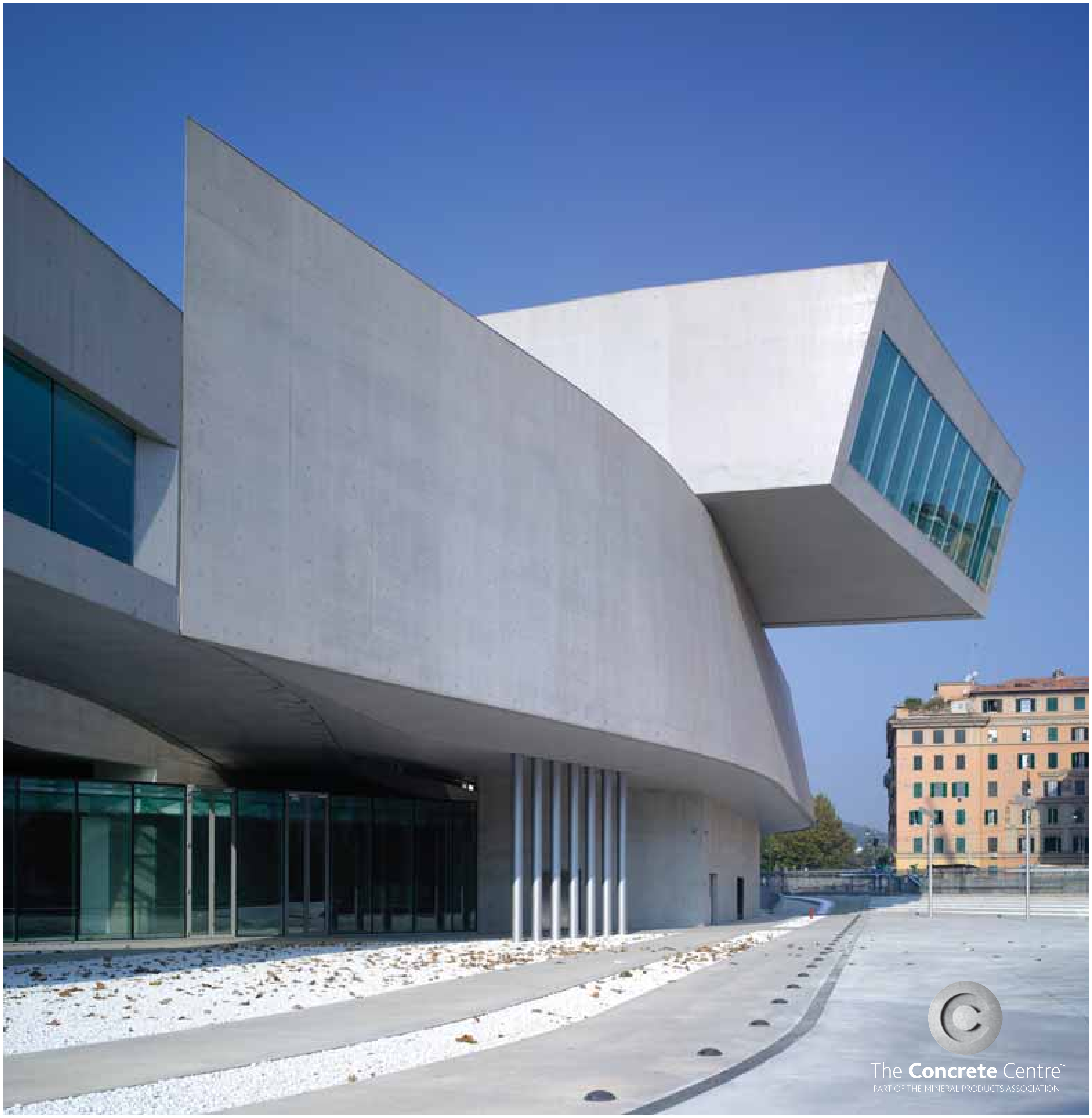
CONCRETE QUARTERLY
WINTER 2009
ISSUE NUMBER 230

Maxxi Museum
Zaha Hadid Architects' new art museum in Rome appeals with swooping curves and lots of natural light

Visual display
Terry Pawson Architects' new arts centre in Carlow uses concrete and glass to express a quiet confidence

Raising standards
Rivington Street Studio's Tomlinson Centre makes the most of concrete's flexibility in adapting to its surroundings



The Concrete Centre™
PART OF THE MINERAL PRODUCTS ASSOCIATION

Welcome

Concrete chameleon

One of the design and aesthetic benefits of concrete is its ability to transform itself into different persona. It can be monumental like the new Maxxi Museum in Rome with its fluid canyons that majestically sweep with heroic resonance. Or it can provide a building of subtle restraint and quiet confidence such as with Visual arts centre in Carlow, Ireland. In addition concrete can reflect the purpose of the building. With the Mountbatten Building at the University of Southampton, the concrete design is robust and rational. Its drama reflects the scientific research being carried out within. Similarly concrete can capture the atmosphere and feel of a place as with the Joseph Chamberlain College, Birmingham, which brings the sense of Oxbridge calm to the chaos of the inner city.

However, concrete is not just about looks. It offers function as well as form. The Tomlinson Centre in Hackney, London, makes full use of concrete's inherent stiffness, fire resistance, thermal mass and flexible profile. Meanwhile in Winchester, the concrete transformation of a tired 1960s office into one of the UK's most energy-efficient office buildings offers a blueprint for the reuse and renewal of our office building stock.

More than any other construction material, concrete provides almost limitless design opportunities and visual possibilities that are fully backed up by an unrivalled range of inherent performance benefits.

Guy Thompson
Head of architecture & housing,
The Concrete Centre
www.concretecentre.com/cq

Inside

On the cover: Maxxi photo by Richard Bryant/Arcaid

mpa essential materials sustainable solutions

The Concrete Centre is part of the Mineral Products Association, the trade association for the aggregates, asphalt, cement, concrete, lime, mortar and silica sand industries. www.mineralproducts.org

News round-up

CIRIA retracts incorrect CO_2 figures for concrete

The Concrete Centre has welcomed the recognition by CIRIA that its stated figure for the embodied CO_2 of concrete as 4000kg per tonne is incorrect. According to the Concrete Industry Sustainability Performance Report, the embodied CO_2 of typical concrete is 95kg per tonne. The admission by CIRIA follows erroneous figures published in September's Evolution magazine.

The Centre believes that there is a misconception about the environmental impact of concrete and welcome moves by CIRIA to set the record straight. There is a need, not only for correct reporting of concrete's actual embodied CO_2, but also for full recognition of the material's ability to considerably reduce the ongoing operational CO_2 of buildings, which accounts for 47% of total UK emissions.

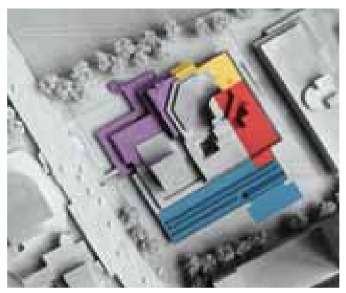
The embodied CO_2 of concrete can be slightly higher than other building materials, but in reality the difference is small. Over the whole life of building, concrete and masonry solutions provide significant CO_2 savings, due to unrivalled high levels of thermal mass that reduce heating and air-conditioning requirements.

The Concrete Industry Sustainability Performance Report can be downloaded from **www.sustainableconcrete.org.uk**

Haworth Tompkins reveals National Theatre revamp details

Haworth Tompkins has revealed details of its masterplan for the renovation and extension of Denys Lasdun's grade II* listed National Theatre building on London's South Bank.

The practice, which was appointed to develop the theatre's design strategy in December 2008, has now written a conservation management plan for the building and begun consultation with local residents groups on the first stage of its masterplan.



Phase 1 includes improving the entrance and creating studios.

The £50 million first phase will improve the transparency of the building and will see a new workshop and studio for scenery designers housed in an extension at the back of the building featuring a glazed facade to allow the public to see into backstage production areas.

A service yard currently on the river bank side of the building will be moved to the back allowing the concrete facade to be redeveloped to make the building more open to the passing public.

The plan also includes moving the existing bookshop in the main entrance, adding a series of new cafés at ground floor level with outside seating and overhauling the Cottesloe Theatre.

Further design work will be completed by the beginning of next year and a planning application is expected to be submitted in the summer.

The Darwin Centre pod has a sprayed reinforced concrete shell.

Cocoon wins top award

The spectacular "cocoon" structure — an eight-storey concrete shell at the centre of the Natural History Museum's Darwin Centre Phase 2 — has been awarded Overall Winner at this year's Concrete Society Awards.

Formed with a continuous sprayed reinforced concrete shell, typically 250mm thick, the 65m-long cocoon provides a home for 20 million of the Natural History Museum's plant and insect specimens and a working area for the research scientists. The pod, designed by CF Møller, also enables the public to interact with the scientists and the collections.

The Concrete Society's judging panel praised the structure, saying it will become "a benchmark for the production of extreme shapes in concrete".

It added: "The doubly curved surfaces could only have been achieved economically with sprayed in-situ concrete. The structure is individual and extremely demanding to design and construct. It is a striking but harmonious contrast to the 19th century original building."

The project was covered in CQ Winter 2008, go to www.concretecentre.com/cq

Flood prevention guidance using concrete

Flooding is predicted to become a major problem due to the effects of increased urbanisation and the extreme rainfall patterns and rising sea levels resulting from climate change. Concrete and Flooding, a new guidance document published by The Concrete Centre, sets out the causes of flooding and how to prevent or reduce their impact.

The threat of flooding is second only to terrorism in the government's national risk register. Climate change, coastal erosion, continued urban expansion and overloaded sewerage and drainage systems will increase that threat.

Concrete retaining walls, sea and river defences, and flood barriers can all provide a high level of flood protection that, once installed, offer long-term performance with minimum maintenance. In addition to protection, concrete offers solutions for effective flood management. Sustainable drainage systems (SUDS) aim to mimic the natural drainage of a site in order to reduce the impact of urban development. Both pervious and permeable concrete solutions can be used, either combined or separately.

Where flooding is inevitable concrete offers a high level of resilience. It does not warp or rot and continues to offer structural integrity. This resilience minimises flood damage and, subsequently, the time taken for buildings to be dried out, repaired and made habitable again.

To download Concrete and Flooding, go to www.concretecentre.com/publications

Events

Heavyweight Sustainable Housing: Materials and Design to meet the Code for Sustainable Homes
December 8
BRE, Watford
One-day conference including case studies and site visit to developments meeting the higher levels of the Code for Sustainable Homes.

Design Tools and Techniques for Concrete Buildings
December 15
Imperial College, London
One-day course on the design of building structures including development of initial sizes for concrete elements.

Masters of Concrete: Geoffrey Bawa's Concrete
December 15
The Gallery, 70 Crowcross Street, London
Evening lecture examining the concrete works of Geoffrey Bawa, one of the most influential architects of south east Asia and a principal force behind "tropical modernism".

Ecobuild
March 2-4, 2010
Earls Court, London
The Concrete Centre will be exhibiting a range of exemplar energy and resource efficient concrete projects

www.concretecentre.com/events

Visual special effects

Terry Pawson Architects' new theatre and arts centre — the Visual — in Ireland is both contextual and conversational

Above
Clerestory windows bathe the main gallery in ethereal light.
Left
The entrance is defined by the opaque glass volumes of the galleries floating above it.

PHOTOS: HÉLÈNE BINET AND ROS KAVANAGH

Designing a new contemporary arts centre for the grounds of a 19th century college, overlooked by a cathedral and located in an historic town centre, offers two choices: either go for a loud bold statement shouting iconic status that aims to put the location "on the map" or try for something more complementary and restrained that achieves the same aim with subtlety. With Visual — The National Centre for Contemporary Art & George Bernard Shaw Theatre — Terry Pawson Architects has successfully gone for the latter.

The new €18 million arts centre in Carlow provides a 350-seat performing arts theatre, four principal gallery spaces, including the largest gallery space in Ireland, plus a café bar and other facilities. These are placed within an assembly of concrete and glazed boxes.

And there is the trick of this architecture. For this is more than a simple assembly of boxes. Pawson has infused this simplicity with a deftness of touch and appreciation of location. The architecture is intuitive rather than attention-seeking. The different volumes of the spaces fully interrelate with each other. Externally, their placement allows the building to be viewed from all angles; internally, they provide a clear procession through the galleries and to the theatre. The concrete structure supports a volume of translucent glass that wraps around the entire building. The soft opaqueness of the glass facade gives the building an ephemeral feel, particularly when illuminated from within at night and with the internal filtering of light during the day. The play of external and internal light means that the building takes on different personalities. Internally, during the day, it is ethereal and unworldly. Externally, at night, it resonates drama and fun.

The ephemeral translucence of the glass is in stark contrast with the robustness of the concrete structure. The interior walls and columns are exposed concrete with an oriented strand-board finish with all the services and fittings cast-in. Concrete trough slabs with a fair-faced finished soffit provide the ceilings in the foyers and Link Gallery. The exposed concrete walls and polished concrete floor of the Link Gallery is a strong juxtaposition to the pure white space of the Main Gallery, which is backlit with clerestory windows for an ethereal light. The introspection and serenity of the gallery spaces are interrupted by the deep red feature wall of the foyer bar and the red seating in the auditorium. These herald the excitement of the performances to be experienced in the theatre space.

Everything about the architecture of Visual is considered engagement and quiet confidence. The choice of the muted concrete hues and glass opaqueness enables the building to quietly relate with its location. The local construction material in Carlow is a pale grey limestone and the concrete and glass construction of Visual reflects and complements this. The layout and atmosphere of the internal spaces engages the visitor. The building's scale and architectural form sit confidently and comfortably with its 19th century neighbours. This is a building that wants to converse rather than shout.

Top
The Link Gallery has a ceiling of concrete trough slabs, and a long glazed wall with a water garden outside.
Above left
View into the gallery from the water garden.
Above right
The auditorium space.

PROJECT TEAM
Client: Carlow County Council
Architect: Terry Pawson Architects
Engineer: Arup
Main contractor: BAM

Hadid makes history

Zaha Hadid's new Museum for 21st Century Art & Architecture in Rome has challenged the technical and aesthetic boundaries of concrete construction

By Graham Bizley

Maxxi, Rome's new Museum for 21st Century Art & Architecture is a bold and challenging addition to the ancient city's long tradition of boundary-breaking concrete construction. Its pristine, tubular forms intertwine like concrete tagliatelle, defining a dramatic entrance hall and an external loggia sheltered by gravity-defying cantilevers.

Located on an ex-industrial site just north of the city centre, the project has taken 10 years to build and has survived six changes of government. Zaha Hadid Architects won the commission in a competition in 1999 with the concept of an urban campus of internal and external spaces linked into the urban fabric.

As yet Maxxi does not have a significant collection of its own. Hadid has avoided the white neutrality of most 20th century museums and laid down a challenge to future curators. The galleries are long, top-lit spaces defined by sinuous walls which, instead of dividing the museum into rooms, flow from one space to the next with carefully placed windows making connections back to the landscape outside.

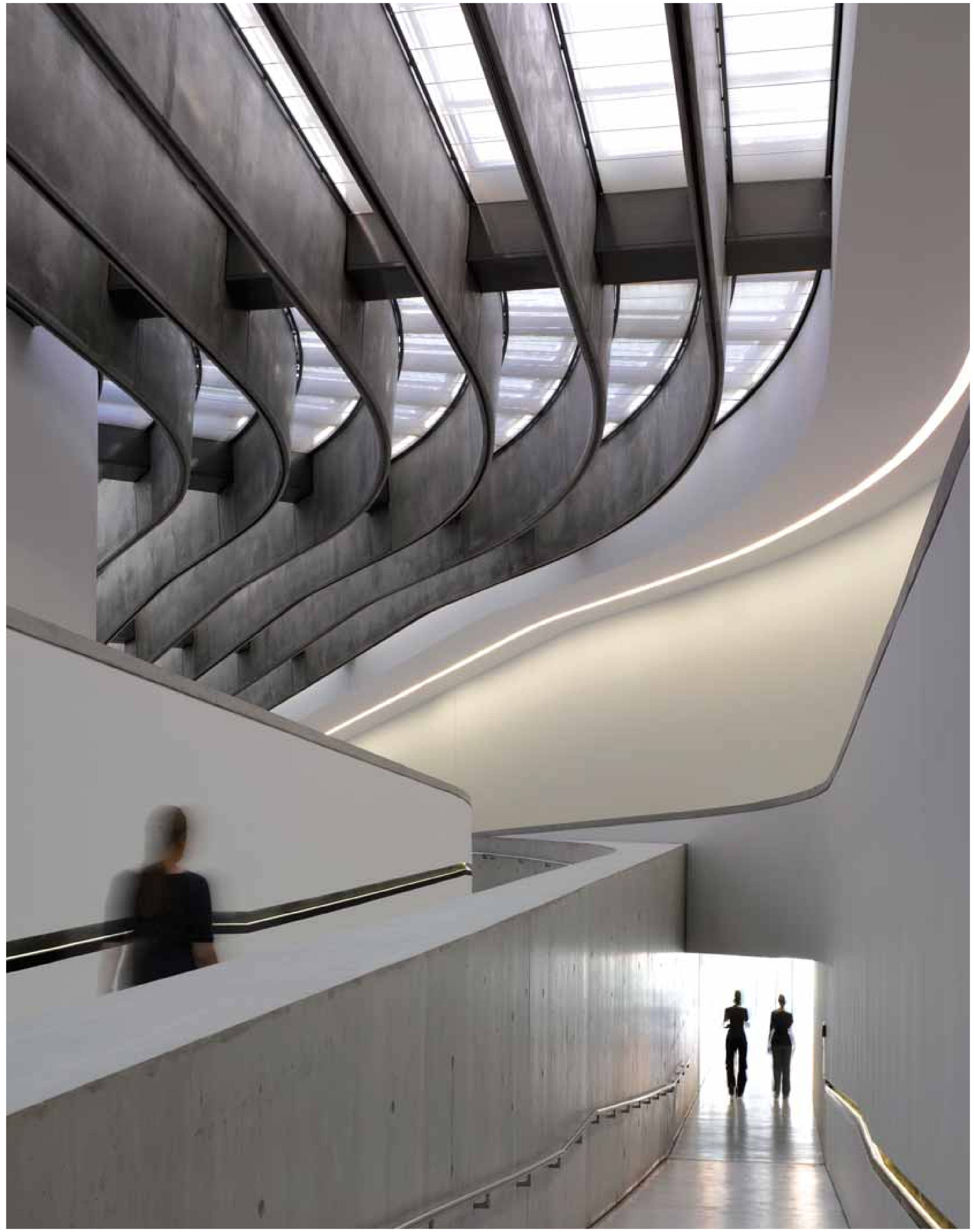
The galleries are lit mostly with natural light via rooflights. The 2.4m-deep glass-fibre reinforced concrete (GRC) clad fins that run the length of each gallery, reflect and diffuse daylight evenly across the rooms. Integrated solar shading, adjustable louvres and blinds ensure the light can be controlled to comply with international gallery standards (see Detail, page 8). The galleries can be subdivided with partitions that can be hung from any point on channels at the bottom of the rooflight fins. To keep the floors free from grilles all the services are located in the walls. A displacement air-conditioning system supplies air at skirting level and extracts it from amongst the rooflights.

In 2002 an earthquake in the region of Molise destroyed a school, following which the seismic regulations for buildings in Italy were completely revised. The working drawings for Maxxi were complete and Rome was newly designated as an area of some seismic risk so the designs had to be revised. The building is split into five different sections that rest on one another with 30mm movement joints in between. To deal with seismic movement 100 shock-transmitting hydraulic pistons have been cast into the horizontal and vertical expansion joints. These allow movement for normal thermal expansion but under sudden shock seize up and effectively make the five sections move in a unitary way as a single entity.

Apart from the upper floors, which are partly built up off 50mm precast concrete slabs, all the sub-structure, walls and floors were cast in situ concrete. The fair-faced walls above ground are exposed externally, for which the architects demanded extremely high quality in the continuity, homogeneity and fine surface texture of the concrete. Hadid's team had used self-compacting concrete (SCC) on previous projects so it was very much in their minds with the design of the Maxxi.

SCC has the same basic constituents as conventional concrete but ▶

Opposite
The sinuous walls flow from one gallery space to the next.
Above
The museum is on a site just to the north of the city centre.
Below
The exposed walls required a high quality finish.



PHOTOS: RICHARD BRYANT/ARCAID

Above
The galleries are mainly lit with natural light, controlled by blinds, filters and louvres.

includes viscosity-modifying admixtures to ensure the aggregate is evenly distributed and super-plasticising admixtures to improve its workability. It can flow around dense areas of reinforcement into small spaces under its own weight and does not require vibration to remove air bubbles, so its natural surface finish is particularly fine. These qualities make it ideal for complex forms and demanding structural applications such as the long, cantilevering fair-faced walls of the Maxxi.

Achieving such expanses of concrete with no construction joints was a huge challenge involving single pours of up to 230cu m. The formwork for the walls was prefabricated off site from a computer model in 2.4m-wide sections up to 14m high. Each truck mixer carries 10cu m and a mixer needs to arrive every 10 minutes to continuously feed the concrete pumps, an impossible demand given Rome's traffic congestion. SCC also requires monitoring of the humidity and granular composition of the mixture so the chosen option was to construct a concrete mixing plant on site.

The basement and ground floors are made from SCC but for the exposed upper floor walls the quality of finish was proving difficult to control and the dry atmosphere was causing tiny surface-cracks. After a series of experiments, the team developed a modified conventional concrete called 3-SC which contains an expansion admixture that counteracts the shrinkage during curing.

Ancient Roman concrete incorporated Pozzolana, a volcanic ash which greatly increased its durability and strength, enabling them to build structures such as the Pantheon that have survived to this day. For the concrete at Maxxi, 25% of the Portland cement content was replaced with fly ash, a residue from coal-fired power stations that has similar pozzolanic properties. The addition of fly ash reduces the heat build-up in large pours as it generates less heat in its hydration process than Portland cement. Fly ash is a by-product from other industries, so effectively no CO_2 is produced in its production. In a project where 120,000 tonnes of concrete was poured on site, a 25% reduction in CO_2 emissions from the use of cement replacements makes a difference.

The building is stunningly inventive spatially but also restrained. Internally it may prove something of a challenge to future curators but it will certainly put Rome back on the map for its contemporary as well as its ancient culture.

PROJECT TEAM
Architect: Zaha Hadid Architects
Local architect: ABT (Rome)
Structural engineers: Anthony Hunt Associates, OK Design Group (Rome)
Mechanical & electrical: Max Fordham & Partners, OK Design Group (Rome)

Maxxi, Rome

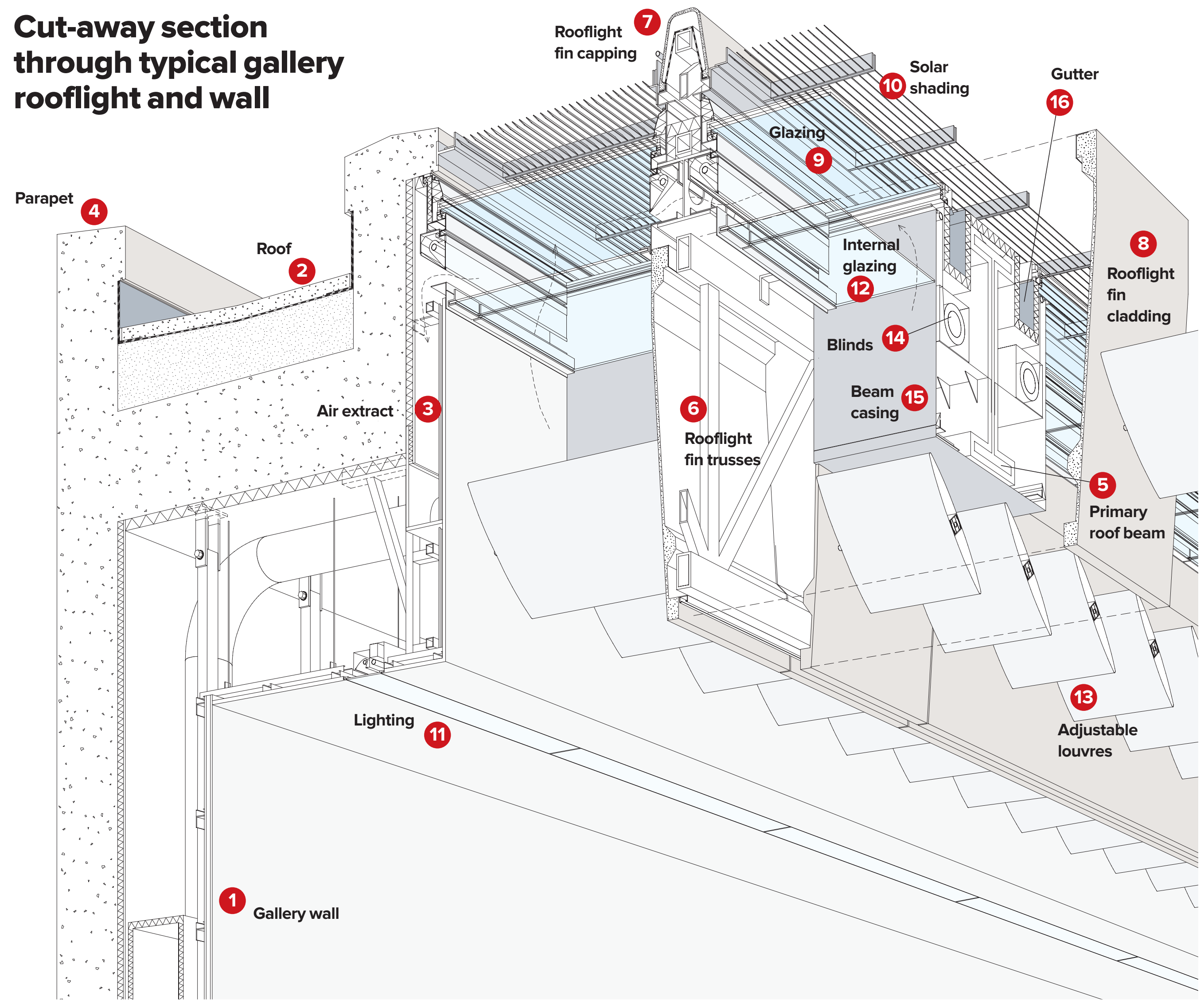
The character of the museum's internal spaces is defined by solid walls and a glass roof that allows natural light into most of the galleries. The walls are concrete, poured in situ to exacting aesthetic standards and left exposed on the outside. The walls are tied together by primary roof beams that span across the galleries at 12.6m centres. An array of 2.2m-deep steel trusses clad in glass-fibre reinforced concrete (GRC) span between the primary beams.

To achieve international gallery standards for climatic control, the rooflights incorporate solar shading, blinds, filters and adjustable louvres. Galvanised steel grilles prevent direct sunlight from hitting the glass. The 600mm-wide aluminium-clad louvres below the glass can be adjusted to alter light levels and can be automatically controlled. Rollerblinds are concealed in the primary beam casings.

To leave the floors clear, the air-conditioning and electrical services are housed in 500mm voids in the walls. The walls are lined with a 50mm-thick sandwich of plasterboard and MDF which can support a point fixing of up to 200kg. Air is supplied through grilles at skirting level and extracted at roof level. To ensure air is extracted from the whole gallery area a plenum is formed by a pane of glass beneath the main glazing. These panes have 10mm gaps on all sides to allow air to be drawn up evenly around the edges. Holes in the rooflight trusses allow the air to pass from one bay to the next.

Detail drawing by Graham Bizley

Cut-away section through typical gallery rooflight and wall



1. Gallery wall
400mm-thick reinforced concrete wall cast in situ.
50mm thermal insulation.
500mm service cavity. Horizontal air-conditioning ducts on 50 x 50mm galvanised steel SHS (square hollow section) brackets.
200mm diameter air extract ducts at 1200mm centres.
60 x 60mm galvanised steel SHS vertical posts at 600mm centres fixed to floor and ceiling.
50 x 27mm horizontal steel channels at 500mm centres supported on 50 x 50mm steel angle brackets.
50mm-thick wall lining consisting of 25mm MDF board between two layers 12.5mm glass-fibre reinforced plasterboard.

2. Roof
50mm concrete slab with reinforcing mesh.
Waterproof membrane.
Screed laid to fall.
500mm-thick reinforced concrete slab cast in-situ.
50mm thermal insulation.
890mm-deep suspended ceiling void for services.
50 x 27mm galvanised steel channel suspended ceiling system.
20mm acoustic insulation between channels.
12.5mm plasterboard ceiling with 5mm acoustic plaster finish.

3. Air extract
Sealed plenum between concrete upstand and plasterboard lining.
Continuous 6cm gap between light fitting and internal glazing for intake.
200mm ducts at 1.4m centres connected to plenum.

4. Parapet
890mm-high x 400mm-thick reinforced concrete upstand cast in situ.
530mm-wide coping with drip on underside.
Waterproof membrane dressed up and fixed to concrete with aluminium clamping plate.

5. Primary roof beam
910 x 302mm I-section beam spanning gallery between concrete walls at nominal 12.6m centres.
30mm spray-applied intumescent plaster to all sides of beam.

6. Rooflight fin trusses
2.2m-deep steel roof trusses at 1.4m centres with intumescent paint finish spanning between primary roof beams.
Each truss is 485 x 80mm upper truss, 260 x 250mm I-section beam (with 90mm diameter holes) and 1400 x 70mm lower truss.
Continuous 40 x 25mm galvanised steel channel bolted to bottom of truss for partitions and artwork.
Alternate trusses also have a lighting track.

7. Rooflight fin capping
220 x 44 x 44mm H-profile brackets bolted to truss to support capping.
PVC membrane folded over top of truss.
240 x 294 x 12mm-thick GRC capping.

8. Rooflight fin cladding
12mm-thick GRC cladding panel with 60mm stiffening ribs and at edges.
Panels bolted to 100 x 100 x 10mm galvanised steel angle brackets welded to truss.

9. Glazing
1170mm-wide double glazed sealed units consisting of 8mm toughened outer pane, 15mm air gap and 11.5mm laminated inner pane with anti-UV film interlayer.
Glazing clamped in insulated aluminium frame.

10. Solar shading
1090 x 590 x 60mm-deep galvanised steel gratings with black epoxy finish.
Continuous 20mm diameter galvanised steel tube for clip-on safety line.

11. Lighting
Continuous fitting with fluorescent luminaires.
6mm acrylic diffuser with UV filter.

12. Internal glazing
1040 x 600 x 8mm toughened mirrored glass with stainless steel edge channels on two edges.
10mm gaps on all sides.
Panes are hinged on one side and attached to a winch on the other.

13. Adjustable louvres
600 x 75mm adjustable aluminium louvres at 600mm centres.

14. Blinds
Roller blinds concealed within beam casing
30 x 21mm horizontal aluminium guide channels.

15. Beam casing
900 x 900mm folded casing around beam formed from three pieces of folded 2mm anodised aluminium sheet supported on galvanised steel brackets bolted to primary steel beam.

16. Gutter
Folded gutter formed from two layers 1.5mm anodised aluminium sheet supported on galvanised steel brackets bolted to primary steel beam.

Learning curve

Nicholas Hare Architects' Joseph Chamberlain College gets top marks from the prime minister for inspiration in design

Winner of the 2009 Prime Minister's Better Public Building Award, the Joseph Chamberlain Sixth Form College offers a lesson in quiet confidence.

Located in Highgate, Birmingham, one of the most deprived areas in the country, the new college had to meet a number of demands. Against the grittiness of its urban surroundings, it had to provide a calm environment that was welcoming while forwarding its academic purpose. The £29 million college campus had to have landmark quality without ostentation. Nicholas Hare Architects met this brief with aplomb.

The last thing you would expect to find next to a busy roundabout on an inner city ring road is a collection of buildings that evoke the feel of an Oxbridge campus. A tree-lined entrance boulevard extends the street into the college and provides access to a square courtyard. Reflecting its Oxbridge inspiration, access to the square is controlled by the porter's lodge. Further on from the square is a large crescent containing all the classrooms that encircles a garden complete with trees and an eco-pool providing a tranquil green oasis.

The square and garden provide not only a calm environment for students but also one that is safe and secure. In particular, the crescent of classrooms provides a robust buffer against the noise and pollution of the college's urban setting. However, that is not to imply that the college turns its back on its neighbours, as the sports hall and the theatre and dance performance hall are available for the local community to use.

Above
A large crescent contains all the classrooms.
Below
The learning resource centre faces the courtyard.

The choice of construction materials enhances the calm confidence of the design. Externally, the walls facing outwards are of load-bearing Buff Dutch brickwork and lime mortar with deep reveals. These provide a robust solidity that stands up to the inner city noise and confusion.

Internally, the treatment is lighter. Glazed walls to the courtyards and lightwells encourage natural light into the buildings and the white render reflects light. Special elements of the college such as the prayer room and the learning resource centre are highlighted by being clad in copper. The main college buildings have a largely exposed fair-faced in-situ concrete frame that gives the buildings their structural form and feeling of solidity while providing a strong thermal mass function that reduces mechanical heating and air-conditioning requirements.

The college is a fitting tribute to its namesake, Joseph Chamberlain, the 19th century liberal politician and educational reformer. It provides an environment that inspires both students and teaching staff, offering them an educational haven that encourages the examination and realisation of potential.

PROJECT TEAM
Client: Learning & Skills Council
Architect: Nicholas Hare Architects
Main contractor: BAM Construction
Principal engineer: BDP

PHOTOS: ALAN WILLIAMS

Phoenix rising

The University of Southampton's striking new Mountbatten Building has risen from the ashes of the fire that destroyed its predecessor

The new £55 million Mountbatten Building's striking appearance of simple dynamic forms complements the use to which the building will be put: 21st-century scientific research and discovery.

It houses the University of Southampton's School of Electronics and Computer Sciences and its Optoelectronics Research Centre. The building contains a state of the art clean room complex and is a key element in maintaining the university's international reputation for world-leading research in nanotechnology and photonics.

Equipment in the new facility, which includes an Orion microscope and a focused ion beam, will make high-speed and low-power computer memory a reality and enable fast prototyping and the development of smaller, faster and more powerful single electron devices. Research done at the facility also includes the development of mass producing point of care blood testing kits.

Externally and internally, the four-storey building makes an impressive statement — it is uncompromising and modern. Its design fuses dynamic forms and volumes that frame both internal and external views. A visual clue to its purpose is provided by the glass curtain walls that allow those outside to view the research taking place in the laboratories and the clean rooms. The glass walls feature a fractal pattern used in research undertaken by the university.

The vibration-sensitive nature of the equipment used in the building and the significant weight of the necessary service plant meant a reinforced concrete frame with hollowcore precast concrete floor slabs and spun precast concrete columns provided the best solution for essential mass and damping. The concrete flat slab design also proved beneficial for the vast number of services running on the underside of the laboratory ceilings and the numerous penetrations for services and ventilation. Much of the concrete frame is exposed to act as a passive heat exchanger. The finish of the concrete is therefore high quality, evidenced by the feature curved stair in the atrium.

The building is naturally ventilated throughout using a stack and has been designed to use 65% less energy than a comparable facility of this type.

The Mountbatten Building is a handsome, no-nonsense building. The drama of its robust design mirrors the dramatic work happening inside.

PHOTOS: PETER COOK AND JESTICO & WHILES

Above
The curtain walling features a fractal pattern used in research at the university.
Left
The curved concrete staircase is faced in polished plaster.

PROJECT TEAM
Client: University of Southampton
Architect: Jestico & Whiles
Structural engineer: Gifford
Main contractor: Bovis
Concrete frame contractor: Mitchellsons

Taking advantage

The new Tomlinson Centre, a professional development centre designed by Rivington Street Studio, makes the most of concrete's many inherent benefits

By David Tucker, Rivington Street Studio

Rivington Street Studio's new £4.8 million Tomlinson Centre, a professional development centre for The Learning Trust, provides an 820sq m new building with 1,240sq m of remodelled accommodation.
The centre is named in honour of Sir Mike Tomlinson CBE, a former chief inspector of schools and former chair of The Learning Trust, who created a lasting legacy of higher standards in education in Hackney and whose drive and commitment was a major factor in the centre being built.

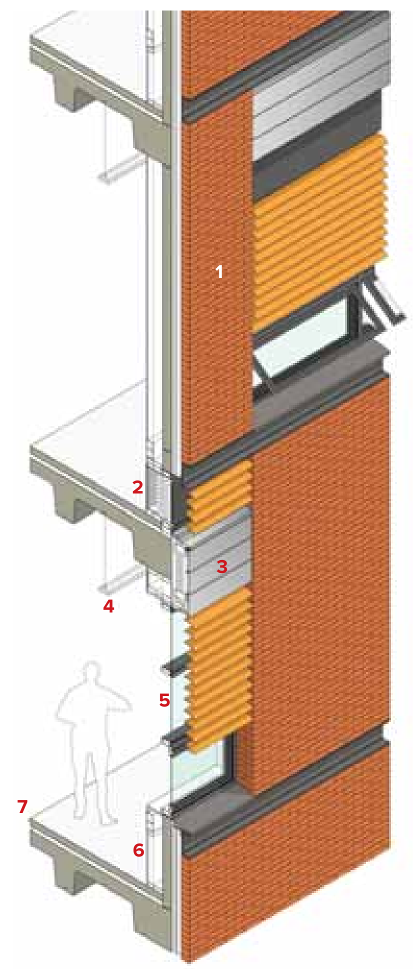
The Tomlinson Centre connects to remodelled accommodation within a Victorian school building, and provides eight training rooms, a 100-seat conference space, ICT training rooms, café and offices, as well as incorporating the City Learning Centre Highwire, a digital technology resource centre for school students, teachers and the local community.

Above
The Tomlinson Centre's brick cladding binds it visually to the neighbouring Victorian school.

The design of the new building sympathetically completes the existing four-storey Victorian board school building next door, while expressing its own identity. Its structure was designed and detailed to take full advantage of the benefits of reinforced concrete, including inherent stiffness, fire resistance, thermal mass, flexible profiles and natural finish. The floor slabs are in-situ troughs which span the clear width of the frame, and were cast using glass-fibre reinforced plastic (GRP) moulds that were reused for each floor. These moulds allowed the design team to determine the profile of the floor ribs and to include a rebate around the perimeter of the soffit as well as along the ribs as a recess for fixing suspended light fittings.

PHOTOS: SARAH BLEE

Cutout isometric diagram



1 Cladding
Brickwork panels on steel support
2 Passive ventilation
System has low-level supply and high-level extract on opposite side of building. Integral acoustic baffles
3 Rainscreen
Pre-weathered zinc cladding panels
4 Lighting
Linear suspended luminaires
5 Glazing
Curtain wall with opening lights and integral support for the brise-soleil
6 Trunking
Flush two-compartment dado trunking set within spray-finished with MDF
7 Flooring
In-situ fair-faced ribbed concrete slab formed by repeated use of GRP moulds with crack control rebate. 70mm floating screed floor on 50mm insulation with embedded underfloor heating

An array of concrete columns and wall panels supports a concrete frame of perimeter beams. The roof structure combines long-span concrete beams, cantilevered floor roof panels, upstands and bay windows. All were cast in situ.

The facade of the new building is modulated with strong horizontal bands corresponding to the horizontal brickwork detailing of the existing Victorian building. These panels "shift" in an abstract way in order to provide visual interest and to subvert the traditional masonry structural order. A zinc clad roof structure emerges above the parapet and two large crisp dormer windows protrude, echoing the rich, quirky roofscape of the existing building and capitalising on the strong views from the top floor of the centre to the City and Docklands. The ground floor nudges away from the rectilinear structure and follows the pavement line and is clad with dark grey terracotta tiles.

Above
The exposed fair-finished concrete floor slabs create the ceiling for the floor below.
Left
View from the playground.

The openings are set within generous deep reveals with brise-soleil fixed flush to the place of the brickwork. Openable windows and louvred panels sit within these openings. These provide natural ventilation, and acoustic baffles attenuate the sound from the adjacent roads and playground. The exposed in-situ coffered concrete frame provides thermal mass for radiant cooling.

This is a building that takes full advantage of concrete's range of inherent benefits in order to provide a quality internal finish and a bold external design.

PROJECT TEAM
Client: The Learning Trust
Architect: Rivington Street Studio
Structural engineer: Michael Barclay Partnership
Main contractor: Quinn London
Concrete subcontractor: JB Developments

Sixties revival in Hampshire

A cramped and inefficient 1960s Hampshire County Council office building has been refreshed and made energy efficient thanks to an imaginative refurb by Bennetts Associates

The transformation of a tired 1960s office into one of the UK's most energy-efficient office buildings offers a blueprint for the reuse and renewal of the country's office building stock.

Throughout the UK are hundreds of 1960s office buildings that have seen better days. They are often inefficient in every possible way: energy-inefficient, workforce-inefficient, spatially inefficient. Hampshire County Council's offices at the former Ashburton Court, in Winchester, represented all that can be wrong with the 1960s office. Its brutalist architecture was at odds with its more genteel surroundings. With a carbon footprint of more than 100kg of CO_2 per sq m, it guzzled energy; it was cold in winter and overheated in the summer; the ceilings leaked and its interior was one of long dark corridors and shoebox offices. The obvious solution was to knock it down and rebuild; however, a feasibility study proved that a comprehensive refurbishment would cost half the price of a new build.

Designing and building an office that is energy and workplace efficient is a challenge at the best of times. This challenge was exacerbated by Ashburton Court. For this was no clean slate but an outdated, dilapidated building. Its low floor-to-ceiling heights ruled out a low-energy displacement ventilation system, as there was not enough space for the required air stratification, and its location next to a busy road prevented window opening for natural ventilation. The low ceilings meant that the best option was natural ventilation. The proximity of the noisy road meant that opening windows for cross ventilation was not an option.

Architect Bennetts Associates determined that the answer was to have windows that opened facing the inner courtyard and ducts that ran up the sides of the building facing the road that vented air at the top. The ducts would create a Venturi stack effect that pulls warm air up to cool the building. The approach works, with the internal ambient temperature proving to be 2-3˚C cooler than outside during the summer.

Studies have shown that the carbon footprint is down from 100kg to 35kg of CO_2 per sq m with an ambition to reduce further to the mid 20s.

The refurbishment also meant a drastic reconfiguration of the internal space to meet the demands of today's workplace. The 12m floor plates and potentially good daylighting meant that the building lent itself to flexible open-plan offices instead of the existing warren of small offices and corridors. The transformation of the building was aided by its concrete structure, which provided a solid starting point that could be easily adapted.

Externally, the facade has been reworked to relate to Winchester's red-brick cityscape. The ventilation ducts are clad in red brick, with the top part finished in grey-painted metal to represent chimneys. Windows have been inserted between the ducts to create a visual pattern that beaks up the facade.

Renamed Elizabeth II Court, the building now has a host of green credentials that place it on course to receive a BREEAM "Excellent" rating. Firstly, reusing the concrete saved 50% of the embodied energy which would have been required to construct a new building. Space utilisation has been improved by 30%, with the building now accommodating some 1,100 employees rather than the previous 625. The operational carbon footprint has been significantly reduced thanks to the exposed concrete soffits, solar shading and intelligent lighting and water saving systems. In addition, a large proportion of the materials that were demolished were recycled, such as the old precast concrete panels, which were crushed and reused as aggregate.

The success of the project has been welcomed by the Carbon Trust, which sees it as a flagship example of what can be achieved through intelligent refurbishment rather than demolition and new build.

PHOTOS: TIM CROCKER AND BENNETTS ASSOCIATES

Opposite, inset
The old, brutalist Ashburton Court (left) has been refurbished to blend into the neighbouring area and renamed Elizabeth II Court (right).

Opposite, bottom
Opening windows face the inner courtyard which has been transformed as a pleasant space for workers.

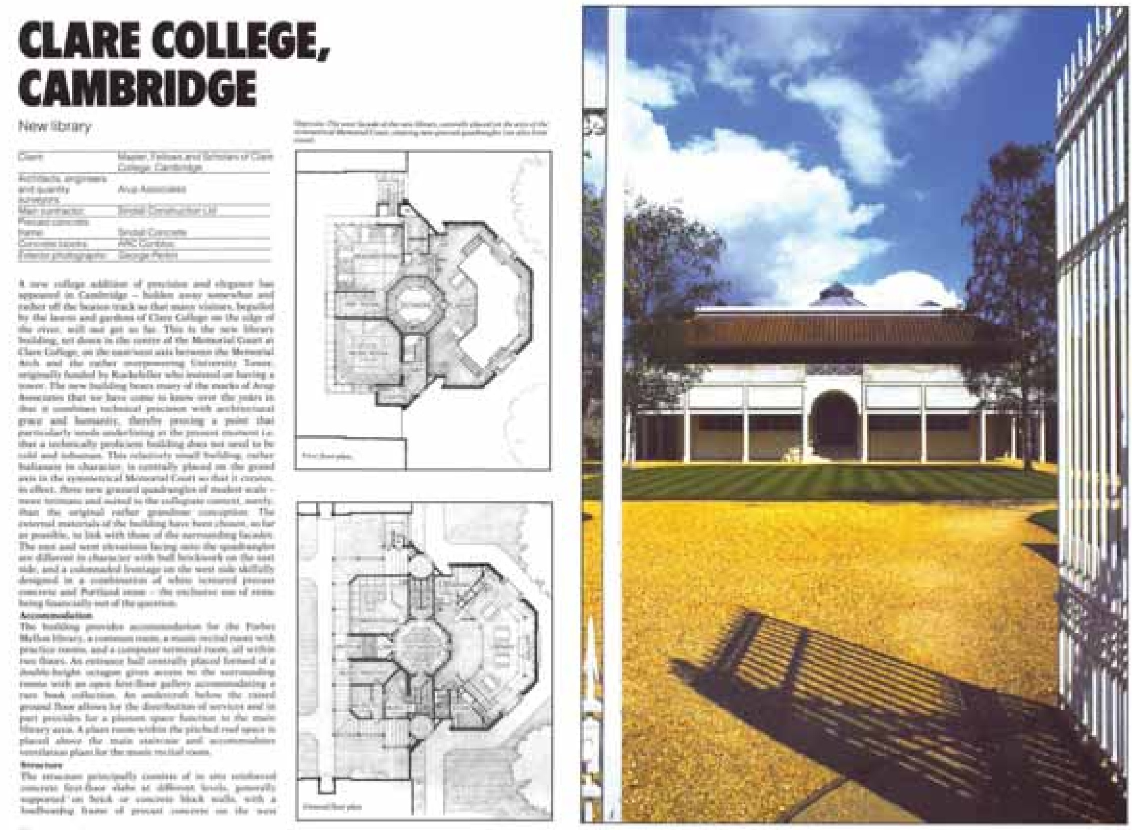
Left
The ventilation ducts have been clad in red brick.

Below
The interior has been redesigned to be more open plan and take advantage of natural daylighting.

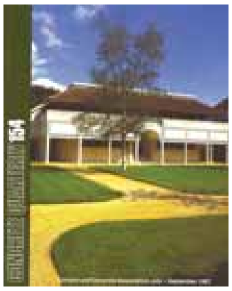
PROJECT TEAM
Client: Hampshire County Council
Architect: Bennetts Associates
Engineer: Gifford
Main contractor: BAM
Project manager: Mace
Cost consultant: Davies Langdon

Retro concrete

Concrete Quarterly was first published in 1947. Since then, CQ has covered many iconic concrete projects. Journey back in time, whether for nostalgia or inspiration, by visiting the archive of Concrete Quarterly at www.concretecentre.com/cq



Eighties style with a no-frills approach



With the eighties pop group Spandau Ballet reforming and shoulder pads making a comeback on the catwalks, Retro Concrete goes back to 1987 to the new library at Clare College, Cambridge. Designed by Arup Associates, the library is Italianate in character and combines technical precision with architectural grace and humility.

Consisting of in-situ concrete floor slabs supported by brick or concrete block walls with a loadbearing frame of precast concrete, the building features a colonnaded frontage that is skilfully designed in a combination of white textured precast concrete and Portland stone – the exclusive use of stone being financially out of the question.

■ To revisit the Autumn 1987 issue of Concrete Quarterly, go to www.concretecentre.com/cq

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