AWARDS SPECIAL

StructuralAwards2024

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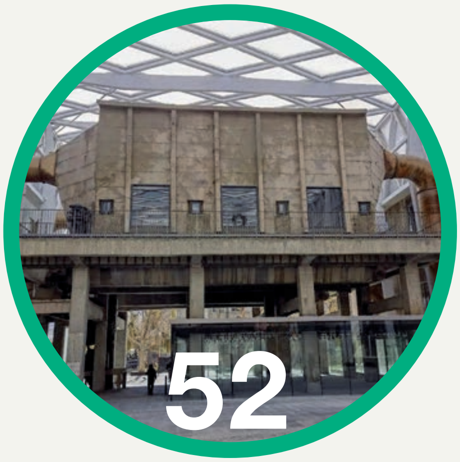


Foreword

Ingenuity in action

John Orr, Chair of the Structural Awards Judging Panel, reflects on the quality and breadth of this year's entries.

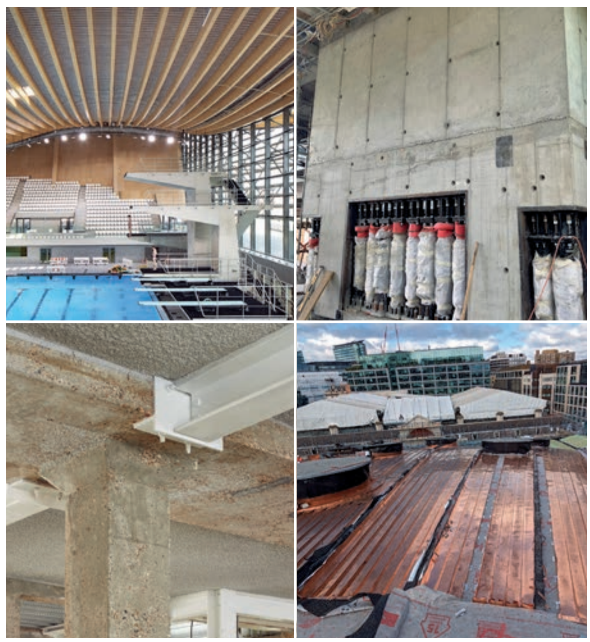
For over 50 years, the Structural Awards have celebrated the very best of our global community, and 2024 has been another fantastic year. Entries were received from all over the world (60% of submitted projects in 2024 were from outside the UK) and the judging panel has had a difficult, but exciting, task of selecting first the shortlist and then the eventual winners.

We are now in the third year of the 'new' Structural Awards, where the judging panel assesses the excellence of each project as measured against the four key attributes of Planet, People, Process and Profession. These attributes allow the judges to consider projects in the round, regardless of structural typology, scale or use. This change has transformed the awards process, and means the very best projects are recognised and celebrated.

Judging process

To get to our shortlist, we have two key stages. First, each submitted project is reviewed by five judges, each of whom brings unique technical expertise, and they can select up to six of their allocated projects as being worthy of shortlisting. The dedicated IStructE team collates all these responses before our first judging meeting, at which we collectively review each project. Each year, I am delighted to see the depth of technical discussion, and the passion that the judges all have for what excellence looks like. The purpose of this first meeting is to arrive at a consensus view on a shortlist, from which we will choose the winners.

Repeating the process of review and selection takes us to the second meeting, at which the panel chooses the 10 or so winners. This is always a tough process, with much lively debate, and the panel really tests all the projects in great detail. The final step is to choose the best of the best – the one winning project that stands out sufficiently to be awarded the accolade of Supreme Award for Structural Engineering Excellence. I am extremely grateful to the entire panel for all the time and effort they put in, each year, to making this whole process a success.



↑Material efficiency and reuse of existing structures have been key trends in this year's shortlisted entries

> **"WE SEE SEVERAL PROJECTS THAT DEMONSTRATE THE IMPORTANCE OF FINDING NEW WAYS TO LOVE OLD BUILDINGS**

Spoilt for choice

Let us turn to this year's entries. Among the shortlisted projects, we find a timber roof whose form is informed and inspired by both material efficiency and an effective M&E strategy, and which you might have seen on TV this year. A project perhaps best described as 'a ship in a bottle', that provides new space to a historic building in a very constrained site. We also see several projects that demonstrate the importance of finding new ways to love old buildings – resisting cosmetic demolitions and using all the structural engineering tools we have to save and reuse buildings is a key part of sustainable design.

This ethos is expertly adopted in one project that achieves a remarkable seismic upgrade, taking a structurally deficient building beyond code by completely changing the structural behaviour – work that required not only excellent technical structural engineering, but also innovative site work – not least coring 37m vertical holes through the concrete frame to add strand anchors that form a key part of the newly rocking building.

Saving material is, of course, a key design criterion for new-build too, and in one of the long-span bridges shortlisted we see innovation in structural forms that has allowed the designers to avoid using huge amounts of concrete. We also have stadia, a deployable roof, tall buildings, heritage structures, and a house that cleverly combines stone and timber in an elegant design.

The shortlist showcases a range of materials – stone, brick, timber, rammed earth, fibre-reinforced polymer, steel, concrete, earth and iron, to name a few. Perhaps in future we will see more projects that make use of reclaimed materials – where design no longer starts with a blank sheet of paper, but instead a library of available components, and the structural form follows from material availability.

All the teams whose projects made our shortlist are to be commended on the quality and ingenuity of their work. Special recognition goes to this year's winners – those projects that truly set themselves apart in their demonstration of excellence against the key attributes. On behalf of the judging panel, I offer our congratulations to all of this year's winners.

Judging panel

Chair

Prof. John Orr

John is a Professor of Structural Engineering, in the Department of Engineering at the University of Cambridge. His research and teaching address climate emergency through interdisciplinary design. John was the first person in the UK to receive an EPSRC Early Career Fellowship in Structural Engineering, won an EPSRC Bright Ideas award, and led the EPSRC Energy Feasibility Study 'MEICON' which examined the culture of design in structural engineering as it relates to embodied and whole life carbon.

Will Arnold

Will is Head of Climate Action at the IStructE. He leads the Institution's response to the climate emergency, bringing this action into all aspects of our work including the publication of best-practice emergency guidance. Prior to his current role, he was a practising structural engineer at Arup for over 10 years, where he was responsible for key aspects of ambitious architectural projects across the world from the UK to Taiwan and Rwanda.

Dr Katherine Cashell

Katherine is a Professor in Structural Engineering in the Department of Civil, Environmental & Geomatic Engineering at University College London (UCL) and is also a chartered engineer and a Fellow of both the IStructE and the Institution of Civil Engineers. Prior to joining UCL in November 2022, Katherine worked as a Reader in Structural Engineering at Brunel University London, as a Senior Structural Engineer at the Steel Construction Institute and a Senior Engineer at High Point Rendel Ltd.

Dr Michael Cook

Mike is a Visiting Professor at Imperial College London and a consultant to Buro Happold, having been a partner of the practice since 1994 and Chairman from 2011 to 2017. He is well known in the industry for his significant contribution to designing innovative buildings and enhancing the reputation of the profession. Mike is a former Vice-President of the Institution and is now Chair of its Climate Emergency Task Group. He was awarded the Institution's Gold Medal for 2020.

Kayin Dawoodi

Kayin is Design Director at Tyrens Sweden. He has been working as a structural engineer on projects worldwide, for almost 20 years, championing the creative design process, typically in complex and unusual design-led projects. He is the current IStructE representative in Sweden and teaches at Chalmers University in Gothenburg. Prior to moving to Sweden 10 years ago, he worked at Arup in London. Kayin co-founded the Bridges to Prosperity UK Charitable Trust and was the 2014 winner of the Young Structural Engineering Professional Award.

Prof. Jiemin Ding

Prof. Ding is the Chief Engineer of Tongji Architectural Design (Group) Co. Ltd. Throughout his career he has demonstrated dedication to excellence in structural engineering design. Prof. Ding specialises in steel structures, super high-rise buildings and long-span complex structural systems.

Ian Firth

Ian is a leading expert in bridge design and construction. During his career he has been involved with world-famous bridge projects like the strengthening of the Severn Bridge, Erskine Bridge and West Gate Bridge, and the concept design of Stonecutters' Bridge in Hong Kong, as well as many smaller pedestrian bridges such as the Inner Harbour Bridge in Copenhagen, Taplow Bridge near Maidenhead and the Sail Bridge in Swansea.

Marta Galiñanes García

Marta is a Transformation Project Specialist and Sustainability Advocate at AKT II. She is known for her expertise in managing large transformation projects, such as the current 81 Newgate Street project. With a passion for sustainability and innovation, Marta's career is characterised by a commitment to engineering solutions that prioritise environmental responsibility and social impact.

Tanya de Hoog

Tanya is the 2024 President of the IStructE and Chief Engineer, Eminence & Innovation Officer at Aurecon. She was previously a founding director of Thornton Tomasetti's London office. Her professional experience spans Europe, the Middle East, North America, Southeast Asia and Australia, where she has worked on a diverse range of projects that focus on engineering creativity and innovation with an intent to foster good design.

Prof. Tim Ibell

Tim was President of the IStructE in 2015, and he is a Fellow of the Royal Academy of Engineering. He has a passion for celebrating creativity within our profession, and for using this creativity to inspire students. Tim has been Professor of Structural Engineering at the University of Bath since 2003, including a year's interlude as the Sir Kirby Laing Professor of Civil Engineering at the University of Cambridge in 2017/18.

Martin Knight

Martin is one of the leading UK architects specialising in the design of bridges and transport infrastructure and is a Fellow of RIBA and the Institution of Civil Engineers and an Honorary Fellow of IStructE. He founded international bridge designers Knight Architects in 2006 and his practice has completed more than 50 bridges in the UK and internationally, including the award-winning Merchant Square Bridge in London, the iconic Lower Hatea River Crossing in New Zealand, and the 270m-long Ulm Kienlesbergbrücke in Germany.

Eric Kwok

Eric is a Technical Director at Goldwave Steel Structure Engineering and is passionate about structural engineering. He received his professional training in the UK and has over 23 years of experience in major international practice. He is a chartered structural engineer and a Fellow of the IStructE, and has extensive design and construction experience across projects in Europe, the Middle East, the Americas, South East Asia and China.

Sharjeel Larik

Sharjeel is a structural engineer with nearly a decade of experience in engineering design, project and interface management, design coordination, site supervision, and contract administration of large-scale multi-disciplinary building and tunnel projects involving the structural design of reinforced concrete and steel structures.

Toby Maclean

Toby is a structural engineer and established Allt environmental structural engineers in 2020, a firm concentrating on addressing the urgent need to decarbonise the built environment with a particular emphasis on carbon embodied in structures.

Michelle McDowell

Michelle is a non-executive director of Civic Engineers and a Trustee of Skills4Stem, with nearly 40 years' experience in structural engineering design. Previously, she was a Board Director of BDP and led their civil and structural engineering group for 24 years. There, she led the redevelopment of the Royal Albert Hall and the 250-strong design team on the Restoration and Renewal of the Palace of Westminster. Michelle's passion is for inter-disciplinary design, creating a platform for truly innovative, low-carbon design.

Dr Andrew Minson

Andrew has been Director of Concrete and Sustainable Construction at the GCCA since 2019. His responsibilities include the global whole life roadmap to net zero concrete by 2050, the GCCA Net Zero Accelerator Initiative and the GCCA EPD tool. He works with partners such as International Federation for Structural Concrete (*fib*), ACI, UNIDO IDDI, UNEP Global Alliance for Buildings and Construction as well as architects, engineers and clients to support delivery of a lower carbon and resilient built environment.

Matthew Penellum

Matt is a Principal Engineer working in AECOM's South East Structures team and a chartered member of the Institution. Matt's career has focused predominantly on the forensic assessment of existing reinforced concrete buildings and he is a member of AECOM's reinforced concrete 'subject matter expert' group. In this role, he is responsible for developing technical guidance specifically tailored to the analysis of existing RC frames. He also has experience in the conservation, restoration and transformation of historic buildings.

Roger Ridsdill Smith

Roger is the Head of the Structural Engineering team at Foster + Partners. He is a Fellow of the IStructE and a licensed professional engineer and structural engineer in the USA. He was awarded the Royal Academy of Engineering Silver Medal in 2010, and the IABSE Milne Medal in 2017.

SawTeen See

SawTeen is President of See Robertson Structural Engineers and provides consulting design services; she is partly retired. SawTeen was the Managing Partner of Leslie E. Robertson Associates from 1991 to 2017. She has extensive experience in the structural design of the full spectrum of building types with particular expertise in tall building design and long-span structures. SawTeen was the partner-in-charge of the structural engineering of iconic structures including the Shanghai World Financial Center; the Lotte World Tower in Seoul and the Merdeka PNB 118 Tower, Kuala Lumpur.

Katie Symons

Katie is Principal Advisor, Engineering, in the Building System Performance branch of New Zealand's Minister of Business Innovation and Employment. She is leading the New Zealand Government's work to reduce whole-of-life embodied carbon emissions of buildings. Katie is a chartered professional structural engineer in New Zealand and the UK, and has over 15 years' experience designing building structures in both countries. She has particular expertise in assessing the embodied carbon of buildings and construction materials.

Peter Terrell

Peter is a former Chairman of the Board of Trustees of the IStructE. He is the founder of Terrell Group and currently President of their Supervisory Board. After early years with Ove Arup, Peter set up as sole practitioner in 1982 in Paris, building a practice that is today recognised as one of the leading structural and multi-disciplinary engineering consultancies in France, with over 120 employees in France, UK and the Middle East.

Planet
Efficiency of design, sustainability, resilience, circular economy and alignment with UN Sustainable Development Goals.

Process
Technical achievement and innovation, influencing briefs, and the appreciation of craft and artistry.

People
Collaborative design and procurement, adding value for the client and stakeholders, and impact on communities.

Profession
Inspiring others, raising standards of design and execution, and enhancing the reputation of the profession.

Find out more

Read full biographies of all the judges at **www.istructe.org/structural-awards/judges/.**

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Location Gashora, Rwanda

Rwanda Institute for Conservation Agriculture (RICA)

Awarded for holistic regenerative design advancing the use of low-carbon, locally sourced materials, and promoting local training and benefits.

PROJECT TEAM

- **Structural engineers:** MASS Design Group; Arup
- **Clients:** Rwanda Institute for Conservation Agriculture (RICA); The Howard G. Buffett Foundation
- **Principal contractor and lead architect:** MASS Design Group
- **Civil, structural and MEP engineers:** MASS Design Group; Arup
- **Contractors:** MASS Design Group; Remote Group; Costwise
- **Quantity surveyors:** MEW Consultants Ltd; Arabella
- **Specifications:** Conspectus

Across whole campus, upfront embodied carbon including structure and architecture is about 60% less than business-as-usual approach

IN BRIEF…

- The Rwanda Institute for Conservation Agriculture teaching campus successfully uses local and renewable materials in a seismic zone. The project utilises quartzite stone foundations, compressed stabilised earth block (CSEB) walls, and timber roof trusses.
- Approximately 2.5M handmade CSEBs were fabricated, accounting for 25% of all the materials used. The CSEB walls reduced embodied carbon by 50% compared with typical concrete block walls.
- The 1378-hectare, 69-building campus plan models a One Health approach, balancing human, ecological and animal health through land use, building materials and renewable infrastructure.
- Local employment was a priority during construction: 90% of the 2500-person workforce came from the district; 35% of the construction budget was spent on labour, and 90% of the entire budget was spent within 500 miles of the site. The project site leadership team was 58% female, a rarity on construction sites in Rwanda.

Quartzite stone was sourced within 10 miles of site, and placed and mortared by hand in interlocking patterns to create foundations

JUDGES' COMMENTS

The project is a fantastic showcase for regenerative design principles. The design works with the strengths and weaknesses of the locally available natural materials, so that they could be employed in the most effective manner. The materials determined the form – large roof overhangs protect the earth walls from rain, and the structural grid is governed by the 4m available timber lengths to minimise waste. The project is impressively low in embodied carbon, and is seismically resistant.

The use of low-impact and bio-based materials at this scale required the development of new skills and supply chains. Local engineers were trained in construction techniques and geotechnical investigations and local communities were boosted by the project's local investment.

Find out more

Read more about this project in the July 2021 issue of *The Structural Engineer*: https://doi.org/10.56330/NJLO6557

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Kings Cross Station, London, UK
Photo credit: Hufton+Crow

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Connect with us

Location Paris, France

Olympic Aquatics Centre

Awarded for the ambitious and efficient structural design of a long-span timber roof.

PROJECT TEAM

- **Structural engineer:** Schlaich Bergermann Partner
- **Client:** Métropole du Grand Paris, Solideo
- **Principal contractor:** Bouygues Batiment Ile de France
- **Architect:** VenhoevenCS Ateliers 2/3/4
- **Key contractors:** Simbala Consortium (Récréa, Dalkia and Omnes), Katene, Indigo Environmental Ltd, Inex, Mathis SAS, MtechBuild

IN BRIEF…

- Built for the 2024 Paris Olympic Games, the multifunctional venue accommodated a 50m pool as well as a diving pool, offering space for 5000 spectators. In its post-Olympics life, a reduced capacity of 2500 fixed seats will enable further use of the venue for other events.
- The venue is spanned by a suspended timber roof and equipped with photovoltaic panels – at 89m, it is the world's longest for tensioned timber structures.
- The roof is formed of a series of timber catenaries – curves that approximate the shape of a hanging chain only in tension.
- All the visible structural elements in the hall are made of timber, supporting loads up to 800t.

JUDGES' COMMENTS

Full of technical innovation and ambitious structural works, this project boasts an impressive 89m suspended timber roof. This building exemplifies the use of renewable resources, highlights the potential of timber, and promotes industry development.

The design of the Aquatics Centre met ambitious structural targets through an integrated approach combining structural innovation with architectural and mechanical servicing intent. The fantastic multidisciplinary design ensures efficiency of both construction materials and operational energy consumption. It represents an outstanding example of sustainable lightweight construction for a modern sports facility.

Olympic Aquatics Centre is one of largest timber sports complexes in world

JAD SYLLA

JAD SYLLA

Concave shape of roof allows for significant reduction of hall's internal volume and thus reduces operational energy demand

> **ALL THE VISIBLE STRUCTURAL ELEMENTS IN THE HALL ARE MADE OF TIMBER**

YVES CHANOIT

Catenary timber roof under construction

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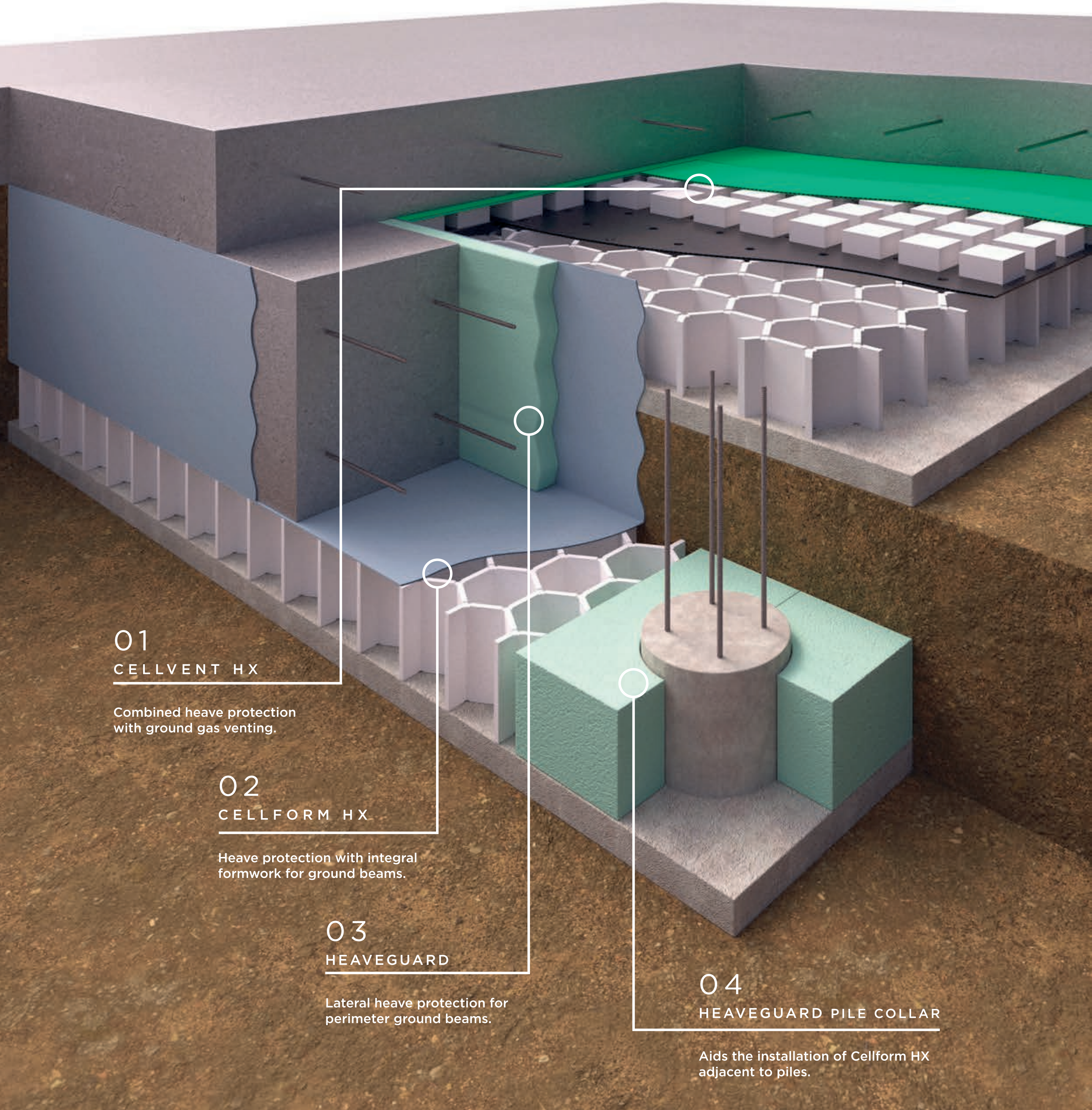


COMBINED GROUND HEAVE SOLUTIONS

HEAVE PROTECTION PRODUCTS WITH INTEGRAL FORMWORK & GROUND GAS VENTING FEATURES

Location Perth, Australia

WS2

Awarded for intelligent engineering solutions that enabled the reuse of an existing structure on a constrained site.

PROJECT TEAM

- **Structural engineer:** Arup
- **Client:** GDI Property Group
- **Principal contractor:** Built
- **Architects:**
  Patterson Architects
  Benson McCormack Architecture
- **Key contractors:**
  Arup
  GERB Schwingungsisolierungen GmbH & Co. KG
  Holmes
  Geoff Hesford Engineering

IN BRIEF…

- WS2 is an 11-storey timber-steel hybrid commercial development constructed in constrained conditions over an existing five-storey basement parking structure.
- An innovative lightweight floor of steel and timber slabs coupled with mass dampers effectively reduced vibration and minimised the weight of the new storeys.
- By employing innovative tuned mass dampers, the team was able to save 700t of steel by avoiding the need for additional stiffness in the floor beam sections.
- The project achieved approximately three times the floor area compared with a 'traditional' concrete solution constructed on the existing structure.

"AN EXCELLENT EXAMPLE OF HOW TO ACHIEVE HIGH-RISE OFFICE ACCOMMODATION ON CONSTRAINED SITES WITH LOW-CARBON OUTCOMES

↑ Floor-to-floor heights needed to match existing adjacent Westralia Square building

JUDGES' COMMENTS

This is an excellent example of how to achieve high-rise office accommodation on constrained sites with low-carbon outcomes through the intelligent reuse of an existing structure. By using steel and cross-laminated timber in floor dampers, and raking columns in place of transfer beams, the engineers were able to achieve lightweight floor construction and 14m spans using the existing foundations.

The lightweight approach meant more storeys could be constructed, significantly increasing the commercially available floor area, and making the project economically viable. The engineers successfully worked with existing structures, responding well to limitations and constraints, and demonstrated good interaction with the client.

← Timber and steel were used in combination as structural framing

↘ Inclined columns increased floor area

Location Christchurch, New Zealand

66 Oxford Terrace

Awarded for a pioneering retrofit approach to save a seismically damaged building.

PROJECT TEAM

- **Structural engineers:** Structure Design Ltd, Phoenix Consulting Ltd
- **Client:** Russell Property Group Ltd
- **Principal contractor:** Dominion Constructors Ltd
- **Architect:** Wilson & Hill Architects Ltd
- **Key contractors:** Tectonus, Geotech Consulting Ltd, Bradley Seismic Ltd, Thermosash NZ Ltd, Macdonald Barnett Ltd, Lewis Bradford, GHD Ltd, Aquaheat NZ Ltd, C&L Electrical Ltd, Contech

IN BRIEF…

- The existing 66 Oxford Terrace, which opened in 2005, suffered damage following the Canterbury earthquake sequence of 2010 and 2011.
- The 13-storey tower building was saved from demolition and repaired using innovative design and strengthening techniques to convert the original design to a rocking wall structure that meets current building code seismic standards.
- The strengthening solution employed damping devices retrofitted to the existing structure, in conjunction with a new 37m long post-tensioning system.
- The engineering team overcame significant uncertainty around design and constructability to integrate damping devices into the building, along with other elements of seismic strengthening, all made possible through complex temporary works and project sequencing.

Restored 66 Oxford Terrace will rock, self-centre and be able to be re-occupied in event of future earthquakes

Resistant slip friction joint damping devices were used to convert original design to rocking wall structure

Anchor strands were inserted from top of column core holes and anchored at base above rocking plane

JUDGES' COMMENTS

An innovative project demonstrating the first use of a novel damping device on a reinforced concrete building. The daring seismic strengthening efforts of the engineers enabled the retention of an existing structure that would otherwise not meet current seismic codes. Instead of opting for a simpler demolition and rebuild, the engineers implemented a system to enhance resilience by allowing the building to dissipate energy and reduce structural forces, creating a rocking plane by cutting the structure off at podium level. Changing the stability system significantly reduced embodied carbon, as compared to demolition and new build. The engineering team involved early engagement with contractors and used 3D printed prototypes to check construction sequences.

Location Christchurch, New Zealand

The Arts Centre Te Matatiki Toi Ora

Awarded for driving a complex strengthening and refurbishment that demonstrates technical excellence and a commitment to preserving historical character.

PROJECT TEAM

- **Structural engineer:** Holmes NZ LP
- **Client:** The Arts Centre Trust
- **Principal contractor:** Leighs Construction Ltd
- **Architect:** Warren and Mahoney Ltd
- **Key contractors:**
  RCP
  Rhodes and Associates
  Dave Pearson Architects
  Powell Fenwick
  Insignis Project Management
  Geotech Consulting Ltd
  RMGroup

IN BRIEF…

- Te Matatiki Toi Ora is an arts and culture hub with some of the oldest buildings in Aotearoa. The collection of 23 neo-Gothic buildings became even more significant following the devastating earthquakes of 2011.
- Before the earthquakes, only focused strengthening schemes had been carried out on site. While these historic works helped to limit further damage, a widespread structural strengthening scheme had never been implemented.
- Wherever possible, heritage materials were salvaged, carefully stored, and reused across the site. This included roof slates, native timbers, and interior and exterior basalt, and limestone and clay brick masonry claddings.
- Deconstruction of the structures was extremely challenging in the context of levels of damage, ranging from partial collapse through to structural compromise, especially while aftershocks were still frequent and significant. The methodology encompassed the cataloguing and control of collapsed stones – a painstaking process of individually numbering and cataloguing each removed element.

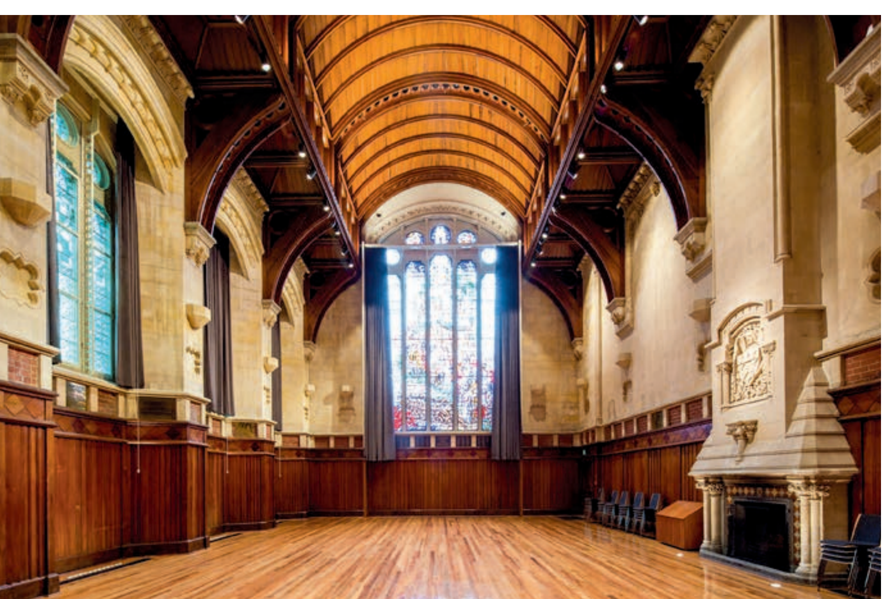
Damage to buildings varied from partial collapse to structural compromise

> "AN EXCEPTIONAL EXAMPLE OF SEISMIC STRENGTHENING OF MASONRY BUILDINGS

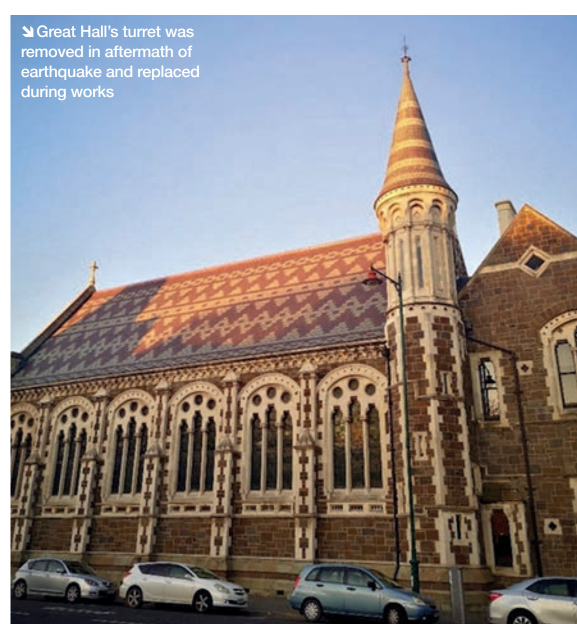
JUDGES' COMMENTS

Targeted structural engineering has been a critical element in the success of this project, making a huge impact by bringing the structures back to life while preserving their heritage character. It stands as an exceptional example of seismic strengthening of masonry buildings.

The success of the project really tells the story of what is possible when structural engineers are involved from the earliest stage. They were a driving force from the temporary remediation the day after the earthquake to the reopening 12 years later. A very impressive project from a technical perspective but also in the commitment to knowledge sharing and offering valuable lessons for the industry.



Restored Great Hall is one of 23 neo-Gothic buildings forming part of Te Matatiki Toi Ora



Great Hall's turret was removed in aftermath of earthquake and replaced during works

Heartburst Pavillion, West Coast, US
Photo credit: Christian Robert, Architect at OU

Location London, UK

Mary Ward Centre

Awarded for tenacious and technically adept engineering resulting in a stunning transformation.

PROJECT TEAM

- **Structural engineer:** SD Engineers
- **Client:** Mary Ward Settlement Group
- **Principal contractor:** Curo Construction
- **Architect:** AWW
- **Key contractors:** Promode Building Services Consultants Ltd, Beadmans, RBA Acoustics, FeatherStone, MLM, Soils Ltd

IN BRIEF...

- A derelict 1970s concrete-framed building earmarked for demolition has been transformed and extended from four to six storeys. Reuse principles were adopted to provide much-needed office, community, education and performance spaces for Mary Ward Settlement – a century-old charity.
- The additional two storeys were achieved with minimal strengthening to the existing foundations and frame. Thorough investigations and analysis proved most of the foundations could withstand load increases with only two shallow foundations requiring strengthening.
- Concrete and rebar samples from the frame were used to confirm the existing strength of the structure and, combined with detailed analysis, only a small number of columns that required strengthening were found.

JUDGES' COMMENTS

The engineers played a fundamental role in giving the client and stakeholders the confidence to strengthen and reuse the existing building rather than demolish. Their diligent and determined approach demonstrated a viable future for the existing structure. The project is a substantial retrofit and vertical extension which doubled the building size, achieving a complete transformation with significant carbon savings. The before and after transformation is remarkable.

DANIEL SHEARING

Mary Ward Centre opened in 2023 and serves 5500 students every year

RICHARD CHIVERS

New steelwork strengthens existing concrete frame

"THE BEFORE AND AFTER TRANSFORMATION IS REMARKABLE"

AWW

Queensway House before transformation

Location Belfast, Northern Ireland

McConnell's Distillery

Awarded for an innovative blend of sensitive conservation and striking structural interventions to revitalise a historic building.

PROJECT TEAM

- **Structural engineer:** Design ID
- **Client:** Belfast Distillery Company Limited
- **Principal contractor:** Felix O'Hare
- **Architect:** Like Architects

IN BRIEF…

- The Crumlin Road Gaol, which ceased to function as a jail in 1996, holds an iconic place in the history of Ireland. Designed by the renowned architect Charles Lanyon, the Grade A listed structure stands as a testament to a defined period of Belfast's history.
- The engineers led the design for the adaptive reuse of one wing of the building, converting it into a whisky distillery. This involved both the sensitive conservation and repair of stone and cast iron elements, as well as contemporary spatial remodelling. Bar areas have been created using cruciform steel columns, and the reception area is framed by distinctive V-columns.
- The arched gull-wing shape ghosts the form of the vaulted cell ceiling behind, and the original cell walls are outlined in the tiling, preserving the original layout for generations to come. The V-column reception hall hosts a patina of structural forms, juxtaposing innovative steel and visual concrete fabrication with historic brick vaults, cast iron corbels, balustrades and bridges.

JUDGES' COMMENTS

An ambitious reuse and transformation project that goes well beyond typical restoration. This project team took a building of local significance and breathed new life into it by solving complex problems with structurally led solutions. The structural interventions and statement precast concrete columns are daring and were guided by a commitment to maintaining the aesthetic, history and character of this unique building. The duality of light-touch, conservation-led engineering and bold design totally reinvigorates the space, making it a showcase for creative reuse.

↑ Every decision was guided by commitment to maintaining aesthetic, history and character of building

→ Crumlin Road Gaol was built as Victorian prison in 1845

↓ Temporary works supported three storeys of heavy masonry walls and barrel-vaulted brick construction above

"THIS PROJECT TEAM TOOK A BUILDING OF LOCAL SIGNIFICANCE AND BREATHED NEW LIFE INTO IT

Location Brighton, UK

Brighton Dome Corn Exchange redevelopment

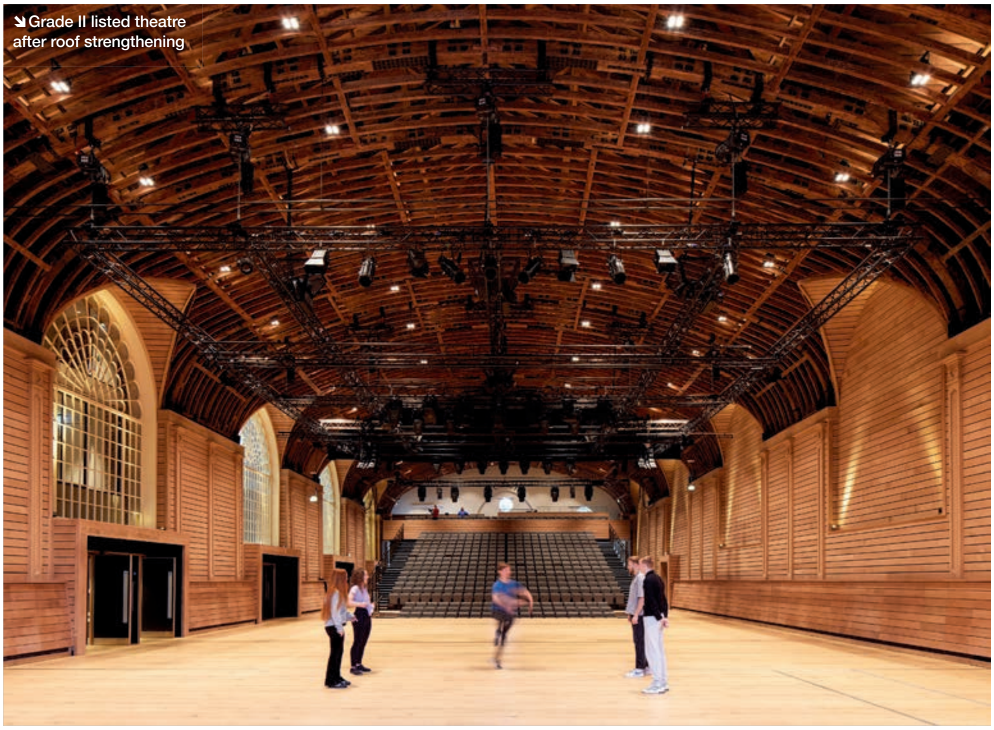
Awarded for the sympathetic adaptation and modernisation of a historic cultural building.

PROJECT TEAM

- **Structural engineer:** Arup
- **Clients:** Brighton Dome & Festival Ltd; Brighton & Hove City Council
- **Principal contractor:** Westridge Construction
- **Architect:** Fielden Clegg Bradley Studios
- **Key contractors:** Baqus; The Fire Surgery; LT Studio; Max Fordham; Jackson Coles; Charcoalblue

IN BRIEF…

- Brighton Corn Exchange is a multi-purpose events venue, part of the renowned Brighton Dome. The site comprises multiple heritage buildings, including the Grade I listed Corn Exchange, and the Grade II listed studio theatre and entrance.
- To secure the venue's future, extensive refurbishment and strengthening works were undertaken. A new gallery was constructed linking the buildings together. A key component was the strengthening and repair to the 200-year-old timber arch roof structure, following detailed digital survey and analysis.
- The roof comprises a unique 18m span flat arch structure supporting an upper duo-pitched roof construction. The arch beams at low level are vertically laminated from three staggered members, bolted together in the manner of traditional temporary arch centring. With only a 2.2m rise, the arches are much flatter and more ambitious than any similar structures.
- To minimise intervention, it was agreed to reinstate the arching behaviour with steel tie rods spanning across the space. Since the arches were grouped in threes, it was possible to use a pair of tie rods to tie three adjacent arches, thereby minimising aesthetic impact. The tie rods were tensioned to balance the self-weight of the roof.



Grade II listed theatre after roof strengthening

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Steel tie rods were used to secure roof's arches and minimise aesthetic impact

JUDGES' COMMENTS

This project is an excellent example of minimal intrusion to an existing building's fabric, particularly when noting its listed status and cultural value, while providing a significant improvement in usability and performance. The addition of covert truss ties beautifully brings the important listed buildings back to life. The retention of large volumes of material was significantly aided through the adoption of the latest digital tools, allowing specific areas to be targeted for strengthening. The conservation-led refurbishment and adaptive reuse showcases a high-quality finish with a modest carbon cost and minimal visual impact.


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IMAGES SHOW PROJECTS BY WALKER DENDLE TECHNICAL RECRUITMENT CLIENTS SHORTLISTED FOR THE STRUCTURAL AWARDS 2013–2024

Location Paris, France

Mobile roof of Suzanne Lenglen court at Roland-Garros

Awarded for the elegant and astute structural design of a lightweight, long-span mobile roof.

PROJECT TEAM

- **Structural engineer:** T/E/S/S atelier d'ingénierie
- **Client:** Fédération Française de Tennis
- **Principal contractor:** Renaudat Centre Constructions
- **Architect:** Dominique Perrault Architecture
- **Key contractors:** Ramery, Taiyo Europe GmbH, MECA, inc., ELEMENT, JPL, CHOULET, Axio, CALQ, MOZAIC

New roof is designed to maintain open-air spirit of French Open

© DPA

IN BRIEF…

- Court 2 at Roland-Garros was built in 1994 as a lean, open-air concrete seating bowl. A new roof has been constructed over the existing court, combining an innovative mobile folding membrane system with a surrounding steel truss frame supported on four corner towers.
- The lightness and the transparency of the membrane roof, spanning 45m and unfolding over 90m, offers an elegant and structurally efficient response. The project team minimised the steel carbon footprint through structural optimisation and targeted conversations with the supply chain.
- The new roof is composed of two parts: first, a static U-shaped perimeter covering three of the four stands (on the east, south and west sides) and remaining open on the fourth side, so leaving views out over the Bois de Boulogne to the north; and second, a mobile covering to provide shelter for the court. The east and west sides of the U contain the rails and mechanisms for the deployment of the central mobile roof.
- 'Deployment', the transition from the folded position to the deployed position, takes less than 15 minutes.

> "
> ## AN INNOVATIVE AND LIGHTWEIGHT LONG-SPAN ROOF SOLUTION

JUDGES' COMMENTS

This project showcases an innovative and lightweight long-span roof solution. The tensioned cable structure advances moving roof designs by making clever use of prestressing. When deployed, the only structure on show above the court are the cables and translucent membrane, providing a feeling of lightness in the roof made possible by concealed trusses at the perimeter. The structural engineers designed a unique and astute solution to a challenging problem.

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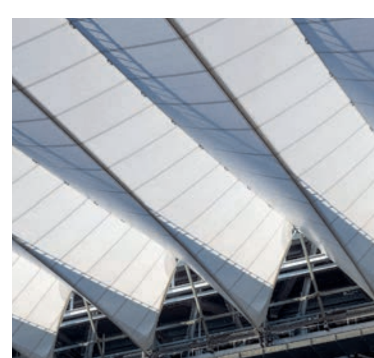
Each steel beam is uniquely tailored to particular forces, achieving near-maximum utilisation



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Mobile covering is composed of 21 V-shaped tensioned fabric modules which span between ridge and valley cables

Location Lhasa, Tibet, China

Tibetan Art Museum

Awarded for the transformative reuse and seismic strengthening of an industrial heritage structure in a challenging environment.

PROJECT TEAM

- **Structural engineer:** Tongji Architectural Design (Group) Co. Ltd
- **Client:** Xizang Autonomous Region Federation of Literary and Art Circles
- **Principal contractor:** Tibet Tianlu Co. Ltd
- **Architect:** Tongji Architectural Design (Group) Co. Ltd
- **Key contractors:** Tongji University; Qingdao Ruiyuan Engineering Group Co. Ltd

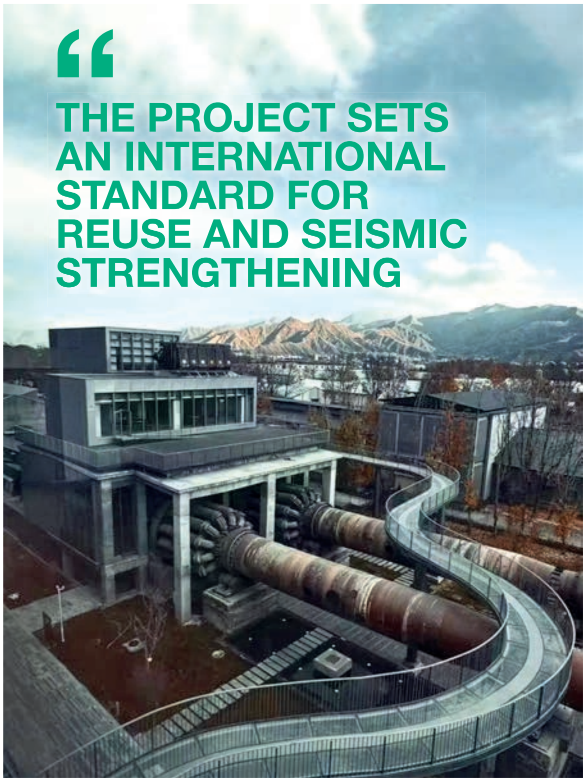
IN BRIEF…

- The Tibetan Art Museum has been reconstructed on the site of a former cement factory. Demolition and retention of the buildings' structures were adapted to the new functions of the art museum.
- The original cement storage warehouses, slurry storage tanks, kiln tail and rectification rooms, and other factory buildings have all been transformed into buildings with a new art function. As a result, a reduction of more than 50% in structural material use has been achieved.
- The project site is located in the Tibetan Plateau, which is the highest plateau in the world at 3800m above sea level. The local ecological environment is fragile and the oxygen in the air is thin, making the transportation of building materials and the construction process very difficult.
- The site was located in a high-intensity earthquake zone. The original factory buildings were designed to earlier standards and had very low concrete strength. Certain techniques were adopted to improve the seismic resistance capacity of the structural components and to reduce the floor vibration acceleration, protecting the artwork collection.

JUDGES' COMMENTS

This project brilliantly reuses a utilitarian cement factory, artfully transforming the storage rooms, kilns and slurry tanks into new museum spaces. By retaining much of the original structure, it minimises the consumption of new materials and showcases how we can learn to love old buildings in new ways. The project sets an international standard for reuse and seismic strengthening under challenging local conditions. It revitalises an industrial site with thoughtful new-build elements, demonstrating bold engineering and low-carbon construction. Not just retention but true transformation.

"THE PROJECT SETS AN INTERNATIONAL STANDARD FOR REUSE AND SEISMIC STRENGTHENING



Former kiln tail was repurposed into office building

The museum has a total floor area of 32 825m², and the height of the tallest building is 23.9m

Art bookstore within Tibetan Art Museum was transformed from former cylindrical cement slurry storage tanks

Location London, UK

Smithfield Poultry Market roof

Awarded for exceptional analytical work to justify the retention of an iconic thin-shell concrete roof.

PROJECT TEAM

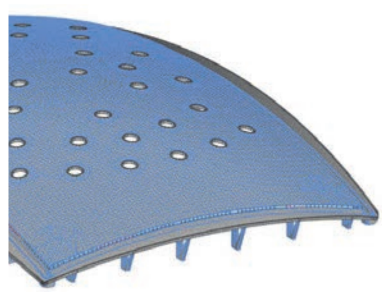
- **Structural engineer:** Arup
- **Client:** Mayor and Commonalty and Citizens of the City of London
- **Principal contractor:** Equans Regeneration Ltd
- **Architect:** Fraser Brown Mackenna Architects
- **Key contractors:** Julian Harrap Architects LLP, AKT II, Stanton Williams, Uk Gunite Ltd, Full Metal Jacket Ltd, Safya Systems UK, Museum of London

IN BRIEF…

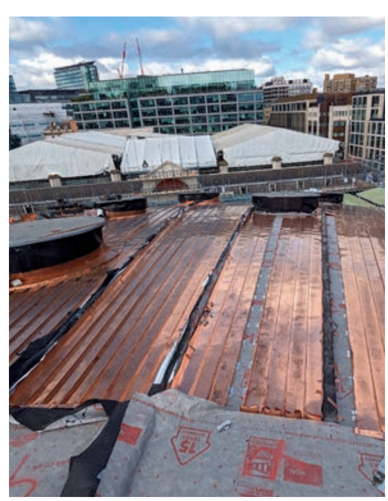
- Smithfield Poultry Market roof was designed by Arup in the 1960s. The dome roof is a doubly curved elliptical paraboloid concrete shell spanning approx. 70m × 40m, with a general design thickness of 76mm.
- 60 years later, with the original design life of the structure exceeded, and the building now Grade II listed, the brief was to develop a strategy to justify the roof according to the performance criteria established by modern standards and enable the transformation of the space to house the new Museum of London.
- Concrete material test results showed hat the compressive strength and stiffness were significantly lower than the design intent. It was deemed more sensible to assess the behaviour of the roof against the performance criteria required by the Eurocodes according to the consequences of failure. This was defined via the so-called reliability index.
- By adopting this sophisticated and innovative approach, and by harnessing a combination of digital, structural and material expertise, the team demonstrated that the roof was able to meet the needs of the future without any strengthening works.

© FMJ

Unique Grade II listed roof will continue legacy as key feature of new Museum of London



Advanced finite-element analysis model was built alongside digital workflow to override software limitations



Removal of existing finishes and placement of new copper finishes was developed using finite-element analysis

> "THE STRUCTURAL ENGINEERS UNDERTOOK EXCEPTIONAL FORENSIC STRUCTURAL ANALYSIS

JUDGES' COMMENTS

This project highlights the pivotal and unique role structural engineers play in breathing new life into existing structures. The iconic roof required extensive structural engineering analysis and thoughtful consideration to prove that maintaining the existing structure was the safest and best solution.

The project showcases how to 'do nothing' through deep engineering analysis and insight, showing a profound understanding of structure and a vision for making a positive impact to our environment. The structural engineers undertook exceptional forensic structural analysis and demonstrate significant decision-making skills and technical knowledge.

Location Lhasa, Tibet, China

Tibetan Art Museum

Supreme Award for Structural Engineering Excellence

↘ Former cement plant was seismically reinforced and suspended cafe was added

PROJECT TEAM

- **Structural engineer:** Tongji Architectural Design (Group) Co. Ltd
- **Client:** Xizang Autonomous Region Federation of Literary and Art Circles
- **Principal contractor:** Tibet Tianlu Co. Ltd
- **Architect:** Tongji Architectural Design (Group) Co. Ltd
- **Key contractors:** Tongji University; Qingdao Ruiyuan Engineering Group Co. Ltd

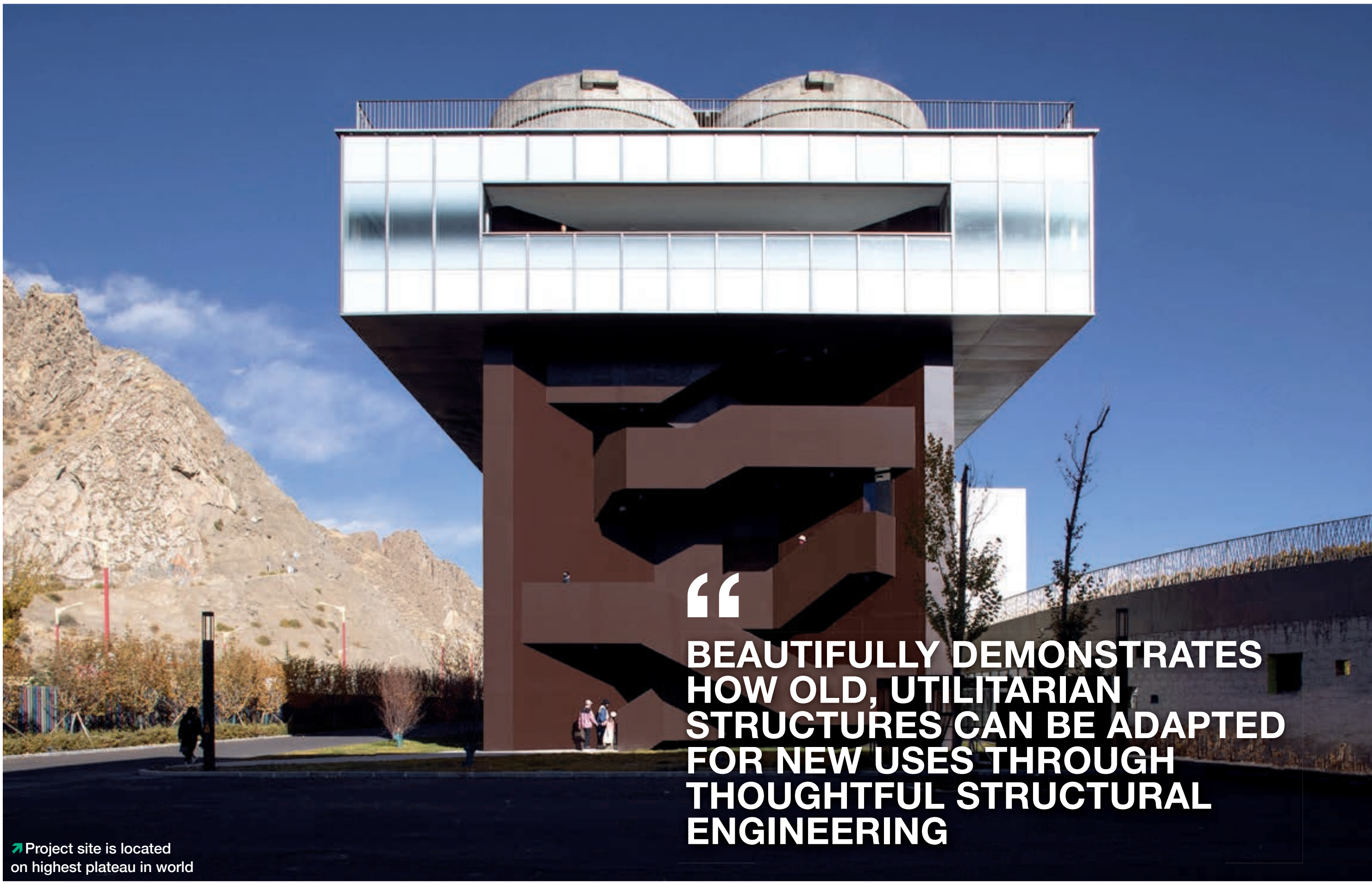
IN BRIEF…

- A 1960s cement factory located on the remote Tibetan Plateau has been transformed into a modern art museum. At an altitude of 3800m, this is the highest plateau in the world and a remote and ecologically sensitive site.
- The existing buildings were found to have low concrete strength, and great care was taken to upgrade them to meet modern seismic requirements and thereby ensure ongoing protection of the artworks.
- The seismic interventions were undertaken with a light touch – adding strengthening where required, installing damping, and utilising base isolation – and were designed to work in conjunction with the existing structures to reduce the scale of new construction.
- This minimum intervention approach was crucial in reducing the impact of construction works on this ecologically fragile site.

JUDGES' COMMENTS

The Tibetan Art Museum is a worthy winner of the Supreme Award because it is an example of how adaptive reuse projects do not have to be the exclusive domain of classic 'heritage' buildings that are already regarded with great historical or aesthetic esteem. A group of industrial buildings in a remote and inaccessible part of the world has been transformed into an inspiring space, made possible by the ingenuity of the structural engineering team. This deserves but also needs to be celebrated, and held up as an example for others in our profession who see examples of these existing buildings every day: what would it take to do the same for those?
Katie Symons

The Tibetan Art Museum provides a roadmap for the future of the structural engineering industry. Through careful design and well-planned structural interventions, the engineers have transformed a derelict industrial site into a beautiful, modern art gallery. By refurbishing the existing buildings,



↗ Project site is located on highest plateau in world

rather than resorting to new-build, this world-class facility has been created with a very modest carbon footprint. If this structural transformation is possible in a remote, seismically active, and ecologically sensitive region like Tibet, then there is no reason that we cannot do the same with our ageing infrastructure across the world.
Matthew Penellum

The Tibetan Art Museum is an extremely worthy winner of the Supreme Award as it beautifully demonstrates how old, utilitarian structures can be adapted for new uses through thoughtful structural engineering, setting a new standard for structural reuse and seismic strengthening under difficult conditions. Moreover, the structural engineering approach emphasised sustainability and low-carbon construction by retaining much of the original factory structure, minimising the use of new materials and being very mindful of the local ecological conditions. Seismic upgrades were carefully integrated, using base isolation, damping and selective strengthening to meet modern safety standards without extensive new construction. This approach preserved the building's industrial character while ensuring the safety of the artwork housed inside.
Katherine Cashell

↗ Tibetan Art Museum is first large art museum built in Tibet