the stone collective

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Pioneering stone as the 21st century's low-carbon, load-bearing building material

Agata Murasko

Contents

This book is illustrated by **Agata Murasko**, an architect and artist who creates spatial narratives which sit at the intersection of digital archaeology, visual storytelling and speculative design. In her collaborations, Agata develops imaginary, evocative and poetic narratives, where real is deliberately layered with fiction thus inviting audiences to craft their own unique interpretations.

Agata Murasko

Our mission

The Stone Collective exists to educate, inspire and enable the confident use of natural and repurposed stone in modern construction – with a focus on structural and load-bearing applications.

Our mission is to remove barriers to specification and empower architects, engineers, developers, quantity surveyors, and educators with the knowledge, tools and support to integrate stone into contemporary practice.

We're committed to positioning stone as a viable, sustainable alternative to man-made materials by promoting:

- transparent pricing
- access to comprehensive test data
- clear standards and specification frameworks
- complete, reliable solutions for today's construction demands.

Working early with quarries and manufacturers will encourage alignment with each material's optimal dimensions to deliver cost-effective, practical solutions that respect the stone's natural properties – and streamline the design and build process.

Together we're simplifying the use of stone for a more sustainable future.

The Stone Collective is an initiative founded by:

Hutton Stone
Johnston Quarry Group
Lundhs
Paye Stonework & Restoration Ltd
and
The Stonemasonry Company

We are a group of industry leaders committed to promoting stone as the sustainable, low-carbon, load-bearing building material for the 21st century.

Agata Murasko

Stone, an introduction

Stone is a strong, durable and abundant natural material that has been used to build beautiful buildings for millennia.

If you think of the buildings that have impressed you the most, chances are that several stone structures, such as the Egyptian pyramids or the great cathedrals of Europe, will be on your list.

The use of stone as a building material has diminished over time, largely due to the apparent usefulness of concrete, which is essentially a reconstituted form of stone. Concrete is versatile; it can be formed into any shape and reinforced with steel bars to provide tensile capacity, bending strength and reliable ductility.

Traditionally, stone is cut into blocks of a few hundred millimetres on each side and the joints between these blocks, usually made from cementitious or lime-based mortars, cannot carry tension. To make a traditional masonry structure stable against lateral loads such as wind or seismic forces, a significant amount of stone is required. According to Professor Jacques Heyman in his authoritative book, 'The Stone Skeleton' up to 98% of the stone is only there for its mass, which keeps the joints closed using gravity.

However, we can also clamp the joints shut by prestressing or post-tensioning our stone structures using steel bars or strands. Additionally, we can automatically cut and mill stone blocks into any shape that can be modelled in a computer.

Structural stone is often stronger than a concrete matrix and, in our experience, post-tensioned stone structures (designed using existing masonry codes of practice such as EC6) are roughly the same size as their reinforced concrete counterparts, making them materially equivalent in size, weight and strength.

Concrete, like stone, is fundamentally extracted from the ground. However, unlike stone, the cement in concrete is processed using intense energy and generating massive carbon emissions. Natural stone, on the other hand, is simply cut into blocks using saws that can be powered by renewable electricity. This results in less processing, less material handling and similar transport requirements for post-tensioned structural stone when compared with reinforced (or post-tensioned) concrete, but with far less embodied carbon.

Like precast concrete, stone panels can be accurately manufactured off-site and then simply assembled on-site, as we have been doing at Sagrada Familia in Barcelona. This reduces waste, increases speed and transforms construction from a noisy, dirty community nuisance into an interesting theatrical performance. Using this approach, we can create entire building structures using stone columns, stone beams, stone slab panels and load bearing (and lateral load resisting) stone façade panels – reducing embodied carbon by about 75% in the process.

This could result in beautiful sustainable buildings that will last for millennia, just like their predecessors.

Tristram Carfrae

Reframing stone

Edinburgh is a city made of stone – its geology is probably the most important factor in its formation. Its origins began on Castle Rock and go back as early as the late Bronze Age.

Historically, stone was Edinburgh's most ubiquitous building material. Before the wars, it was used everywhere no matter the function, scale or time period, from humble to grand, from domestic to public – it was the universal solution.

Texture, stone dimensions and quarry availability shaped the city as we know it now. In the past, standardisation naturally occurred based on the output of quarries and architects adapted themselves to it. There was an economy of scale and an inherent circular economy due to the sheer amount stone was built with, alongside the acceptance of all parts of quarry production according to use, for example the use of ashlar for front elevations and rubble for rear.

How we use stone now is a post war legacy, with the introduction of cavity walls and the favouring of 'clean' unblemished stone as a thin external cladding layer and rejecting rubble, tonal variation and the use of masonry as a load bearing material. This has led to huge waste in quarry production, a subsequent rise in prices and a perceived unreliability of stone as a stock item. In recent times stone in Edinburgh has been seen as an expensive, elite high-end finishing material – this can be seen in the countless office blocks and high rise residential buildings that are thinly and monotonously clad in stone tiles.

In order to re-develop a convincing case for stone, we need to understand its natural characteristics and how it is extracted and processed from place to place. It is a natural material and we should not necessarily expect it to have uniform aesthetics. Newly extracted stone should not be viewed and judged at the point of construction. When dealing with natural materials they should have a period of time to settle and unfold appropriately within their environment. The evidence surrounds us in Edinburgh and we should take meaningful inspiration from its historic past and in so doing enjoy the significant financial and carbon cost benefits that are then instantly possible.

There is merit in unpicking historic construction as more often than not it was inherently sustainable and resourceful. The limited palette of local materials and efficiency of construction was refined through repetition. By applying similar principles to modern contexts, we can simplify and decarbonise our work, contributing to a sense of place and identity through re-framing stone's perception as a utilitarian, economic and beautiful primary building material.

Natasha Huq & Marcus Paine

Pierre Bidaud

Graphic statics in support of stereotomy

Ancient intuitions of geometric equilibrium

Since the earliest days of construction, builders have sought to understand how to keep stone structures in balance. Leonardo da Vinci (1452–1519) was one of the first to graphically represent the deformations of an arch at the point of failure, anticipating the concept of hinges. The foundations of graphic statics began to emerge in the 17th century with new tools such as the force polygon. This is a geometric figure constructed by placing, to scale, the vectors of the forces acting on a point end to end. If the system is in equilibrium, the polygon closes – the last vector returns to the origin of the first. Hooke also proposed an analogy between the shape of a tensioned cable (funicular) and that of a compressive arch.

The concept of the line of thrust

The line of thrust represents the path of compressive forces within a structure. If this line remains entirely within the thickness of the masonry, the structure is stable. The concept was formalised in the 19th century, especially through experiments using wooden or plaster models (Barlow, 1846), where the force trajectories became visible through inserted hinges or wedges.

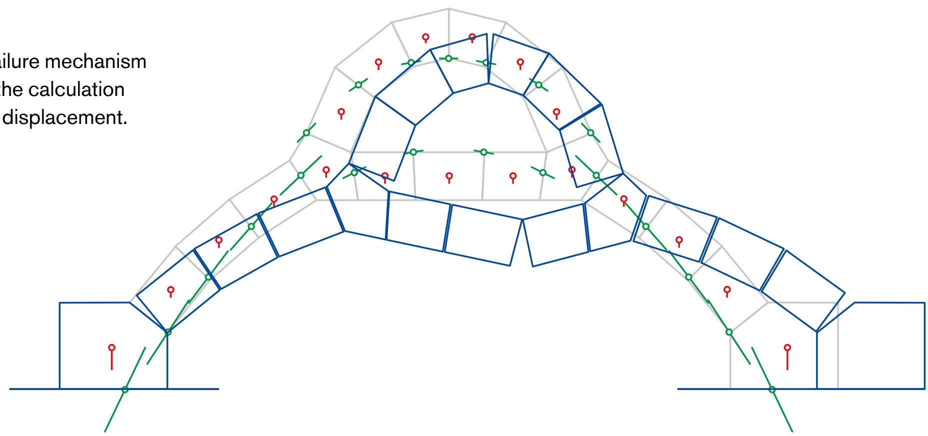
A science of drawing serving structural design

Graphic statics is a method for resolving the equilibrium of structures using geometric constructions. In the 19th century, engineers including Méry and Henry Moseley developed precise drawing-based methods. These became central to the design of masonry, metal and timber structures – long before the age of numerical computation. Graphic statics allows for the identification of force paths and the adjustment of geometry accordingly. Many engineering works were dimensioned using this approach.

The theoretical revival by J. Heyman

In the 1960s, Professor Jacques Heyman brought graphic statics back to the forefront in the analysis of stone structures. In The Stone Skeleton, he introduced a limit analysis model based on three simplifying assumptions: zero tensile strength, infinite compressive strength and infinite friction between blocks. If the line of thrust remains within the masonry, the structure is stable. He also introduced the concept of geometric safety factor, based on the minimum thickness required to ensure equilibrium.

Thrust line and failure mechanism associated with the calculation during a support displacement.



P. Nougayrèd

Digital tools for massive stone construction

Today, graphic statics is enhanced by powerful digital tools. Software such as RhinoVault and the Stabilithos plugin (for Rhinoceros) can automatically generate lines of thrust while overcoming the limitations of manual methods. These tools incorporate more realistic parameters: friction coefficient (μ), limited compressive strength.

They allow users to visualise lines of thrust, test different loading scenarios and observe potential failure modes through limit analysis. By including the mechanical properties of materials, these tools provide simulations that more closely reflect real structural behaviour.

A teaching method that's still alive

Graphic statics remains used as a teaching tool, both in engineering schools and among stonemasons. Whether drawn by hand or modeled digitally, it offers an intuitive understanding of the flow of forces. In full-scale experiments – such as the displacement of an arch support – the predicted hinges often match the cracks observed in reality.

Far from being obsolete, graphic statics remains a simple, robust and accessible method for designing massive stone structures. It deserves to be brought back to the heart of contemporary architectural and construction practices.

Paul Nougayrède & Paul Vergonjeanne

Failure mode during a support displacement of a structure, workshop 2022.

P. Vergonjeanne

Engineering with stone

Stone is most commonly seen as walls in historic buildings, thin cladding on new ones or internal finishes but how we use stone could hold the key to unlocking the low carbon construction of the future.

For many years we have been complacent with our structural materials, relying on homogeneous steel and concrete alone for all structural applications. This has become the case even where it makes little sense, large steel beams or concrete slabs are common even in low rise buildings where they are not needed. To tackle the climate emergency, we need to diversify our material use and especially look to use traditional materials in a modern way.

The main ingredient of concrete is stone; if local concrete is available then local stone is available. Stone is stronger and more durable than concrete, it exhibits negligible creep so less deflection, its higher density provides better acoustic and vibration characteristics as well as thermal mass. In all ways its properties are better than concrete, yet it is overlooked as a structural material.

Opposite: Niwa House features an entirely timber and stone superstructure. Within the roof, thin stone slabs work in compression, glulam beams in tension, and together they form a system around 150% stiffer than timber alone. The stone provides thermal mass that keeps the interiors comfortable. It is structure, architecture and environmental system rolled into one and is the first use of the system at full scale.

Architecture by
Takero Shimazaki Architects

Engineering by
Webb Yates

The main constraint on stone is that it comes in solid blocks of limited size. Using modern cable tensioning methods to link smaller blocks into larger prefabricated elements can overcome this. Structural stone is now being used to make beams, columns, floor slabs, trusses and foundations. Stone is useful not just in isolation, it can be combined with engineered timber products such as glulam and CLT to create low carbon structures fully based on natural materials.

The higher mechanical properties of stone enable smaller section sizes compared to concrete but we also need to be using materials efficiently, especially as stone can be more expensive per cubic metre. Trying to simply swap out a concrete flat slab for stone could result in a missed opportunity. To truly design sustainably we need to understand the material, its strengths and weaknesses, how it is shaped and assembled, and where it comes from. For example, stone can be used as thin slabs compositely on top of glulam beams to utilise the benefits of both timber and stone, producing an elegant exposed soffit that provides acoustic separation, thermal mass and is easy to assemble on site. New structural stone forms show what is possible when natural materials are used effectively.

Alex Lynes

Felix Koch

Felix Koch

The digital archaeology of stone

The surgical analysis of stone buildings has evolved into digital archaeology – a precise, non-invasive study that respects both material and maker. Traditional methods once relied on destructive sampling, core drilling and fragment removal to reveal construction techniques. Today, advanced surveying techniques allow us to read a building's history without physical harm, providing insight into construction methods while identifying the volume of stone suitable for repurposing.

Light Detection and Ranging (LiDAR) laser scanners provide a detailed mapping of the stone surface by emitting light pulses and measuring return times with startling precision. Triangulation, pulse and phase systems cast geometric nets across stone façades, creating point clouds so detailed they capture subtle undulations left by masons' chisels when originally constructed. These digital models record surface geometry at millimetre resolution, preserving craftsmanship not only in stone but as precise digital data.

Photogrammetry extends this capability by adding texture and colour to geometric measurements. Combined with laser scanning, it produces detailed digital twins documenting every surface variation – cracks, erosion, discolouration – creating archives that are both visually accurate and technically rigorous.

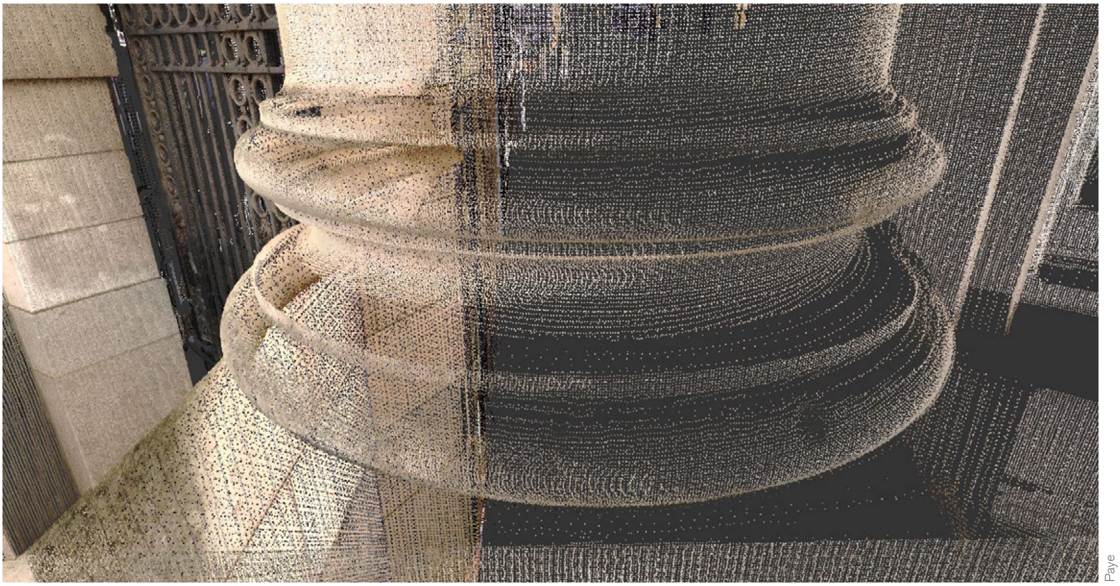
Ground Penetrating Radar (GPR) complements surface-based methods by examining masonry interiors. Like medical ultrasound reading hidden life within a body, GPR sends electromagnetic pulses through stone walls, returning with maps of internal mysteries. Stone thicknesses, voids, brick cores and structural discontinuities reveal themselves as shadows within shadows – technology as divination, reading masonry's internal poetry with scientific precision.

Together, these tools create comprehensive digital twins functioning as diagnostic instruments and cultural records. They enable the design team to understand the original construction methods, assess structural integrity and plan interventions with greater certainty. Crucially, they support an approach to repurposing the masonry by identifying the potential within the building as though it is a built quarry being assessed for mining.

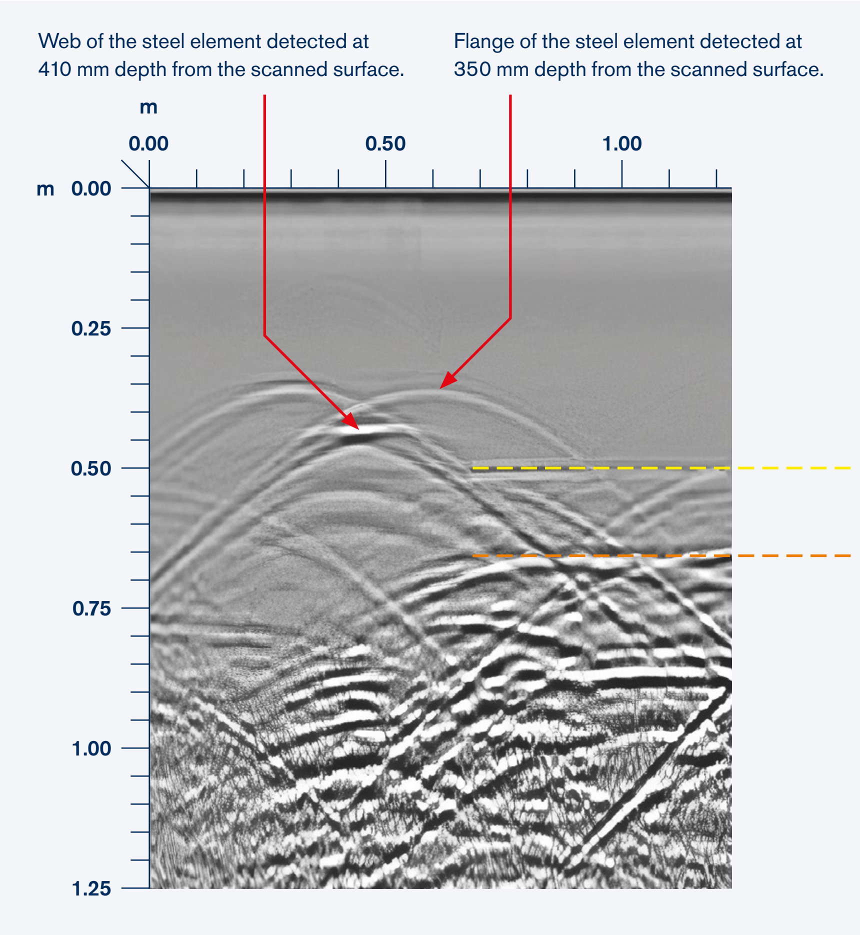
This integrated approach has transformed building investigation from invasive testing and approximation into an evidence-based discipline combining scientific precision with cultural stewardship. Designers can now discover repurposing potential within existing buildings, accurately determining original construction techniques. This precision provides certainty for sustainability targets earlier in design processes.

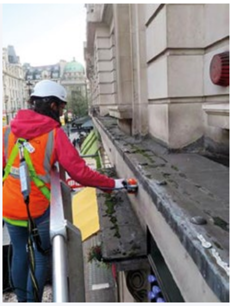
In this technological triumph, we find ourselves drawn closer to the human hands that first shaped these stones. Tool marks become immortalised in code, intentions decoded by algorithms that have learned to see with human eyes.

Robert Greer



A point cloud survey of circular column and base, Admiralty Arch, London.





Ground Penetrating Radar (GPR) scan at 7 Millbank to determine stone thickness and steel frame location.

Modernising the use of stone in structure

How can we modernise the use of stone in structural applications to ensure dimensional stone is reintroduced into the modern construction lexicon? Can stone compete through new approaches to structural systems that offer construction flexibility, prefabrication and easy integration?

Advances in engineering, calculation software and material development now allow the stone industry to address these demands. A handful of companies in Europe have begun tackling the challenge of prefabrication and are offering suites of solutions, many inspired by practices successfully adopted in the CLT sector.

One such solution, developed in the UK, is augmented stone; a prefabricated kit of parts consisting of stone elements connected by either steel connectors or concrete nodes. The system, which includes columns, beams and planks, is post-tensioned off-site, combining the flexural strength of steel rebars with the recognised compressive strength of natural stone.

By standardising elements, creating span tables and enabling hybridisation through metal connectors, augmented stone reassures main contractors and allows straightforward specification of components. Its goal is to make the transition from concrete or CLT frames to mineral, fire-proof structures both simple and practical, for commercial and residential buildings up to eight storeys.

Another key advantage is sustainability; augmented stone makes use of discarded material – stone rejected due to aesthetic imperfections – thus reducing waste and increasing resource efficiency.

In Germany, the approach focuses on prestressed, prefabricated and hybrid natural-stone elements. In prefabrication, components are produced with high precision. Any bespoke dimension that can be verified structurally is possible. At the same time, standardising types; lintels, beams and slabs, enables secure specification and reliable planning. Where required, individualisation remains possible, for example through automated robotic machining which enables profiled geometries, high-quality finishes and repeatable details without losing industrial cadence.

The range of applications is growing noticeably. An ongoing project in Bamberg, Germany, is utilising numerous prestressed lintels in external walls – more than 150 elements with spans up to 5 m demonstrate that large openings and reduced cross-sections can be combined without sacrificing mineral robustness and fire safety.

Equally essential is the forward view; prefabricated stone components can be dismantled and reused. This design-for-reuse capability creates value beyond the life cycle and supports the transition to a circular construction economy. To harmonise procedures and facilitate specification and approvals, Bamberger Natursteinwerk is working together with the German Natural Stone Association to develop a standardised rulebook for the use of natural stone as a load-bearing building material.

In this way, the German approach shows natural stone is not only a material of the past, but of the present and future. It offers a viable option for a climate-friendly transition in construction.

Pierre Bidaud & Hermann Graser

Pierre Bidaud

Loadbearing stone beam, 8 m long and 600 mm thick in Luget Stone,
for a large-scale project at the Stonemasonry Company's workshop, Ketton, UK.

Bamberger Natursteinwerk Hermann Graser

Prestressed lintels with spans of up to 5 m at the workshop of Bamberger Natursteinwerk, Germany.

Agata Murasko

Agata Murasko

Innovative hybrid bridge design

Marrying tradition with innovation for sustainability

The Lower Thames Crossing is a proposed footbridge designed as a collaboration between Eckersley O'Callaghan, A is For Architecture and The Stonemasonry Company. The project showcases a groundbreaking approach to modern infrastructure by utilising the art of stone masonry, combined with contemporary engineering techniques and sustainable materials.

Reimagining stone in modern engineering

Stone has been a fundamental material in bridge construction for centuries due to its exceptional compressive strength and durability. The demands of modern infrastructure such as higher loading capacities, longer spans and stringent vibration standards, led to the dominance of steel and concrete. These conventional materials, while versatile, come with high embodied carbon costs, long-term maintenance and end of life challenges.

This bridge design reintroduces stone as a primary structural component, capitalising on its sustainability benefits and structural capacity in its arched form. The arches are constructed from limestone, which boasts a compressive strength equivalent to ultra-high-strength concrete but with significantly lower embodied carbon. Limestone, as a naturally occurring and locally sourced material, requires minimal processing, thereby reducing environmental impact. The use of 'unloved' quarry stone – essentially waste material deemed unsuitable for aesthetic applications – further enhances the circular economy and cost-efficiency of the project.

Structural innovation with prestressed stone arches

The bridge's main structural elements are prestressed stone arches that rise gracefully from either side of the crossing, meeting at a central pier strategically located in the verge between an off-ramp and the main A-road. These arches are designed in an inverted catenary form, optimising the natural compressive strength of stone and minimising material usage. The stone blocks are precisely cut using digital modelling and CNC technology, allowing for customised sizing that reduces waste and enhances structural efficiency.

The prestressing system, achieved through exposed and replaceable steel tendons, maintains the arches in a pure compression state, preventing load reversal during both installation and permanent use. This approach not only guarantees structural integrity but also facilitates inspection and maintenance, contributing to the bridge's longevity and adaptability.

Sustainable construction and embodied carbon efficiency

A key driver of this design is its commitment to sustainability. The hybrid system dramatically reduces embodied carbon, achieving an A1-A5 embodied carbon value of 198 $kgCO_2e/m^2$, significantly lower than traditional reinforced concrete or steel alternatives. Additionally, if demountable reuse and biogenic carbon are considered, the end-of-life embodied carbon could be as low as 121 $kgCO_2e/m^2$ easily achieving A++ on SCORS for Bridges.

A is for Architecture

The Lower Thames Crossing.

Merging tradition with digital design

The project beautifully bridges historical craftsmanship with modern technology. Utilising advanced parametric design tools, the team conducted a comprehensive form-finding exercise, resulting in a structurally optimised catenary arch shape. Finite Element Analysis (FEA) validated the performance and behaviour of the arches, ensuring that the design meets vibration response criteria while minimising material usage.

To further enhance structural efficiency, a panelisation algorithm informs the final size and arrangement of the stone blocks, maximising the use of available quarry stone. The stone fabrication process is fully digital, from 3D scanning of the raw material to CNC cutting and preassembly at the stonemason's facility before final installation on site.

Construction and maintenance strategy

The construction sequence is designed to minimise disruption, with combined central arch segments lifted into place during overnight closures using a mobile crane. The systemised approach ensures repeatability, allowing for future scalability in other locations. The exposed prestressing tendons are easily accessible for inspection and replacement, ensuring long-term durability with minimal maintenance requirements.

A vision for sustainable infrastructure

This innovative bridge design revives the use of stone in modern infrastructure, setting a new benchmark for sustainable construction. By intelligently combining the ancient art of stonemasonry with cutting-edge digital tools, it achieves a harmonious balance of structural efficiency and environmental responsibility while looking beautiful.

Rob Fuse

Case study
Coulouvrenière by Atelier Archiplein

This four-storey stone residential building located on an exceptional site on the banks of the Rhône in Geneva facing the river was designed by Geneva-based architectural practice Atelier Archiplein for the Nicolas Bogueret Foundation. The project was guided by three elements; the use of natural materials, stone and wood, the search for the best possible integration into the site for a building of modest size and lastly the chosen typologies, notably the distribution by passageway.

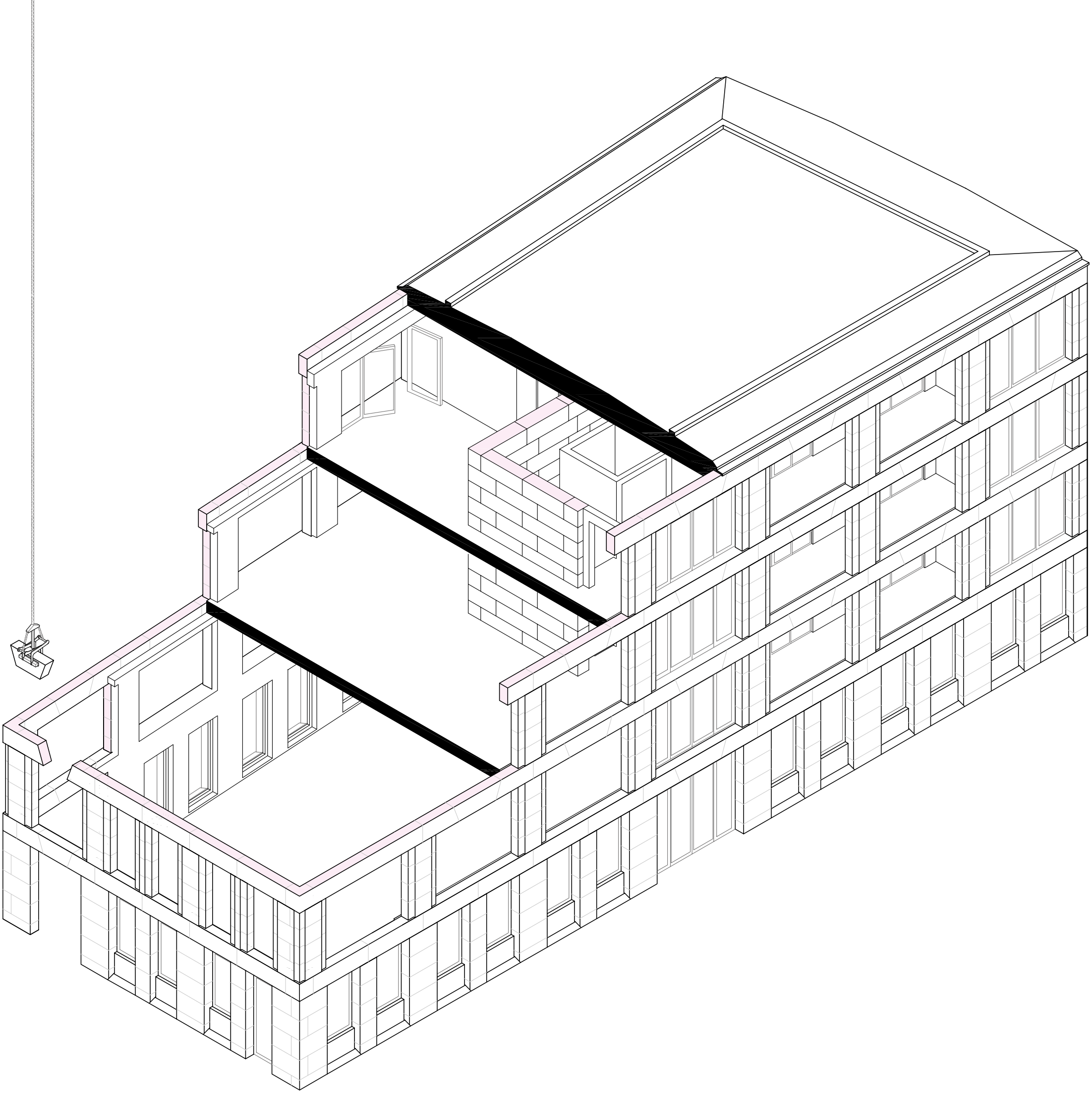
Each one of the ten social housing apartments has south facing passageways that can be used as an outdoor space, with large bay windows to the north that open onto the Rhône, extending the interior space into the greater landscape. The project proposes a succession of thresholds to accompany inhabitants from the street to the Rhône in a path that is intended to be open while guaranteeing privacy.

The project developed a simple and rational architectural language that combined stone and wood. The entire vertical structure is made of solid stone. The interior load-bearing wall and timber floors reveal the raw beauty and strength of the materials both from the outside and within the heart of the building.

The floor plan is based on the principle of a load-bearing solid stone façade forming the outer shell of the building, combined with an interior core made of solid stone. This results in a free and open plan that can be inhabited with lightweight and reversible partitions, defining the living space.

Building with natural materials offered the opportunity to question the current modes of building production in light of environmental and climate challenges. This search for alternative approaches aims to respond to the urgent need to overhaul existing models while maintaining a connection to centuries-old construction know-how.

11h45 / Atelier Archiplein



Architects
Atelier Archiplein

Location
1 rue de la Coulouvrenière, 1204 Geneva, Switzerland

Completion
2023

Surface area
1,100 m²

Team

Project management
Francis Jacquier

Structural engineering
B+S ingénieurs

Acoustics engineering
Batj

Structural work
Grisoni

11h45/ Atelier Archiplein

Case study

Saint-Bodon House by Christophe Aubertin

Architect and founding member of Studio Lada, Christophe Aubertin created a house for his client and her three children in Nancy, France that combines stone and timber in a celebration of craftsmanship and contemporary design. The house revives traditional trades and techniques through stone arches, timber frame joinery, standing seam roofing, arched windows, floors and tiles in local stone and bespoke spruce furniture. The result is a building with a compact volume and rational layout that is both beautiful and efficient.

Stonemason Sébastien D'Elia specified Migné stone, quarried in Poitiers which was left exposed in order to explore the full aesthetic potential of stereotomy; the art of cutting and assembling stones. Crepey Stone from Nancy was used for floors and tiles.

Stone walls were reduced to 25 cm with stability provided via a composite timber floor system implemented by carpenters Paul de Rambures and Fabien Paris. A large bay window on the north elevation of the house features a taut curve that limits the formwork to its upper part, while the use of arches in a row on the street side allowed the stonemason to completely eliminate it.

Olivier Mathiotte

Olivier Mathiotte

Olivier Mathiotte

Architect
Christophe Aubertin

Location
Nancy, France

Completion
2024

Built area
155 m²

Collaborators
Caique Da Costa
Stephanie Dunand
Florian Faucheur
Nathan Illy
Zoe Teulet

Team

Engineering
Stono
Terranergie

Stone construction
VRD GO CRBM
D'Elia Stone Construction

Roofing and framework
de Rambures & Paris

Plastering and insulation
Laurent Fenêtres
SK54

Carpentry
Cagnin Carpentry
Alexandre Hubert

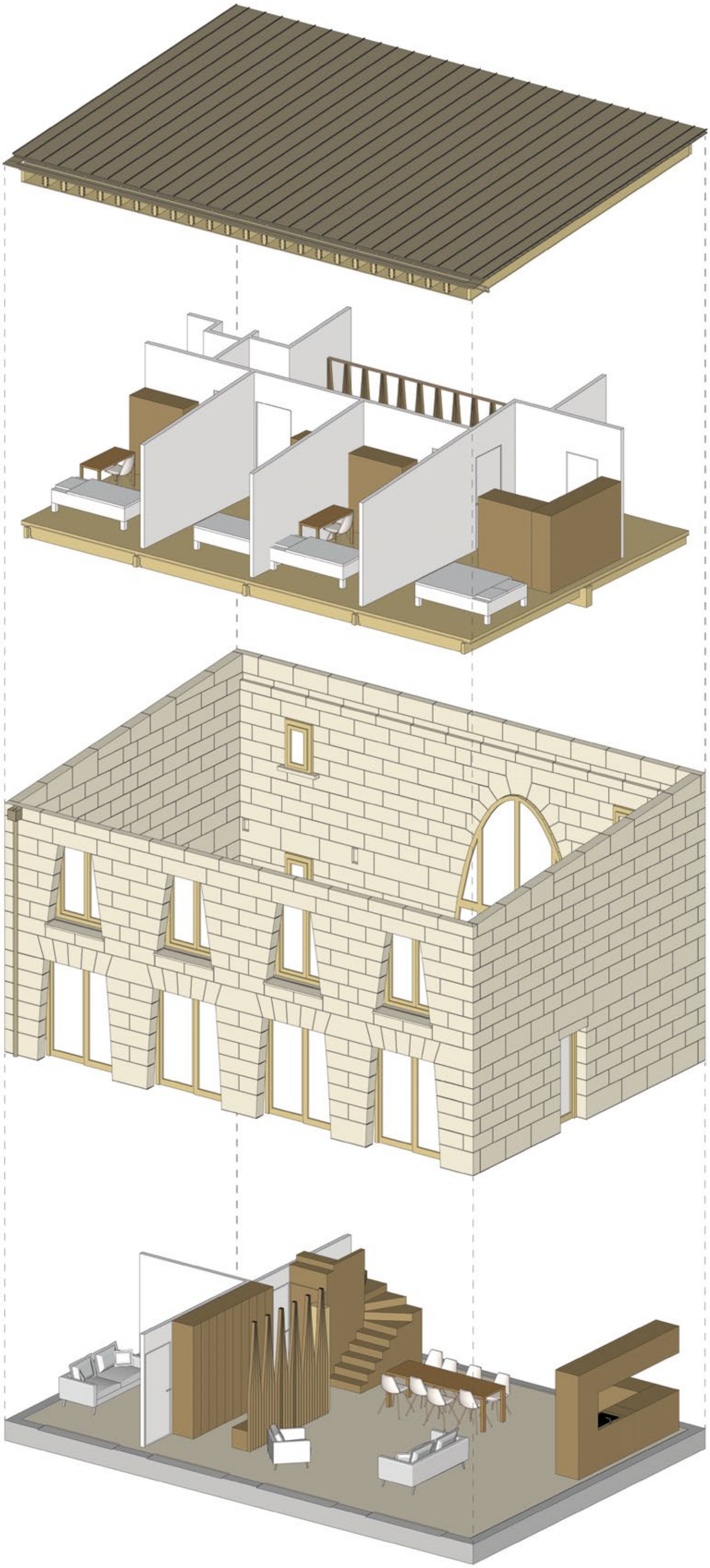
Marblework
Lembo marblework

Ventilation electricity
AdElec

Plumbing
Vachon

Heating
MEV2C

Metalwork
Rodriguez metalwork



Case study

Social housing 2104 by Harquitectes

Designed by Barcelona-based practice Harquitectes in response to a commission by the Balearic Institute of Housing (IBAVI), this social housing scheme comprises 25 units for elderly occupants.

The project's distinctive strategy embraced the practice of 'urban mining' with demolition materials from the old school utilised as resources to construct the new building.

Once the demolition was completed and materials selected, nearly all the rubble was repurposed according to material type. Approximately 160 m^3 of sandstone was used to construct large blocks of cyclopean concrete with cement and lime mixed with the recycled marès stone forming 40% of the block volume and composed of large cobbles up to 30 cm in diameter, sandstone gravel, and picadís (sand from the marès). Each block was cut with a large disc saw from a 4 x 4 m^2 slab revealing the stones on the faces of the blocks.

The scheme features an L-shaped plan with blocks stacked to build load-bearing walls perpendicular to the street, supporting cross-laminated timber ceilings. On each floor, the walls reduce in thickness by 10 cm, allowing direct support of the timber panels and facilitating the speed of execution of the entire structure.

Perpendicular to the main walls, 13 cm thick partition walls, constructed with the same cyclopean concrete and resulting from cutting a 60 cm wide block into four 13 cm sections, tie the structure of the entire building together with the stair and elevator core.

The façade displays the structural system: the end vertical walls of the prefabricated block walls, which decrease in height on each floor and support the horizontal timber ceilings, and, as the façade of each apartment, floor-to-ceiling wooden balconies with a lateral opaque strip and Venetian blinds to protect from the eastern and western sun.

Architects
Harquitectes

Location
Palma de Mallorca, Balearic Islands

Completion
2024

Built area
1.610 m^2

Materials
Repurposed Marès sandstone

Collaborators
Anna Burgaya
Ángeles Torres
Cynthia Rabanal
Victor Jorgensen

Team

Quantity surveyor
Xavier Suárez

Structure
DSM-arquitectes

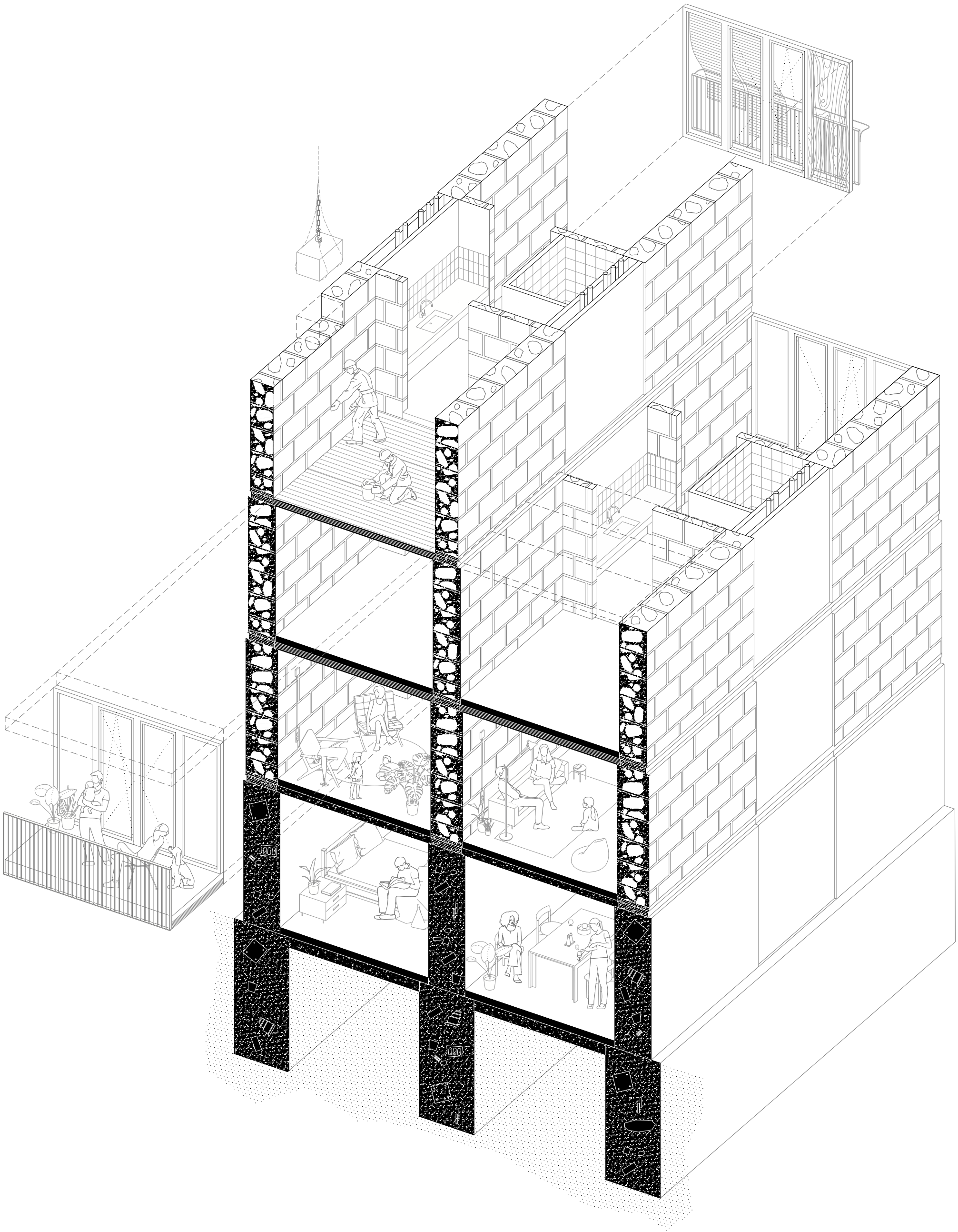
Engineering
M7 enginyers

Environmental consulting
Societat Orgànica

Acoustics
MC acústica

Lime construction expert
Joan Ramon Rosell

Adrià Goula



Harquitectes

Case study

317 Finchley Road, London by Groupwork

This landmark mixed-use development in North London comprises three distinct stone-framed buildings: Block A: nine storey, Block B: six storeys and Block C: four storeys. The scheme features a fully loadbearing frame, engineered for all gravity and lateral loads with no secondary structure required.

The project demonstrates that precision-fabricated structural stone can be effectively deployed in phased, urban, multi-block housing. Using Norwegian Larvikite in a dry-assembled, post-and-lintel system that allows reversibility and future reuse, the project exemplifies the re-emergence of structural stone construction in dense urban settings. The approach minimises carbon, simplifies construction and delivers long-term durability.

The original specification of Italian basalt was replaced with Larvikite, quarried and fabricated by Lundhs AS in Norway. The stone blocks were manufactured in-quarry by Larvikittblokka, while the lift shaft was manufactured by Hustadvika. This transition brought key technical, environmental and logistical advantages including; consistent dimensional accuracy with all stone manufactured to tight tolerances at source, documented performance with advanced test data produced specifically for this project, exceptional strength and durability suited for structural and weather-exposed applications, and certified sourcing, with full environmental product declarations (EPDs).

The post-and-lintel stone exoskeleton of the building supports precast floor slabs without any internal steel or reinforced concrete frame.

Groupwork

Architect
Groupwork | Amin Taha

Location
317 Finchley Road, London NW3

Completion
Late 2025

Engineer
Webb Yates

Stone Supplier
Lundhs AS
(Norwegian Larvikite)

Stone type
Norwegian Larvikite
(Lundhs AS)

Finished product
370 m^3

Stone elements
494 precut units

Average stone size
2769 mm / ~2100kg

Fabrication & delivery
7 months
just-in-time from Norway

This system draws on ancient principles, executed through modern fabrication and assembly techniques.

Efficient delivery was critical due to limited site access and storage. A carefully phased logistics plan allowed for just-in-time installation. The switch to Norwegian Larvikite and the project's success in coordinating digital design, off-site production and efficient delivery logistics, offer a viable template for future low-carbon construction. Larvikite's use reduced embodied carbon significantly: 80% less than a steel-frame equivalent with stone cladding and 55% less than concrete-frame equivalents. The stone ensures high durability and fire resistance, with zero maintenance required for the exposed frame.

Ben Ayling

Groupwork

Stone, a conclusion

Stone is one of the orchestrators of Earth's living system. Magma cools as it meets the air, hardening into rock that weathers into sediments and soils. From these, life emerges, and in dying, leaves behind mineral hordes that compress into new layers. Sometimes, slow currents in our planet's turbulent core distort these sediments and metamorphose them into fantastic materials. The cycle of eruption, erosion, sedimentation, drift and distortion is ongoing. If sped up, it would shimmer like a flickering film.

Look at any stone. Its stability is an illusion created by time's scale. It holds a story of becoming, dissolution and transformation. The way stone binds, fractures, endures, and catches the light is the record of its long gestation. Architects, engineers and masons harness these capacities, arranging them into another cycle of life and transformation. Every building is a daughter of geology.

Last autumn, I crossed Australia, traversing a thousand miles of red mountain chains. Quartz and sandstone formations stretched to the horizon, all sharing the same generative processes. A parent mountain, usually igneous, eroded into sedimentary layers. Wind and water carved patterns into them so that their bedding planes contained a secret script that anticipated their future. When these were cast up again by Earth's restlessness, they tilted at different angles, offering themselves up to erosion once more. That reworking produced a staggering variety of new forms: Uluru, Kata Tjuta and Kings Canyon. They became places of worship.

We cut stone to make structures that seem to withstand the passage of time. It allows us to believe that our communal bonds will outlast our own lives. We build societies on that belief. Shaped and sculpted, stone gives the illusion of stillness. Yet it is always eroding, already changing. The best masons know this. They see a pattern in the close grain of the material, a record of what it was and a promise of what it will become.

Hold it for a moment.
Feel it – it lives.
Now let it return to the dance.

Niall McLaughlin

Niall McLaughlin

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