER FIORE

Photo © Peter Aaron, Esto

Williams College in Williamstown, MA, underwent a recent renovation, which restored Sawyer Library and Stetson Hall with a five-level, interactive atrium. Photo © Peter Aaron/OTTO

Williams College is a private liberal arts college located in Williamstown, MA. Ranked as the second-best college in America last year by Forbes, the quaint campus has a longstanding history. In 2003, the college's administration and design professionals came together to develop a multi-phased approach to reestablish the function of the library and restore its historic Stetson Hall. Having served as the main library and home to rare original copies of our nation's founding documents, including the Declaration of Independence, the Constitution and the Bill of Rights, Stetson Hall ultimately became underutilized after two previous inflexible expansions.

"Williams College embarked on a major reinvestment strategy to improve student and faculty interaction and the college's humanities and social sciences campus, culminating with the construction of a new collaboration-based library," said Lee Clark, project manager and senior associate at Bohlin Cywinski Jackson (BCJ) in Wilkes-Barre, PA. "The new library project not only anchored the college's north campus, but also reinstated the college's historic Stetson

Hall as an iconic destination."

Stetson Hall, designed by Cram and Ferguson and constructed in 1922, previously combined the college's many library spaces, but by 1976, had lost its purpose as the main library and assumed a peripheral role on campus. BCJ's primary design goal for the building's exterior was to restore the historic Georgian brick and limestone on Stetson Hall as the focus of a new quadrangle and to have the larger, new library addition act as a backdrop for that important campus icon.

"As part of the Sawyer Library project, Stetson was fully renovated, restoring its original library function and reimagining the building's main floor as a new entry into the larger addition," explained Clark. "Exterior restoration included repairs and cleaning to the limestone and brick facade, and replacement of the building's mottled green and purple slate roof. The marble flooring and wall bases inside were also restored."

TYING TOGETHER HISTORY

"We selected an exterior stone for the new west facade just behind Stetson that was as substantial as the older build-

On one of the restored facades, the irregular texture of the sculpings is distinguished with the smooth, honed bands of slate. Photo © Nic Lehoux

ing and complementary to it but not attempting to replicate it," added Chris Sutterer, project architect and associate at BCJ. "By contrast, the addition's east facade, which faces away from traditional campus buildings and toward the surrounding Berkshire Mountains, is clad with a skin of lightweight stone shingles."

On Stetson Hall, about 300 square feet of existing decorative limestone was skillfully cleaned and repaired by Adam Ross Cut Stone Co., Inc., Albany, NY. "These sizes ranged from 32- x 16- x 4-inch full stones to 3- x 3- x 1-inch composite mortar repairs," said Jason Kilgore, res-

The vertical bands of slate provide a striking contrast and cast unique shadows. Photo © Nic Lehoux

The original stacks for Stetson Hall, comprised of cast iron shelving and supported by cast iron and marble slab flooring, were located in the rear wing and only accessible to library staff. Since the stacks were no longer meeting the College's needed, they were demolished, and the marble slabs were salvaged, refurbished and cleaned to create new marble stair treads and flooring tiles in the atrium. Photo © Peter Aaron, Esto

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The south half of the east elevation features vertical, translucent fins, which provide some shaded relief from the daytime sunlight. The triangular shadows cast by the fins create an interesting complement on the slate wall shingles. Photo © Peter Aaron, Esto

toration architect and associate at BCJ. "There were several hundred individual replacements and repairs made on the east elevation of the existing building where two existing additions were removed prior to the new addition beginning construction."

The roof was also replaced with roughly 9,000 square feet of unfading, mottled green and purple slate shingles, which were supplied by Evergreen Slate Co., Inc. in Granville, NY. "The shingle sizes matched the existing building's three shingles sizes, with exposed heights of 6 ½, 7 ½ and 11 ½ inches, all in random widths," Kilgore added.

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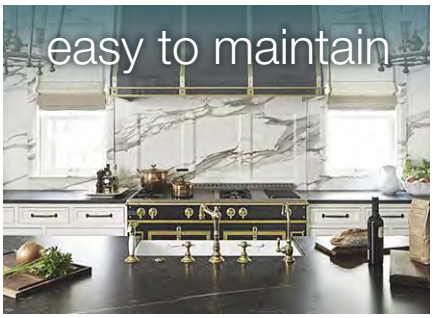

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Stetson's original book stacks, composed of cast iron shelving and marble flooring, were no longer meeting the college's storage needs and were also demolished. The space was transformed into a large atrium to create a transition space between Stetson Hall and the modern addition to Sawyer Library. "The marble was salvaged and installed as flooring in the Stetson atrium and as monumental stair treads in Sawyer's atrium," Clark explained of the luminous five-level space. "The refurbished marble was cleaned to a milky white and reflects the bright natural light of both atria."

Behind Stetson Hall, the addition's west facade is faced with sculpings, irregularly shaped bricks made from the rough edges of quarried slate blocks, which were saw-cut to produce a dimensional product that could be laid up in a traditional manner. To contrast the rough texture of the sculpings, window jambs and the ends of the wall were honed to a smooth finish.

"Roughly 6,300 square feet of material was set ranging in random sizes from 8 to 16 inches in length and 2 to 8 inches in height, and nominally 4 inches thick," said Sutterer of the distinctive slate supplied by Whitehall Cut Stone, Inc. in Whitehall, NY, and Vermont Structural Slate Co. in Fair Haven, VT.

Slate is again utilized on the addition's east elevation, where roofing shingles are used to create wall panels. "Around 3,700 square feet of exposed slate was hung on the eastern elevation of the addition using 16- x 16-inch (16- x 8-inch, exposed) roofing shingles on an aluminum and stainless steel hook system," said Sutterer of the textured material supplied by Vermont Structural Slate Co.

LOCAL MATERIALS HIGHLIGHT LANDSCAPE

Locally sourced stone, wood and recycled materials were chosen to bring the architectural concept to life, which ties into the surrounding landscape and reflect the college's goals for sustainable growth. "The unfading green slate is a local material, since the college is only a few miles from the Vermont border," said Clark. "Also, the gray-green color blends perfectly with the mountain landscape that surrounds the campus and is reflected in the expanses of glass on the north and east faces of the building."

Although the addition was roughly three times the size of Stetson Hall, the

restoration of the century-old landmark required more attention, since the new stone had to match to the original stonework. "This was a major hurdle to overcome due to the state of the stone that was revealed once the two existing additions were demolished," Kilgore explained. "Because the buildings were occupied and abatement was required, it was difficult to schedule significant exploratory demolition. Therefore, until the two additions came down, no one really knew in what condition the original stone would be, which made documentation of the full scope of work challenging.

"Awarding this work to the right mason who would be willing to work with the design team and owner to determine the most economic process for the uncovered restoration work was imperative to the success of the restoration work and the project," he added.

The project culminated after almost three years of consistent work, with more than one year dedicated solely to the extensive cleaning and exterior restoration of Stetson Hall. BCJ's design team was onsite weekly during the construction to ensure that all stone was being installed correctly.

"We were particularly interested in monitoring the consistency of color and range of sizes provided for the slate sculpings, as well as the craftsmanship shown in laying these random stones and providing the recessed joint that gave the appearance of a dry laid stone wall," Sutterer explained. "For the shingle wall cladding, we verified that the metal backup and hanger system was properly installed, particularly to prevent damage to the thin slate edges."

Since the project's completion in 2014, it has received positive feedback from the student body and public alike. "The college and surrounding community have embraced the building and appreciate its sensitivity to the materials and scale of nearby campus buildings, as well as to the colors and textures of the region as a whole," said Clark. ■

Williams College Sawyer Library
Williamstown, MA

Architect: Bohlin Cywinski Jackson, Wilkes-Barre, PA

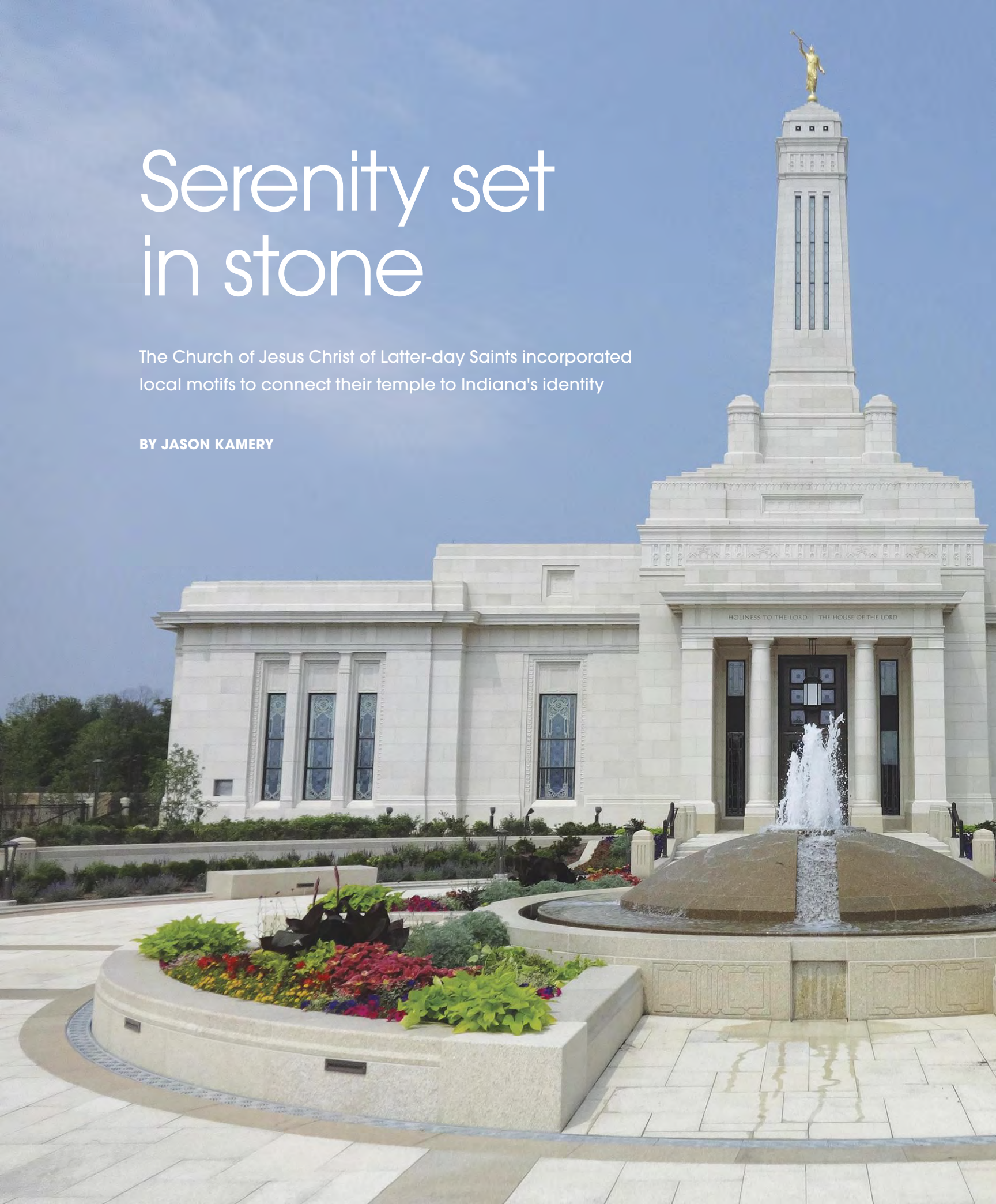
Stone Supplier: Vermont Structural Slate Co., Fair Haven, VT (addition's slate wall shingles, sculpings and honed bands); Whitehall Cut Stone, Inc., Whitehall, NY (addition's slate sculpings and honed bands); Adam Ross Cut Stone Co., Inc., Albany, NY (restoration limestone); Evergreen Slate Co., Inc., Granville, NY (restoration slate roof shingles)

Stone Installer: Champlain Masonry Co., Inc., Pittsfield, MA

Serenity set in stone

The Church of Jesus Christ of Latter-day Saints incorporated local motifs to connect their temple to Indiana's identity

BY JASON KAMERY



Totaling 34,000 square feet, the Indianapolis Temple stands on the southwest corner of West 116th Street and Spring Mill Road in Carmel, IN, an Indianapolis suburb located just north of the city. The Indianapolis Temple was the first temple built in its namesake state. The owner desired a high-quality structure with an exterior that could withstand the influence of pollution and the area's harsh winter weather. A natural stone exterior was specific, with limestone being the favorite due to its abundance in the area.

"Every temple for the Church of Jesus Christ of Latter-day Saints is intended to feel like an integral and relevant part of its region's identity," said Randall Knight, associate principal for MHTN Architects. "It is designed to represent the highest expression of beauty and reverence. With the Indianapolis Temple, it was important for the building to reflect the cultural heritage of the city and its residents. The design team studied regional precedents extensively while also sensitively utilizing iconic Indiana references in the exterior and interior design motifs.

"Cohesion between all design elements across a broad range — from interior decorative paint to landscape features and site planning gestures — ensured the serene environment that the owner sought." The structure's design strives for a monumental appearance, not unlike many of the city's most iconic stone buildings. The massing relies on principles of symmetry, order and classical proportion, with a streamlined restraint regarding ornamentation. Significant precedent buildings include the Indiana State House, the War Memorial, the Indianapolis-Marion County Public Library

and the Soldiers' and Sailors' Monument. The resulting edifice incorporates classical architecture with an Egyptian influence. The inspiration from Monument Circle is reflected in the Temple's two stately spires, each created from carved limestone. The taller of the two reaches 86 feet above the roof, 150 feet from the ground. "There were certain significant motifs used throughout the project," said Knight. "The Celtic Knot motif is a variable decorative pattern of intertwining and weaving line work. It is expressed in the Indianapolis Temple graphically as well as in three dimensions. Its never-ending weaving is a visual reference for eternity, which is an important spiritual concept in LDS temple worship. It is carved into stone transom panels and frieze decoration, in addition to interior applications in art glass, wood carving and decorative paint." Other motifs include the tulip poplar and peony flower, as they are the state's tree and flower. Indianapolis is the "Circle City," and the designers used the historic plat of the city as a design element expressed as a circle in a square.

To ensure that the intricate stone detailing could be fabricated and installed utilizing the most efficient methods, the design team engaged KEPCO+ in a six-month design-assist initiative, and the company was later awarded the installation contract for both the exterior and interior stone work. Stone selections were made based on balancing appearance and durability. Because of its prevalence in the region, limestone cladding was a

"Every temple for the Church of Jesus Christ of Latter-day Saints is intended to feel like an integral and relevant part of its region's identity," said Randall Knight.

given. The design team ultimately selected Aero Crème, a Turkish limestone. "It had the warm white color that the owner desired," said Knight. "Laboratory testing for weathering and physical properties was performed before the stone selection could be finalized." Two granites were chosen for site walls, hardscape and fountain. G350 from China and Giallo Antico from Brazil were selected. These were chosen, according to the architect, for their complementary color as paired with the limestone cladding. The Church had also previously used G350 with success at other temple projects.

There is extensive use of natural stone on the interiors, including the use of Aero Crème for architectural stone pilasters. Several marbles were chosen for flooring and carved decorative and liturgical elements. These include Perlatino, Sahara Beige and Arctic Grey, all sourced from Turkey.

Bestview International Company, located in Glenview, IL, was selected to handle the fabrication needs for the project. According to Bestview, the biggest challenge was the fabrication of the dome fountain stones. "There are four pieces of dome stone in total; the largest size of dome stone is about 108 x 63 x 12 inches, weighing 4,000 kgs per piece," said Perry Liu, president of Bestview. "First, Bestview had to produce granite block big enough for the four pieces of dome stone. In this way, we were able to reduce the color aberration and tonal variations as much

There is extensive use of natural stone on the interiors, including the use of Aero Crème limestone for architectural stone pilasters.

as possible among the pieces. Secondly, the transverse finish on the dome stones looks easy, but is quite a difficult process to achieve. As the architect said, 'When the water comes out from the top of the dome, the transverse steps make the water flow and jump with natural rhythm.' The challenge was to make sure all transverse steps went down a consistent gradient and scale. To obtain the best transverse finish, Bestview had to make four stone mock-ups with a 5-axis CNC machine to ensure the quality before the Giallo Antico blocks were fabricated. Finally, the fountain domes achieved the best transverse finish after two months of fabrication. From mock-ups to the finished pieces, it took a total of five months on this unique dome-shaped stone fountain."

INTERIOR PILASTERS

Each elevation features a portico, with two stately columns framing the main entrance on the east side of the temple. The south and west side porticoes each have four columns, while the north portico has five columns. These 15 limestone columns were designed with bases and capitals in the Doric order. Fluted limestone pilasters were incorporated between the exterior windows. Each of the 10 pilasters, detailed with a profiled base and Egyptian-inspired capital, was fabricated and inspected before leaving the Bestview facility to ensure a successful installation. Before the project was final, gilding, last-minute polishing and filling were performed onsite by artisans for an exacting finish for the opulent interior.

"The fabrication of the pilasters started in December 2013 and it took about six months to complete," said Liu. "One of the of the most time-consuming fabrication elements was those awe-inspiring pilaster capitals. To complete one pilaster capital, the Bestview team modified the common 3-axis CNC carving machines by adding one more carving axis and bit to improve efficiency. At the same time, we had to change the principal axis of the CNC machine to increase the working distance of the carving bits." It took approximately 10 days

Fluted limestone pilasters were incorporated between the exterior windows. Photo © Antonio Chapital

to carve each pilaster before coming to the next stage of polishing.

SITE WORK

In total, 16,000 square feet of granite site work surrounds the temple, creating a tranquil setting for its many visitors. To complement the temple's honed Aero Crème limestone exterior, G350 Granite was chosen for the majority of the site work, while Giallo Antico granite was used for the fountain and as an accent to the paving. "The typical paver was 2 inches thick, while the granite wall caps and curbs were 6 inches thick," said Liu. "The site work also includes cubic granite stair treads, planter walls, plinths, cubic keystones, solid cubic benches and fence piers."

Carved around the stone windows is the flowering bud of Indiana's state tree. The temple's limestone entablature also features carved frieze elements, including the leaf and flower motif repeated throughout the building. Local Indiana craftsmen delicately carved the traditional signage into the limestone above the main temple doors, which reads "Holiness to the Lord, the House of the Lord."

FINISHING THE PROJECT

The exterior cladding installation for the project began in September of 2013 and was completed in October of 2014, with site work installation completed in January of 2015. Despite central Indiana's brutal winters, with wind chills often measuring negative 40 degrees, crews missed only two days of installation — and those were due to above-average snowfall. "The primary design challenge was to create a timeless building using classical orders and proportion," said Knight. "Creating a monumental stone facade with many complex profiles while ensuring a 21st century building envelope required an intense design and construction process. Coordinating details and engineering with the most advanced building practices provided a successful outcome."

Through the collaboration of the design and construction team and the commitment of the field crews, the Indianapolis Temple was completed on schedule and within budget. The dedication of

the building was held in August of 2015. The project is a 2016 MIA+BSI Pinnacle Award of Merit winner in the category of "Commercial Exterior." ■

LDS Indianapolis Temple
Carmel, IN

Architect: MHTN Architects, Salt Lake City, UT
Stone Supplier: Metamar, Isparta, Turkey (Aero Crème limestone)
Stone Fabricator: Bestview International, Glenview, IL (G350 Granite, Giallo Antico Granite and Perlantino Marble)
Stone Installer: KEPCO+, Salt Lake City, UT
General Contractor: Shiel Sexton Construction, Indianapolis, IN

The exterior cladding installation for the project began in September of 2013 and was completed in October of 2014, with site work installation completed in January of 2015. Photo © John Wright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Roundtable: Architects reflect on natural stone

In this discussion, several architects share their thoughts and experiences about the use of natural stone in design

BY JENNIFER RICHINELLI

Photo © C.L. Fry

For a recent residential project, David Costea, senior project manager at Burleson Design Group, prominently showcased local Texas limestone throughout the home's exterior and interior living spaces. Photo ©C.L. Fry

While times change and trends come and go, natural stone remains a popular choice of building material for both residential and commercial design. The editor of *Stone World* magazine recently had the opportunity to talk with a few experienced architects — representing various regions of the U.S. and diverse areas of architecture — and asked their opinion on a range of issues related to designing with natural stone. Participants included:

- **Jon C. Bernhard**, *AIA, senior partner at Swaback Partners PLLC, Scottsdale, AZ*
- **David Costea**, *senior project manager, Burleson Design Group, Wimberley, TX*
- **John G. Waite**, *FAIA, John G. Waite Associates, Architects PLLC, Albany, NY*

Here is what the architects had to say during our discussion.

How often do you use natural stone in your designs?

Bernhard: It is rare and unusual that I do not use natural stone. In addition to the beauty, durability and a broad range of available sizes and shapes, natural stone limits introduction of toxins into the designed environment and has a modest carbon footprint from production through end of life cycle, or recycle.

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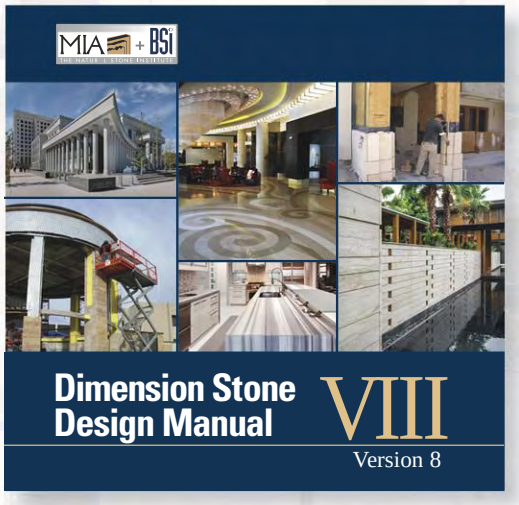
After months of waiting, the moment has finally arrived—version 8.0 of the *Dimension Stone Design Manual* is now available for purchase. This new edition includes a new Tolerances chapter, a revised Wet Areas chapter (including MIA's recent "Wet Areas" technical module and the addition of larger scale graphics and nine additional detail drawings), and a new Restoration and Maintenance chapter, which includes over 100 photos that provide examples for many items highlighted in the Troubeshooting section. AutoCAD® files are also available for purchase.

To order your copy of the *Dimension Stone Design Manual, Version 8.0,* visit **www.naturalstoneinstitute.org/bookstore.**



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Large span stone arches were incorporated into the residential design to capture the home's hilltop view. Photo ©C.L. Fry

Natural stone often has the ability to complement its surrounding environment — tying a structure to the ground. Photo ©C.L. Fry

A rough-cut stone fireplace adds a touch of rustic elegance to an interior living space. Photo ©C.L. Fry

Costea: Natural stone in some fashion is used in almost all of our projects, stone veneer being the primary use. We use stone for a couple of reasons: 1. Durability and longevity of the material with a relatively maintenance-free quality. 2. Design aesthetics of the building to fit with surrounding architecture.

Waite: Our firm, John G. Waite Associates, Architects, has a practice focused on the preservation, rehabilitation and restoration of existing buildings and the construction of new buildings within historic contexts. Because of this, we are strong advocates for the use of natural stone either to match existing stone in historic buildings or to be compatible with historic materials in new construction. In our restoration work, we go to great lengths to match original stone. If that is not available, we look for a similar stone that matches in color and texture, with the same physical and chemical properties. We do not like to use substitute material, such as cast stone, glass, reinforced concrete or reinforced polyester (fiberglass) in the restoration of historic buildings. Those materials do not behave the same as natural stone and certainly don't weather and patinate the same. They also don't have the life expectancy of natural stone, which is not a good characteristic for a material to be used in a building that is being restored to last hundreds of years into the future.

How do you go about sourcing stone for your projects?

Bernhard: In addition to local suppliers, I have had the good fortune of visiting natural stone fairs and stone conventions around the world. These opportunities included touring quarries and production facilities, meeting suppliers and other

Jon C. Bernhard, AIA, senior partner at Swaback Partners PLLC in Scottsdale, AZ, created a highend luxurious feel for the interior living space of a residence in Paradise Valley, AZ, with a variety of natural stone. The floor pattern follows a radial pattern of Oklahoma Pink granite — originating at the main entrance of the approximate 10,000-square-foot home. Photo by Dino Tonn

For the master bath of the Arizona residence, Bernhard selected large-format Lavender Blue granite floor tiles. A chiseled finish was applied to the steps leading to the tub to conceal the seams that were accentuated with this particular material pattern. Photo by Dino Tonn

extraordinary sources, enabling access to virtually any stone, in any quantity or configuration delivered to any jobsite, with confidence.

Costea: In collaboration with the stone supplier or mason working directly with the project's general contractor.

Waite: We begin a project by researching the history of the building — both its original construction and subsequent modifications. Usually there is information on the original stone and its origin. We also may check with a geologist to determine if the stone is actually the same as identified in the historical records.

We then would work with a stone supplier or fabricator to determine if the original stone is still available, or if it isn't, we have to determine a suitable match. In Albany, we frequently work with Adam Ross Cut Stone, a company that has been in business for over 125 years. We have worked extensively with Adam Ross over the years, and they are very knowledgeable about stone sources and installation.

Do you find more stone varieties are available now than say five or 10 years ago?

Bernhard: I find new stone varieties every year, likely as a result of better extraction and cutting technology. This has also created expanded sizes and uses for stone varieties that have a long history of availability.

Costea: We are seeing more stone varieties available due to the expanding or changing design climate. As clients are willing to explore design beyond what was once thought of as traditional, they are also looking at how materials are incorporated in the building.

Waite: For our purposes, I would say it's about the same over the past 10 years. However, some of the quarries, such as the Longmeadow Brownstone quarry, are no longer in production and it is difficult to find a match.

What are some current trends you are seeing when it comes to stone in architecture and design?

Bernhard: The trend of sustainable design and extensive availability of natural stone products has provided greater exposure, and subsequently, a greater understanding of stone. This familiarity shifted the perception of natural stone as a limited application, premium cost material, to understanding

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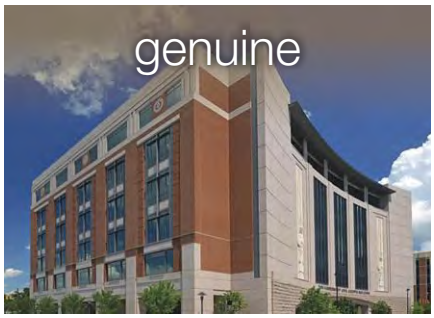

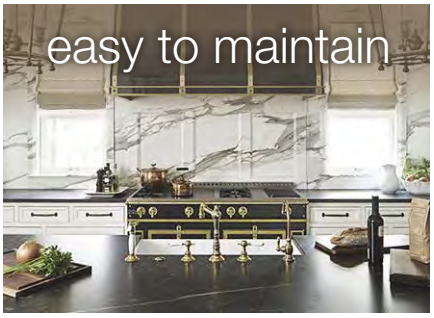

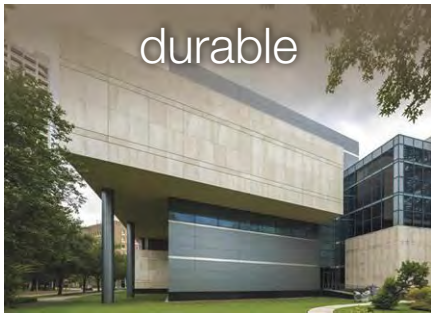

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the range of potential uses for natural stone and realization that modestly priced stone is available.

Costea: Trends we see are very contemporary or modern, as well as an aged or weathered appearance with popularity in reclaimed material (especially wood). That same trend is carrying over to stone.

Waite: In the historic preservation field, I think that there is a growing awareness that natural stone should be used to repair historic buildings rather than substitute material such as cast stone, glass, reinforced concrete or reinforced polyester (fiberglass). These materials behave differently than natural stone and do not weather and patinate the same. They also do not have the same life expectancy.

Also, today there is a growing concern for authenticity in the restoration of historic buildings. The use of natural stone only reinforces the sense of authenticity and integrity.

How closely do you work with a quarrier or stone supplier when working on a project? What are some matters you discuss or are looking for prior to installation?

Bernhard: Working with a supplier early in the design process has great value. I discuss design concept with suppliers early and often. The supplier can advise on size, availability and alternate materials to consider. This expands the potential for better design with material that accommodates or exceeds expectations. Final design is often influenced and altered as a result of the challenges and opportunities presented by the supplier.

Costea: Not directly. The project's general contractor generally acts as an intermediary between our practice and the stone supplier or mason.

Waite: Depending on the project, we usually work very closely with the supplier and quarries. Often it is difficult to find the same stone as what was used originally. If that isn't available, finding another stone that is compatible with the original stone with similar physical and chemical

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"In addition to the beauty, durability and a broad range of available sizes and shapes, natural stone limits introduction of toxins into the designed environment and has a modest carbon footprint from production through end of life cycle, or recycle," said Bernhard, adding that he chose Corton Beige limestone from Egypt for the project.

properties, as well as appearance (color, texture, veining, etc.), is essential. Some of the things we discuss are block size, color variation, natural imperfections, bedding plans, finish and tooling.

What is a recent project you completed that included stone in its design?

Bernhard: I am working on a large estate using natural stone as a primary material. The majority of the walls of the home are finished with large split-faced limestone. As a feature, large-format honed Italian travertine is being installed on a massive wall that runs from the exterior of the main entry through the foyer and great room and continuing out the exterior. The stone is selected and installed to appear as a solid 30-inch-thick, 60-foot-long mass of stone, pulled straight out of the ground in one piece.

We visited the quarry in Tivoli, (Italy), to select the ideal stone, with limited striations and imperfections to allow book-matching with no mirror/repeat appearance. We worked intimately with the installer to establish invisible seams and corners, with sufficient opportunities for structural movement.

Natural stone is the primary contributor to this home's extraordinary and unique design.

Costea: A custom residence with an expansive pool deck flowing into a negative edge pool overlooking a hilltop view. Large span stone arches are incorporated to capture the hilltop view.

Waite: We recently created new construction documents to restore the rotunda at the University of Virginia to its original glory. A fire in 1895 destroyed all the marble capitals, and so there was not one intact example of a complete capital. All there was to work with was one partial lower capital base and two to three small fragments from the upper portion of the upper capital, as the original capitals were fabricated in two portions: lower and upper. There were no close-up photos either, just an image from 1895 which showed the capitals at a 100-foot distance. There were also no original drawings and architectural design plates which would confirm the original design.

"Working with a supplier early in the design process has great value," said Bernhard. "I discuss design concept with suppliers early and often. The supplier can advise on size, availability and alternate materials to consider."

What would be some advice you would give to someone who has not worked with natural stone before?

Bernhard: Go visit your local supplier to get an initial understanding of the wide range of available materials and have a discussion about the different ways to use natural stone. Visiting a fabricator will provide an invaluable understanding of what is possible with regard to shapes, sizes and details. Then let your imagination run wild.

Costea: Natural materials act and behave differently than manufactured materials. Treatment of natural materials differs from that of manufactured materials.

Waite: Meet with the stone supplier/fabricator early in the design process and visit the quarry. Discuss the proposed details and technical issues such as bedding, type of mortar, installation, finishing, etc.

Have you ever encountered difficulties when working with natural stone on a project? If so, when looking back, what would you have done differently?

Bernhard: Like any product, difficulties can occur if you don't think through how the product is used, exposure and durability. Consider finish/texture to accommodate slip resistance with exterior application, specifically around pools and wet locations; consider resistance to wear, UV exposure and chemicals; know the material's performance specifications relative to your installation, and if test data is not available, have the materials tested.

Costea: Using natural stone at or around certain type of pools can be challenging while providing a surface that will not react with the pool water.

The stone flows seamlessly from the interior living spaces to the outdoor design of the Arizona residence.

Waite: We have encountered difficulty in securing the original stone in the restoration of Tweed Courthouse, after the quarry closed. We have not had difficulties with stone we specified if the proper research and evaluation was done to avoid surprises.

Do you think there is anything the stone industry can do differently to improve the process for architects and designers who work with natural stone? If so, what?

Bernhard: Based on personal experience, the more architects and designers are

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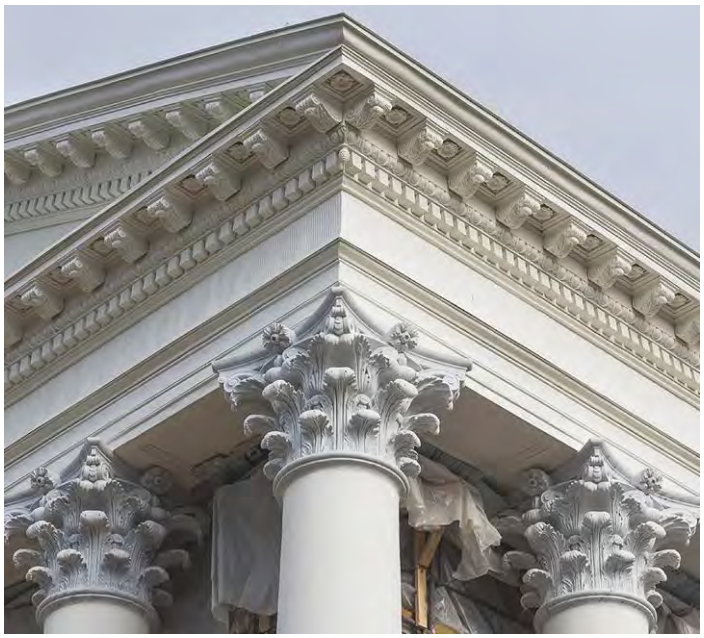
John G. Waite, FAIA of John G. Waite Associates, Architects PLLC in Albany, NY, is a strong advocate for the use of natural stone either to match existing stone in historic buildings or to be compatible with historic materials in new construction.



educated on the merits of natural stone, the more stone will be used — the more that is known about natural stone, the more appealing it is. Generally speaking, this knowledge results in better design.

Costea: Stone selection or review can be daunting for clients, and an online resource to view available stone materials would help and offer the client a clear vision.

Through the efforts of the Natural Stone Council (NSC), more stone producers are receiving their ANSI/NSC 373 Sustainable Production of Natural Dimension Stone certification, which is a testament to running an environmentally friendly operation. Do you see the benefits of selecting stone from one of these quarriers, as opposed to someone who is not certified? Why or why not?

Waite and his firm recently created new construction documents to restore 16 white marble columns and capitals of the rotunda at the University of Virginia in Charlottesville, VA.

Bernhard: If an environmentally friendly supplier is available, all other variables being equal, this responsible operation is the preferred source. Based on my observation of the growing awareness and sensitivity to sustainability in schools and from clients, environmentally friendly certified operations will continue to grow in importance.

Costea: If possible, both we and our clients prefer to use sustainable materials, however, the biggest impact on stone selection is the location of the quarry. If a sustainable quarry is within a reasonable distance, as not to add cost due to transportation, it would be the quarry of our choice. ■

Author's Note: Heather Fiore contributed to the content of this article.

Waite advises those new to working with natural stone to meet with the stone supplier/fabricator of a project early in the design process and visit the quarry, as he did with the rotunda project. "Discuss the proposed details and technical issues such as bedding, type of mortar, installation, finishing, etc," he said.

The healing power of stones in gardens and memorials

Natural stone becomes a vehicle for healthy, transformative journeys

BY MEGY KARYDES

What makes a healing garden, a *healing* garden? And can natural stone help someone mourn and heal from loss?

Virginia Burt, FCSLA, FASLA, often gets asked what makes a garden a healing garden and her answer is always the same. "Any garden is healing and research proves it to be so," said Burt, principal of Virginia Burt Designs, and a landscape architect who creates landscapes and gardens of meaning for residential clients, healthcare facilities and unique special projects. "It has been my experience, however, that deep transformative experiences can be facilitated in gardens designed specifically for healthcare settings."

There is no shortage of research showing the power of spending time in nature. The scientific benefits of clocking outdoor time range from elevated moods to better concentration.

What is new is the mounting scientific evidence that healing gardens are helping patients undergoing cancer treatment, Alzheimer's disease and other health ailments. It's no surprise that more hospitals and healthcare centers are adding healing gardens to their campuses. The American Society of Landscape Architects even maintains an entire professional network of consultants who specialize in designing therapeutic gardens.

While Burt maintains that any garden can be a healing garden, she admits that when she designs gardens specifically for a population, such as people with cancer, autism, or a particular segment of seniors, she and other such designers must consider the needs of the patients (and staff) as part of the design process.

"You're making choices that support people going through that journey," she added.

THE POWER OF NATURAL STONE & INTENTION IN A HEALING GARDEN

The design of a healing garden is important to its purpose, and natural stones are integral to the process since they serve as the bones of the garden. In some cases, natural stone plays a different role, especially after someone dies.

Natural stone markers and memorials are an important way for families to mourn the loss of those they love as well as aid in the healing process.

"After someone dies, loss will always exist," said Alexandra Morosco, artist and founder of Washington-based Morosco Fine Arts, whose primary work is as a sculptor in stone and bronze. Her focus, she said, is telling "stories in stone."

"What I strive for is that my clients experience some form of growth and healing threaded through their journey of loss," she added. "I feel working together creatively taps into some vein that allows a unique opening to healing and conversation. My work is sort of like an art therapy process with the stone being the actual therapist."

"People like stone," admitted Burt, noting that the size, type, color and texture of

Sculptor Alexandra Morosco has focused her work on co-creating sacred healing spaces, sculptures, and memorial stones through her unique process of deep listening with her clients since 2013. Emergence, opposite page, is one of her Legacy Sculpture pieces.

"An Chloch" (The Stone) - Fisherman's Memorial, Inis Oirr, Aran Islands, Ireland. This monument was created to honor fishermen lost at sea in Ireland. Placed with a backdrop of the sea and horizon as its environment, it holds a place for people to come and sit, pray, or simply mourn, and, hence, heal, says Alexandra Morosco. Photo courtesy of Cormac Coyne.

stone used in a healing garden will be dependent on the project's intent.

"If you're looking for it to be relaxing and meditative, you're going to pick a material that you love to look at, that will inform those goals," she added.

Intention plays a big role in Morosco's project. She works as an interpreter or "channel," as she calls herself, for her clients. "I listen deeply to a story, a memory, a dream or a desire and work to bring that to life through the vehicle of stone or other mediums such as wood, bronze, or landscape elements," she explained.

Morosco believes there is no better place to heal than where growth occurs, whether it be botanical or an internal spiritual growth. "Gardeners everywhere know that they feel best when they have a healthy garden," she said. "When the intention of a landscaped or built environment is that of healing — the healing effects can be immense."

Healing gardens aren't restricted to places like hospitals or healthcare centers. Morosco is currently working on a sculpture for a private garden where the central theme is healing.

"In my work, the commissioning process in itself is an act of healing," she explained. "My current client is very excited about this process, and it gives her something to look forward to and a will to see something through. It means so much to her that she actually took a chip of the stone with her into (cancer) surgery, feeling that this stone and the project had so much power, it would lend her strength through the surgery. This, to me, is evidence that stone has amazing strength and power in ways that are hard to define, but no less real to those who feel it. We see that most every culture or religion has had some form of stone that they held in their hand, from prayer beads to worry stones, there seems to be an ancient thread."

Burt has a number of stories in which healing gardens have played a powerful role in the healing process. In some cases,

Carved from Indiana limestone, this memorial was to honor a mason. Alexandra Morosco suggested that a hammer be carved into the stone, as if he just set it down on the stone for the last time. Photo courtesy of Alexandra Morosco.

it doesn't even happen in the garden.

She was working to create a bench for a healing garden using a large boulder, and a man who was building a piece of steel to support the boulder visited her in the shop with his then-five-year-old daughter to discuss the project. His daughter, for unknown reasons, hadn't spoken in two months. He picked her up and put her on the bench, which Burt had designed to seem like it was hugging you.

"She was just as happy as can be," remembered Burt. "She was there, having a quiet smile on her face."

When the time came to leave, he walked over to her and said, "OK, we have to go." As he reached for her, she said, "I want to stay here."

One of the common reasons designers and architects cite stone as powerful is because stone gives gardens grounding energy. "Sometimes we see gardens that are all color and fire — but we also need grounding energy to balance our energy," Morosco said. "Even common stone, such as granite and fieldstone, has an immense presence of an ancient knowing, holding space in the garden, like a sage or wisdom keeper. I believe that people are drawn to stone in a garden for this reason, so if it is a sculpture, standing stone or stone bench, it is all earth energy and I think people need that, especially when undergoing treatments that really challenge the body, fatigue them, or when there is a lot of emotional 'thinking' about their illness."

"HEALING" MARKERS THROUGH PERMANENT SCULPTURES

While hospitals and health centers are among the first places we think about when we think of healing gardens in a non-residential setting, there are other places where natural stone and healing takes place.

"For centuries we have witnessed the emotional healing that occurs at a cemetery," said Morosco. "I don't think it is

Death is inevitable but how we choose to honor those who've passed can be part of our healing process, too. The Beckoning Hand by Alexandra Morosco was a collaborative process with a man who lost his wife of more than 20 years. Using one of his wife's favorite materials, Vermont white marble, they created not only a loving memorial but gave the husband the space to journey through a loss that was deeply personal. The side opposite the hands has a distinctive square and cylindrical drawer carved into it, that is "from the core" of the stone and is indeed, a core — an intimate jewel box that holds their wedding bands together. Photo courtesy of Alexandra Morosco.

only the inscription, I believe the stone itself holds those in mourning. I have witnessed this by creating a monument for fishermen lost at sea in Ireland, in the Aran Islands. It is not a healing garden, but it is a healing stone."

Placed with a backdrop of the sea and horizon as its environment, it holds a place for people to come and sit, pray or simply mourn, and, hence, heal, added Morosco. "They can share the space with others, which creates a place for conversation, or they can visit it alone, and share the space with just the stone. People have witnessed and experienced amazing healing there at that stone."

Another form of "healing garden" is not for the people in it, but for the environment, Morosco noted. "Sometimes stone, or a water feature, can be the only thing strong enough to balance other elements, such as destructive past stewardship, visual blights, or noise pollution, say from freeways or trains. This can merge with Feng shui, and is worth looking at stone as a viable solution to help heal a space, in addition to becoming a healing garden itself."

She's currently working on another memorial that many who work with natural stone will appreciate: It's for a stone mason.

"This is a more traditional memorial, carved from Indiana limestone," explained Morosco. "The man who passed was born and raised in Indiana and started his life-long career as a mason in Indiana, working this true and great stone."

Morosco suggested that a hammer be carved into the stone, as if he had just set it down on the stone for the last time. While it's still a work in progress, according to Morosco, his wife said in a meeting that upon seeing the hammer carved in stone, "I can just see him picking up his hammer, always wanting to get back to work. He so loved his work..."

"The element that I witness that is most extraordinary is the true and deep healing I see," said Morosco. "Each person I work with, I engage in a very meaningful and often long series of conversations, emails, and exchanges. We journal together. We journey together. They are experiencing the process of acceptance and grief and loss, and as I feel into their loss, I am experiencing true purpose and calling. I craft An Invitation to Remember, and their memory lasts forever when carved in stone. As a carver, every day I feel I have no time to waste and pray my hands hold out for many more sculptures and memorials to come." ■

Adapted from an original appearance on usenaturalstone.com.

Building the future from a piece of the past

The benefits and design options are endless when you choose to reuse, repurpose, or recycle historic natural stone into your project

BY STEPHANIE VIERRA, ASSOC. AIA, LEED AP BD+C

Left: These Big Dig cobblestones have a traditional patina that blends into many environments. Right: Semi-dimensional reclaimed granite blocks — raw material harvested. Photos courtesy of Stone Farm Living.

Have you ever wondered what happens to building materials after they are created, installed and served their useful life? Many disposable products have entered the marketplace over the years and often these types of products end up in landfills after they are used or wear out. Today homeowners, architects and contractors are instead seeking materials that make a longer-lasting impression on their projects and serve more than one useful life. This is part of a growing movement to reduce waste, conserve resources and create more-sustainable buildings and a sustainable way of life.

Natural stone can easily be reused, repurposed and recycled into new applications and projects. From whole buildings to building elements such as flooring, walls or countertops, and landscape components including pavers, blocks, steps, treads, landings or decorative accents, stone offers a wide range of options for second-life designs. Natural stone is only enhanced over time as the patina improves with age and its technical characteristics tend to remain unchanged. Stone speaks volumes about the quality of a project, as it can perform and look beautiful for many lifetimes.

To incorporate a recycled stone may take some extra time at the outset of a project and close coordination throughout design and construction. But the rewards are worth it. Not only are you saving a valuable part of history, but you are also letting the stone continue to tell its story and be a part of a new chapter in time, contributing to fewer materials ending up in landfills, and saving resources that would otherwise be used to create new materials. Using stone in the project may also qualify for credits in green-building rating systems such as LEED and the Living Building Challenge (LBC). These rating systems are intended to help create buildings and communities that reduce energy use, are healthy, enhance the environment and contribute to a more sustainable future. Conservation of materials is becoming increasingly important within these programs as well as within green construction codes that are emerging and being adopted across the country.

European cobblestones ready for reuse in a new installation. Photo courtesy of Stone Farm Living.

Additionally, the green standards for natural stone, known as ANSI/NSC373 Sustainable Production of Natural Dimension Stone, and the Chain of Custody standards are accepted within both LEED and the Living Building Challenge. Within LEED, credits can be earned in Option 1 of LEED v4 BD+C and ID+C Material Resources credit Building Product Disclosure and Optimization — Sourcing of Raw Materials, provided that the facility and/or quarry operation has earned certification including either optional credit 7.2.1 (Ecosystem Boundaries) or 7.2.2 (Environmental Impact Assessment), and has made its scorecard publicly available. The Living Building Challenge supports the use of natural stone through the ANSI/NSC373 aligning within the LBC 3.1 Material Petal, in the Responsible Industry category. Consult a sustainability professional or architectural firm about entering into the LEED or LBC process to ensure you are using a stone that can be provided in the quantity, timeframe and budget, while also meeting the rating system's requirements.

It is important to first define the project. What look, color, style, function and application do you wish to achieve? Then, get to know the local environment. Are there historic stone buildings or stone quarries in your area that have played a significant role in the design and architecture of the place that could provide a source of stone to reuse? Are there architectural salvage yards nearby to explore for materials waiting to be reused, repurposed or renewed? Are there stone fabricators and installers with experience in repurposing stone? Do the stone yards and fabricators have scraps left over from their fabrication process available for use? Do you have a preference for antique French limestone or Italian marble? The search for these materials may add time and resources to the project if you cannot locate a source nearby. But the result is the same — a project that will last for many more years.

There are recycled-stone sources around the country with inventory organized by type and source of stone and potential applications. Ask what types of stone are available for repurposing as you begin your search. Typical sources may come from curbing, cobblestones, granite blocks, pavers, posts, foundations or quarry tailings from the fabrication process. In many cases the stone can simply be cleaned up and prepared for repurposing into a new application using the same methods as newly fabricated stone. But fabricating a new design element from old stones is also an option.

The Recycled Granite Franchise, headquartered in Schererville, IN believes no stone should ever end up in a landfill. It recycles 2 million tons of stone waste every year and its business is growing, demonstrating that recycling stone contributes to job creation and waste diversion. Most of the stone collected is post-consumer waste from the granite countertop industry, but the company also recycles stone materials being torn down from hotels

The lower part of this breakfast bar is an example of many projects that include recycled split-stone veneer. The stones can be dry stacked directly over a variety of surfaces including drywall, brick, cement board, etc. Photo courtesy of RecycledGranite.com

and commercial buildings. Its inventory, most of which is granite — one of the oldest, most abundant and durable building materials — consists of stones originally quarried in Brazil, China, India and many other countries. Partnering with natural stone fabricators helps reduce disposal costs for the industry.

Recycled stone can be installed the same way any other tile or paver is installed. Examples include projects that have used thin-set mortar for lightweight wall veneers or others that simply dry-stack the stone, and pavers that have been installed using polymeric sand, which effectively locks them in place. Recycled Granite also creates an artistic line of products such as wine stoppers, jewelry, planter boxes and more. The idea and intent is to use everything possible.

The key to success is in knowing how to get the highest value out of the material you are working with, and Recycled Granite offers these tips:

- Choose your color palette first; a timeless color will guarantee lasting beauty and appeal. They offer color blends that will match any décor, and can create custom blends at affordable prices. They also have a variety of shapes and sizes to meet all types of needs for interior and exterior applications.
- If you see something you like, get it while you can. There is a chance you won't see it again, since recycled stone choices may be limited. However, they say that their stone is guaranteed for a million years.
- Search the Internet for ideas and sources of stone to reuse or recycle. Not only will you find thousands of photos and images of stone design ideas, you will also be able to locate stone sources.

In New England, where there is a rich history of stone quarrying and stone buildings, Stone Farm Living has

Left: This 1,200-sq.-ft. walkway at the Morton Arboretum in Lisle, IL, represents over 25,000 lbs. of granite diverted from a landfill. Right: Denali Blend of Recycled Granite pavers offer the richest and darkest hues of granite for a dramatic, high-end look. Photos courtesy of RecycledGranite.com

harvested cobblestones from historic Faneuil Hall in Boston, paving stones from the Boston Common and even cobbles from Belgian villages, all for new use elsewhere. The patina of stone is their passion, as it is unique and can't be faked. Patina is at the heart of what makes old stone so special — its texture, coloring, and graceful aging. What Stone Farm appreciates most about reclaimed materials is that they all have a story to tell — a history to be discovered and preserved. They and their clients understand and appreciate that using natural elements makes good design even better. Stone Farm recycles hundreds of 20-ton loads a year and generally gets the material

Left: This split-stone veneer wall is approximately 6 lbs. per sf., so there was no need for metal lath or grout. Right: Over 200 lbs. of white antique granite were dry-stacked in this backsplash and did not require any grout. The granite pieces are the cutoffs from the fabrication process and were split by people with special needs, through a program Recycled Granite calls Green Abilities, which creates jobs for people with disabilities. Photos courtesy of RecycledGranite.com

Left: Railroad trestle blocks pre-harvest. Right: Harvested railroad trestle blocks. Photos courtesy of Stone Farm Living.

from contractors who come across it in their work. Cobblestones, road curbing, granite foundation blocks and stone building parts are some of the bigger categories. Reclaimed stone veneer, standing stones, granite posts and millstones may also be available.

Of all the material Stone Farm harvests, sections of old buildings offer the biggest range of shapes, sizes and unique and varied pieces of old stone. Many types of buildings used stone elements as part of their structure, from early colonial residences using long granite planks as foundation stones, to 19th-century mills using granite for sills and thresholds. Since these stones were part of old buildings, they were often cut, carved, or had their surfaces textured, so the company thinks of them as having more-refined surfaces. Stone Farm often collaborates with its customers and designers to transform what may look like an odd-shaped piece of stone into something elegant and functional.

Harvested monolithic steps ranging in size ready for potential use in new projects.Photo courtesy of Stone Farm Living.

Left: Palette of stone after harvesting and ready for installation. Right: Stones installed in an exterior landscape design. These weathered gray and earth-tone pavers are a combination of granite squares and rectangles, which allow running bond and patchwork paving patterns with a loose joint. They are 4-6" thick with natural sides with no square over 18" x 18". Photos courtesy of Stone Farm Living.




Recycled stone step installations varying in design, number and complexity. Photos courtesy of Stone Farm Living.

Their advice to those who want to use reclaimed stone: Be prepared to handle variability in sizes, as the material was often handmade, which was common for old steps and landings. It is better to consider your project with a range of sizes that may work in use. Stone Farm encourages its clients to use their imagination, because old stone can be cut it into new products that provide a new function while preserving the old look and patina. There is a use for virtually every old stone — you just might not see it right away.

Reclaimed granite steps come from a variety of sources: actual old steps, curbing repurposed as steps, or granite slabs that are cut into steps. A monolithic step is a solid piece of stone generally from 6 to 8 inches thick. Regardless of where the material comes from, the surfaces are worn and weathered and come with a lot of character. It is important to consider the potential range of step materials, including the variety of finished installations, from simple to complex configurations.

No matter the type of project you are designing or constructing, recycled stone can play an important role in meeting your long-term goals. Keep an open mind and enjoy exploring the possibilities. You too will be making a sustainable contribution by reusing, repurposing or recycling stone with the added benefit of many more years of use and enjoyment. ■

Adapted from an original appearance on usenaturalstone.com.

Resources

- American Society of Testing and Materials, International www.astm.org
- Living Building Challenge www.living-future.com
- MIA+BSI: The Natural Stone Institute www.naturalstoneinstitute.org
- Natural Stone Council www.naturalstonecouncil.com
- The Recycled Granite Franchise www.recycledgranite.com
- Stone Farm Living www.stonefarmliving.com
- Stone Federation of Great Britain www.stone-fed.org/uk
- Sustainable Sites Initiative www.sustainablesites.org
- U.S. Green Building Council www.usgbc.org
- The Natural Stone Promotional Campaign www.usenaturalstone.com

Targeting architects-in-training to foster a love of natural stone

Two stone companies use quarry and fabrication facility tours to educate and inspire architecture students

BY IYNA BORT CARUSO

Photo courtesy of U.S. Stone Industries

Photos courtesy U.S. Stone Industries

A light industrial area of downtown Topeka, close to the Kansas state capitol building and abutting the riverfront, was targeted for a new minor league baseball stadium. There were 22 different proposals for the stadium, all designed by fourth-year architectural students in a long-running collaboration between Kansas State University and U.S. Stone Industries in Manhattan, KS.

It was never intended to be built.

U.S. Stone Industries launched the program in the 1980s, and while it's morphed several times over the years the goal has remained the same: expose students to natural stone. "It's educational but it's also about marketing as well," said Alan Harshbarger, the company's architectural sales manager. "Hopefully we become part of their network once they launch their careers, so if they have a question about stone or require stone for a project they have somebody they can call in their network who can help them out."

Photo courtesy TexaStone Quarries

The eight-week program involves much more than lectures and PowerPoint presentations. The students visit the quarry, tour the fabrication facilities and get hands-on with the stone. "We set up an area of the plant with all kinds of stone where the students can actually use hammers and chisels and grinders and work on the stone to get a sense of its size and weight. We have found it's a really good way to engage with young people," Harshbarger said.

Todd Gabbard, associate head of the university's Architecture, Planning & Design department, has run the accelerated summer program the last four years. "The notion that students are actually talking to product manufacturers and, in this case, seeing how stone gets turned into material for a building—that's the real value," he said.

In addition to opening up facilities to the students, U.S. Stone Industries offers scholarships for the winning designs in an amount "enough to get their attention," Harshbarger said. Last year, two students tied for first place based, among other factors, on overall design, the best use of the Kansas stone and how well it worked into the design. First-place winners were awarded $700 each. A third student earned an honorable mention and received a $300 scholarship.

Andrew Lindsey, a senior from Kansas State University, was one of the two winners. He named his proposed stadium Ad Astras Field, Latin for "to the stars." Lindsey's design used limestone for the façade as well as for pavers in what he described as an urban pathway that started from the capitol building, ascended as it neared the stadium and then wrapped around the building to provide panoramic views down onto the ball field. In his years of architectural studies, it was the first time he toured a facility related to a project he was working on. "It was a unique opportunity and I'm grateful I got to do that before I graduated," Lindsey said. "It still sticks with me the importance of using natural material to celebrate what's in the earth."

Through professors at Kansas State, U.S. Stone Industries rolled out a similar program ten years ago at Oklahoma State University in Stillwater, about a three-and-a-half-hour

Photo courtesy TexaStone Quarries

drive away. "They're almost mirror images of one another. They both have very good architectural programs and it's been very successful," Harshbarger said.

Harshbarger also has benefited from the connection on a personal level. "I learn something every time. It keeps me engaged. I walk around with a renewed energy and appreciation for what these students are doing and what they will do once they get out into the industry."

It's not unusual for companies to get behind designer education. Engaging students by introducing them to the product and the process helps foster what will hopefully turn out to be a lifelong appreciation of natural stone.

TexaStone Quarries, in Garden City, TX, invited more than 20 architectural students from Texas Tech University in Lubbock as well as members of the West Texas Chapter of AIA to participate in what was dubbed Stone Extravaganza. The group toured the fabrication and quarrying facilities, witnessed demonstrations on stone care and got to install veneer on a makeshift wall, among other activities. "We wanted them to participate and get hands-on as much as possible to get a feel for the stone," said Brenda Edwards, owner and general manager of TexaStone Quarries. It was also a chance for students to engage with working architects.

"We believe you can't wait until you've got architects in your office. You have to reach them before they actually get into workforce, and the best places to reach them is going to be in the colleges and universities," she said.

"Most universities don't introduce natural stone to their students so it was rewarding to see them so engaged and so interested in what we do and how we do it. Stone is a natural product," said Edwards. "And they were in awe of it all." ■

Adapted from an original appearance on usenaturalstone.com.

Quarry and Fabrication Facility Tours

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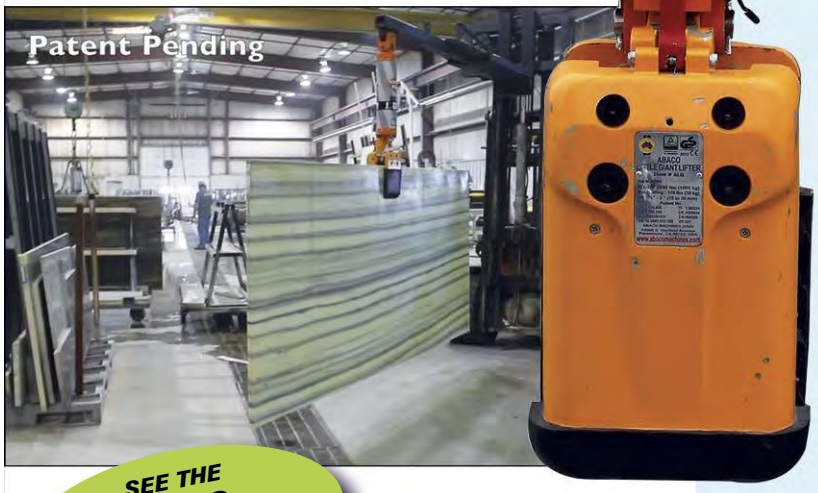

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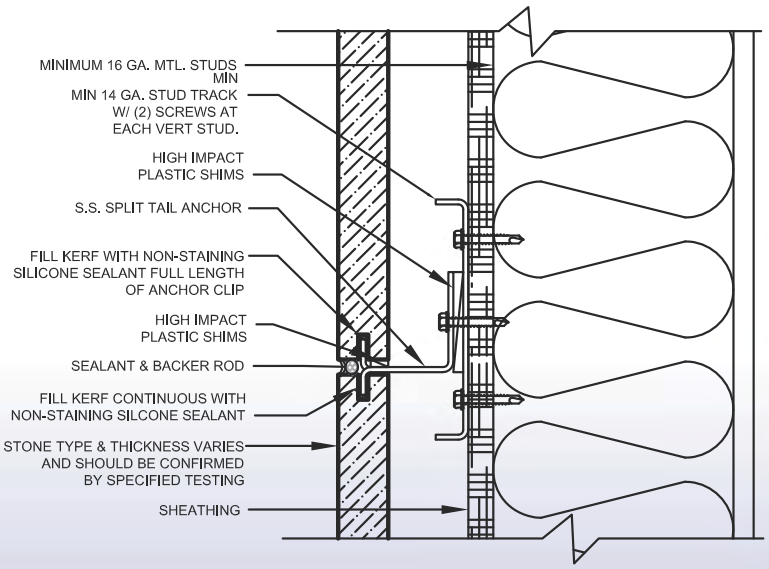
TECHNICAL Queries+Quandaries

By Chuck Muehlbauer, MIA+BSI Technical Director

Q: ***I'm looking at Detail #2 on Page 15-D-2 of the* Dimension Stone Design Manual. *It seems to me that the horizontal track mounted to the face of the studs is superfluous. Why can I not simply fasten the stone anchors directly to the studs and eliminate the track?***

A: In some cases, yes, it could be eliminated, but in the majority of cases I would prefer that it be included in the detail.

The horizontal track accomplishes two things. The first is load sharing between the studs. A stud frame is designed to resist uniform lateral loading (principally wind loading, although potentially also seismic). There is actually a wind loading for which we must design in interior environments. If the studs are designed to take uniform load and they are 16" (400 mm) on center, then it is important that EACH stud resists the load from only that 16" (400mm) tributary region. If you anchor the stones directly to the studs and you are only fastening to every other stud, then half of the studs will be carrying all of the load, while the remaining half of the studs carry none of the load. This double-loading on half of the stud quantity would result in loads exceeding their design capacity, and buckling of the studs is likely. Even if you chose to fasten anchors to every stud, in which case you might have 3 or 4 anchors in both the top and bottom beds of the stone, you may still not achieve uniform loading as intermediate anchors often do not assume their designed share of the load. The horizontal track is an effective method of equalizing the loads on the studs.



STAINLESS STEEL SPLIT-TAIL ANCHOR ON METAL STUD BACKUP WITH HORIZONTAL TRACK
(REF: Detail 2 on DSDM Sheet 15-D-2)

The second benefit of using the horizontal track is that it provides full lateral position adjustment of the anchors, so that the anchors can be placed at their optimum location on the stone panels, and not just where a stud happens to occur.

Pending the design and rigidity of the studs, you may be able to eliminate the track, however that usually involves over-design of the studs because you are only fastening to some of them. It may also force you to position anchors at less than optimum locations of the stone panel. You will find that the horizontal track is in many cases the most cost effective way to address these issues.

Q: ***I've specified an imported travertine for an exterior patio in a non-freeze/thaw environment. One of the local suppliers said they would not warranty it because they don't recommend travertine for exteriors. Why is there a prohibition of using travertine outdoors? Isn't it just like any other marble?***

A: Travertine, despite being referred to as "travertine marble" for decades, is actually a specific type of limestone. It isn't the stone fabric that causes the concern, it's the filler. All travertines have voids in them, which is just the nature of the product, and in nearly all cases those voids will be filled. The filler is commonly a resinous product, but since it is done in an overseas factory, we don't have control or even knowledge of exactly what product is used to fill those voids. In service, we frequently see discoloration of the fillers due to UV light exposure, and sometimes we also see dislodging of the filler. In your climate, travertines are sometimes used as exterior pavement surfaces, but in many cases they don't age well. That is likely the reason for the supplier's apprehension about providing it for your project. For the record, I'm in agreement with him on this issue.

Travertine quarry

CALENDAR OF EVENTS

American Society of Landscape Architects
Annual Meeting & Expo
Los Angeles, CA
October 20-23, 2017
www.aslameeting.com

Kitchen and Bath Industry Show (KBIS)
NAHB International Builders Show (IBS)
Orlando, FL
January 9-11, 2018
www.kbis.com/show
www.buildersshow.com

The International Surface Event (TISE)
Las Vegas, NV
January 29-February 1, 2018
www.intlsurfaceevent.com

Tucker Design Awards
Tobin Center for the Performing Arts
San Antonio, TX
February 25, 2018
www.naturalstoneinstitute.org/tuckerawards

MIA+BSI Annual Convention
San Antonio, TX
February 25 – March 1, 2018
www.naturalstoneinstitute.org/2018annualconvention

Xiamen International Stone Fair
Xiamen, China
March 6 -9, 2018
www.stonefair.org.cn

Coverings
May 8 -11, 2018
Atlanta, GA
www.coverings.com

Vitoria Stone Fair
Espirito Santo, Brazil
June 5-8, 2018
www.vitoriastonefair.com.br

American Institute of Architects
Conference on Architecture
New York, NY
June 21-23, 2018
https://conferenceonarchitecture.com/

ADVERTISER INDEX - FALL 2017

Monastery of Alcobaça: Designing with Natural Stone and Water in Portugal

BY VINCE MARAZITA, STONE TRENDS INTERNATIONAL

I don't know about you, but I am a real fan of history — especially history that I have not studied, and especially history of thought and architecture. Most of the monuments worldwide are made of stone, and much of our human expression throughout the centuries has been built in stone.

Last year while organizing a conference in Portugal for a group of architects, I asked the Portuguese stone association (ASSIMAGRA) what are the "jewels" of stone architecture in Portugal. Of course, being one of the main countries known for their quarrying activities throughout the centuries, Portugal is full of beautiful stone monuments, cathedrals and public spaces.

Photos courtesy of Vincent Marazita, Stone Trends International

It was during this tour that I first visited the Monastery of Alcobaça in Alcobaça, Portugal. This monastery is one of the largest churches in all of Portugal with a great timeline of stone use from the different centuries. Built from local Portuguese limestone, the church construction began in 1178 and was completed in 1252 — in less than 100 years. I'm not the only one to recognize the beauty and the importance of the Monastery, as it was listed as a UNESCO World Heritage site in 1989.

As with many 18th century facades in Portugal, you approach the main entrance and the towers appear obviously in an ornate Baroque style. As you enter the church, one expects to see highly ornate, gold-leafed altars, choirs and pews. Instead, it seems as if you walk into another world, and one that is one of the first and finest examples of Gothic architecture in Portugal. The most striking aspect of the church is the lack of ornamentation. Because of its simplicity, the vertical lines of the Gothic architecture and the beautiful stonework are even more pronounced.

Our tour was led by Dr. Ana Pagará, director of the church and one of the world's true experts in Cistercian monasteries — the order of monks who built this monastery. It is regrettable that there are not more Cistercians alive today. They were masters in the built environment and in manipulating waterworks within their stone design.

For example, they incorporated a complete underground system of cisterns and canals to divert water from the nearby Alcoa River. They had designed their water systems to facilitate both fresh drinking water and gray water, and even diverted the flowing river with fish directly into the large kitchen through a specially built canal.

To wash the kitchen and other floors in the building, Cistercians were masters at closing and opening canals to create water dams that would flood the floors for washing and then drain again once the floors were scrubbed. For those who love stone architecture, especially both stone and water design, this is a unique place to visit.

At the conclusion of our tour, Dr. Pagará shared that one of the best reference libraries in the world to learn more about the Cistercian Order of Monks is in Kalamazoo, Michigan — just a few miles from my hometown. I will be continuing my research on these masterful builders, and you, too, should consider making a visit to Portugal to see this amazing building. ■

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