Jane Wernick Associates was founded in 1998. Jane was previously an Associate Director at Ove Arup & Partners, where she had worked since 1973. Our practice has been fortunate to be involved in a wide range of projects. The aim of this exhibition is to give a sense of that range and an insight into the way in which we work.

The majority of our work has been in the cultural and institutional sectors. Many of the projects are fairly small, but we hope that they add something to the communities in which they sit. We enjoy the challenge of working with architects of all types. You will see work we with some architects who are keen to express how the structure behaves, and others for whom the structure is the hidden skeleton that supports the body of the architectural form. The style isn’t what matters: it’s that the architects care deeply about what they are doing, that there is integrity in their design approach, and that they are happy to enter into conversation with us about their aspirations.

We are a small firm of seven engineers and various other helpers and so can regularly discuss the direction and ethos of the practice. We are based in London. We see engineering as an integral part of the design process. It is a creative activity which involves a productive approach to problem solving in an atmosphere rich with collaborations and ongoing conversations.

In June of this year Jane gave the firm, which is a limited company, to a trust fund company that now owns it for the benefit of its employees, past and present. The only condition of the gift is that the company will not engage in nuclear or military projects. To mark the occasion, we went for a trip on a canal boat, with some of our past employees, and other friends who have encouraged us over the years.

The aims of our practice could possibly be summarised as follows:

Everyone should be rewarded fairly for their efforts.
The freelancers are equally important to our success.
We should do work that we are happy to have published.
We encourage teaching and other related pursuits.
We should do our best to make sure our projects do not harm the planet.
We must have fun whilst we do our work.

Please visit our website at www.wernick.eu.com for more information.
Influences

The projects on this board show some of the key projects that I worked on when I was at Ove Arup & Partners. These projects, and the people I worked with, have shaped my understanding of structural engineering and may explain some of the thinking behind the work of our practice. Ove Arup was a prolific writer, and his particular philosophy has influenced my thinking about the role of the engineer, and how a firm of engineers might operate.

I was fortunate to work with the late Peter Rice on a number of the projects shown here. He had an extraordinary ability to encourage others to stretch their creative side. The hanging chain models on the right were created at the Institute of Lightweight Structures in Stuttgart, by Fritz Cito and his team in the late 1970s. They were used to develop the forms for a series of domes that would have been part of some buildings for the government of Saudi Arabia. Although this project was never built, we learnt a great deal about form finding, and dealing with complex geometries.

The glass facades at Parc de La Villette were conceived by Peter Rice, Ian Ritchie and Martin Francis, who went on to form the practice RFR. The vertical loads of the glass are carried through belted fings. The horizontal wind loads are carried by a series of cable trusses. As well as being the precursor to Pikington’s Plane glazing system, this system gave the illusion that the structure could be incredibly light, by concentrating the material in a small number of large bending elements, against which the slender Kenson elements can be stretched. The project was completed in 1994.

The scheme design for Stansted Airport took 18 months to develop. Norman Foster’s idea was that passengers would be able to clearly understand their route through the terminal from landside to airside. To aid this, the ceilings should be high, and not cluttered with services. All horizontal services and baggage distribution takes place under the concourse plane. Services rise up through the trunk of the pylons, which are placed at 36m centres. By splicing the trusses, they support the roof slab at 16m. The long scheme design period allowed us to look at many variations and to really refine the design of those towers.

In 1979 Peter Rice’s friendship with Renzo Piano led to a commission to re-evaluate the design of the structure of the Fiat car. Our goals were to reduce weight and hence fuel consumption, and produce a car that could be re-styled by the addition of clip-on replaceable panels. By returning to a chassis type of structure, made of 1mm thick pressed steel, we could produce a structure which was much quicker to analyse than a monocoque structure, thereby reducing the need for costly prototypes. As structural engineers, it is great if we get a chance to work in a different regulatory framework. Without the crush of building regulations and familiar codes of practice, we are forced to think from first principles.

The tradition of architectural and engineering competitions can also be very liberating, and also lead to lifelong design conversations between architects and engineers. The bridge competition was the winning entry for an ideas competition launched by the British Institution of Civil Engineers in 1987. I was in charge of Arup’s Los Angeles Office when I received a fax from David Marks and Julia Barfield asking if I would collaborate with them. We wanted to design a bridge that would be like those primitive suspension bridges that change their shape as you walk over them. Our bridge is modelled on D’Arcy Thompson’s description of the four legged animal as a quadrupedal bridge, spanning between its front and back legs, with its skeletal carrying the loading, and its tendons carrying the deflections. Because they were still in the U.K., and I was on the West Coast of the States, we decided to span it across the Grand Canyon.

Years later, when I was back in London, they told me about an idea they had for another competition. This time it was for a landmark to celebrate the new Millennium. The challenge was to come up with a scheme that would be as transparent as possible. The site Julia spotted, beside the old County Hall Building, and the River Thames, meant that we had to rationalise it over the river. We decided to hold the cables in rings on the outside of the structure, so that you don’t have to look through any obstructions, particularly when you are at the top. This was not just a collaboration between three or four people but a project that required the input of thousands of people.
Xstrata Treetop Walkway, Royal Botanic Gardens, Kew

This is an 18m high steel structure which allows visitors to pass close to the canopies of the ‘champion’ specimen trees at the Royal Botanic Gardens, Kew. Visitors see the gardens from a unique viewpoint and learn about the crucial role trees play in climate change.

The use of weathering steel was suggested to Tony Kirkham, the head arboriculturalist, as a material whose colour would blend well with nature, yet would look man-made, and that would need no future painting.

The design was developed by Jane Wernick. Associates with Marks Barfield Architects, to fit amongst the trees and their root systems, and was detailed in close collaboration with Brittain Steel, the fabricators, to make best structural and architectural use of the weathering steel.

The walkway is fully accessible, being accessed by either stairs or a lift.

Weathering steel is only available in plates, not rolled sections. This had a significant impact on the design. As the pylons had to be fabricated from welded steel, it was acceptable that they should also be tapered. Each triangular pylon branches to support a 3m diameter node platform.

The identical 12m long walkway modules consist of vertical and horizontal trusses that span between the pylons. The spacing of the intersections of the diagonals with the top and bottom booms follows the Fibonacci sequence, with the closest spacings at the supports. The arrangement looks fairly irregular, yet allows each tree half-open to be identical, but handled, to allow standardisation.

The floors and balustrades are lined with a galvanised steel expanded mesh that provides both safety and transparency.

The dynamic behaviour of the structure was analysed with input from the wind specialist R.W.C. Anemos who assessed both the quasi-static wind loads for the structural analysis, and the dynamic effects. Although there is some sway of the structure, it is not susceptible to lateral synchronous excitation. It moves much less than the trees.

The foundation design was critical. Reinforced concrete piles were acceptable to Kew, provided they avoided the main radial roots that provide stability to the trees. This required a radar root survey. The challenge was to design a pile cap that would be pin together, and to which the pylon could be attached, without wrenching out the fibrous roots that occupy the top metre of soil and supply the trees with nutrients and water. A pilecap above ground was not acceptable as it would reduce the permeability of the soil, and be visually intrusive. So a customised galvanised steel grillage was designed that could sit above the roots, close to the existing ground level. A steel section is plugged into each concrete pile, and welded to the grillage, to act as the principal pile reinforcement.

The project was completed in 2008 and brings delight to all who visit.
South London Gallery

Client: South London Gallery  Architect: 6a Architects  Services: Serge Lai Engineers

This project comprises the refurbishment and extension of a terraced house, beside the Camberwell College of Arts, a disabled access route to the South London Gallery, and a new education space in the courtyard behind the gallery. A new lift provides access to all levels, including the existing South London Gallery, avoiding the listed staircase.

The extension uses a mixture of steel frames, timber stud walls and floors, and load-bearing masonry. It makes use of the side wall of the South London Gallery for stability in one direction, and steel portal frames with timber stud shear walls in the other direction.

The education centre is a 4m high single storey structure with a skylight lantern in the centre. The roof is constructed using a steel roof supported by 5 new columns, and the existing masonry walls on two sides. Stability is provided by the walls, in conjunction with a steel braced bay on one side, with one side that can be opened up to the garden.

The project provides a variety of internal spaces, large and small, with room heights varying from low to high and engaging directly with the outside spaces, giving the gallery many opportunities for exhibitions and other events. It has just been completed.

The Lightbox, Woking

Client: Woking Galleries  Architect: Marks Barfield Architects  Services Engineer: Max Fowthum LLP

The Lightbox museum was built as a museum and gallery for the town of Woking, to the south-west of London. It was built to a tight budget using a mix of private donations and public funding.

The building sits on a narrow site between a busy dual carriageway, and a quiet canal. For this reason, the main circulation zone is on the side facing the road. Glazing at the lower level on that side allows passers-by to glimpse what is going on inside. A galvanised clad concrete wall provides acoustic protection to the entrance courtyard.

The photo on the right shows how the glazed openings generally face along the canal. This led to the choice of steel bracing for stability, which allows the braced bays to be arranged in a cherry-pick fashion, whereas shear walls need to be continuous from ground to roof. The floors are made of reinforced concrete, which provides good thermal mass.

The project was completed in 2007.

Goodwood Education Centre

Client: Cass Sculpture Foundation  Architect: Studio Downie Architects

This building sits within the grounds of the Cass Sculpture Park. It houses the administration office and archive of the Foundation, as well as providing an exhibition building. The site is cut out of the chalk landscape so the building is almost hidden. It is constructed in reinforced concrete, with a serpentine roof which is at the same level as the ground on one side of the building.

The project was completed in 2008.
Oundle SciTec

Oundle SciTec is a development which brings together the teaching of technology, art and aesthetics with the study of science. Oundle is a large independent school which encourages pupils to develop their own projects and avenues of enquiry. The design team was chosen as the result of a competition and we were keen to embody the ethos and spirit of the school.

The two storey scheme takes in several existing buildings including the Old Sanderson Workshop. The development will provide new science laboratories, a new lecture theatre, an enhanced area for design technology, a new art department, a new materials, mechatronics and electronics block, and linking circulation areas. The first phase, which was completed in 2007, includes the chemistry and biology laboratories.

Reinforced concrete is used for the walls, columns and slabs for its high thermal mass, as natural ventilation is used throughout, with fume cupboards for the noisy gases. Structural steel and timber are used in some locations on the roof. The majority of the new buildings are coated with a green rubber roof, and the roof of the central circulation space incorporates photovoltaic glazing.

The laboratories are arranged in pairs off a shared short corridor which acts as a two storey ventilation shaft. Circular holes in the walls allow the air to pass into these shafts.

The west staircase incorporates various structural devices, such as so-called ‘cantilever stone tread’ and a landing that is hung from a roof beam via a stainless steel bar. It is hoped that building structural engineers will study how it works.

The Henrietta Barnett School

This project includes the conversion of part of the Grade II listed building by Lutyens to a new science wing and the construction of two new wings with a total of about 1,000m² floor area to house Music and Drama, Design and Technology and Art. The structural works in the existing building were fairly minor, mostly involving the removal of partitions.

The new buildings are constructed using loadbearing brickwork with concrete floors, and timber vaulted roofs. The brickwork is constructed with a mortar that contains lime, which is more accommodating of thermal movements and so meant that we did not have to use thermal joints.

This is one of a series of small projects that we are working on with Michael Hopkins Architects that use timber for the roofs. In this case, we are using the inclined sides of the roofs as trusses that carry the horizontal wind loads to the shear walls at the ends of the buildings. This allows for a completely uncluttered vaulted space within the classrooms at the first floor.

The project is due for completion this autumn.
Rainham to the River

The village of Rainham, which is to the right in the aerial photo, has been cut off from an area of marshes and the River Thames by the Channel Tunnel Rail Link and the main-line trains into London. Although there is a steel footbridge over the railway, the route to the marshes, either by stairs or by a zig-zag ramp, is not at all welcoming.

The project comprises a new link to the marshes from the top of the existing staircase, and works to make the marshes more accessible, including new watercourses, footbridges and boardwalks.

With Peter Beard Landroom we have developed a 120m long ramp that is supported by timber columns. The columns are all at 15 degrees to the vertical, and their arrangement, combined with the stiffness of the ramp’s steel structure, provide the stability system. Generally the columns support the ramp at 3m intervals along its length, except where the ramp needs to span over the services road. The position of the footings has been constrained in many instances by the existing watercourses and underground services.

The stiffness of the overall structure has been assessed, both in terms of the maximum deflections and its natural frequency, which needs to be above 1.3Hz, to avoid the risk of lateral synchronous excitation.

The project is due to be completed in 2011.

RSPB, Aveley & Rainham Marshes

The project consists of a series of boardwalks, with their handrails, and a teaching node made from three re-configured shipping containers that sit on platforms in the water. A tree trunk has been used within the space as a column, it is rather oversized!

Timber piles have been used throughout as they are less intrusive in the landscape and are much more sustainable than steel or concrete alternatives. The client has accepted that long term settlements may be larger as a result and that it may be necessary to jack up the building and insert shims in the future.

The vertical boards on the platforms are orientated such that none of the openings are greater than 100mm wide, so that no additional barriers are required. They act as an effective screen when watching the wildlife.

Self-composting toilets are used at the node.

This project was completed in 2009.
Bayt Adbullah Children’s Hospice, Kuwait

Client: Kuwait Association for the Care of Children in Hospitals
Architect: Marks Barfield Architects

The original concept, proposed by the architect Aza Al Ghuwairi, included a rooftop walkway, a ‘magic carpet’ and a Ferris Wheel to add elements of design for this children’s hospice. Marks Barfield Architects and Jane Wernick Associates were approached by the client to develop the design, based on their experience with the Millennium Wheel and thenextInture Walkway at Kew Gardens.

We considered using timber for the main structural elements, as it wouldn’t get so hot in the extreme temperatures experienced in Kuwait. It’s important that the children don’t burn themselves when they touch the structure. However, Gulf Consult, the design and build contractor for the buildings, were anxious about the durability of timber in timber at those temperatures. So the designs have been developed using structural steel, with perforated aluminium for the cladding.

We are now entering the detailed design stage of the work, with Waagner Biro, who will be the contractor for the walkway.

The sketches on the right show the timber and steel options considered for the Ferris Wheel. The structural design is the same for both options i.e. the gondolas are supported by an arrangement of radial elements, braced by two squares. This lattice structure, in which the elements act in tension or compression, lie in two planes between which the gondolas hang. We rely on gravity to keep the floors horizontal. They will move at a bit. Each gondola can carry 4 passengers, including 1 wheelchair. The overall diameter of the wheel is 16m. It will turn slowly, stepping to allow the passengers to get on and off. The wheel will be turned by truck tyres that turn against the circular rubber strip.

We considered several options for the upper walkway, which consists of three tubes supported by towers between the buildings. At the end of the walkway there is a viewing platform with a lift and staircase to the ground. The sides of the tubes support the floor and roof, and could take the form of beams, inaction or arches as shown. It was decided to use arches, from which the floors can be suspended. The arches will be made from fabricated steel, with a triangular cross-section as shown in the sketch to the far right.

The drawings below show the components of the ‘magic carpet’. It is an inclined walkway supported by a pair of arched arches which also support the canopy. The canopy is clad with colour-coordinated perforated metal, supported by secondary steelwork.

We are now developing the structural design, in collaboration with Waagner Biro. Critical issues include how the steelwork will be broken down into pieces that can be delivered to site, and how to minimise the number of site welds. Care will need to be taken to ensure that thermal expansion and contraction can occur without introducing high stresses in the structure. A series of sliding bearings is being considered to allow the overall structure to ‘breathe’ as the temperature changes. These bearings will need to be hidden in pockets under the low points of the arches.

Where the ‘magic carpet’ meets the building at first floor level, there is an external terrace under the cover of the link canopy. This is a simple arrangement of columns that support a roof that links the canopy of the ‘magic carpet’ to the rooftop walkway.

The construction of the main hospice buildings is nearing completion, and it is hoped that these structures will be completed by the end of February 2011.
This project provides an accessible pedestrian and cycle link from Twelvetrees crossing, which is just South of the Olympic Park, to the East India Dock Basin at the River Thames. The main structural elements are: a new stair and lift tower, which provide access from a strip of land between the River Lea and a canal up to the Twelvetrees road bridge; a 75m span footbridge at Poplar Reach and a link through the underside of the A13 road bridge.

The area that this linear park, which will be called the Fawt, passes through is one of large light industrial buildings, empty development plots and residential areas. Part of the aim of the project is also to provide East-West connections through this area, which is surrounded by regeneration projects. The skyline is dominated by enormous sheds and gas cylinders. This has led to the use of an architectural language that is quite tough and uncompromising.

The structures will be made from galvanised steel and the connections will be as straightforward as possible.

Threading through the arches that support the main part of the A13 road (one of the main roads into London from the East), has required us to design connections that have as little impact as possible on the existing structure. Where the route passes under the approach roads to the main road, it will be suspended with hangars from those structures.

The process of attaching anything to Transport for London's structures is a complex and bureaucratic undertaking, requiring much negotiation. Various studies are required, such as the consideration of a fire in the link, and whether boats can impact the new structures.

The project has just achieved Planning Consent, and is due to be completed by March 2012.
2 Carlton Gardens, London

Client: The Institute for Government
Architect: Burrell Foley Fischer LLP
Services Engineer: Atelier Ten

2 Carlton Gardens, a Grade II* listed building, which was previously occupied by the Privy Council, has now been renovated for use by the Institute for Government.

In order to route two new air ducts from a ground floor plant room to the ceiling of a first floor meeting room it was necessary to create openings in the landing of a stone “canterlevered” staircase at two levels.

The effect on the structure of forming the openings was studied assuming that each flight is supported by the landing immediately below, which is in turn built into the surrounding masonry. It was assumed that the treads do not cantilever from the wall, but do derive torsional restraint from it. Each tread is supported by the tread below, with the torsion produced being resisted by the masonry wall. In practice the treads will cantilever partly, due to the weight of wall above. The studies showed that we needed to insert new steel beams under the landings in which the holes were to be made.

In addition it was necessary to remove an existing wall beneath the stair at ground level. Since the staircase appeared to be an original stone “canterlevered” stair it would not have had a support wall in this location. However, since this could not be absolutely determined we decided that we should carry out an incremental load test, which confirmed the validity of our assumptions.

The project was completed in 2009.

The Royal Society of Chemistry

Client: The Royal Society of Chemistry
Architect: Julian Hamap Architects

Julian Hamap Architects were asked to carry out a phased refurbishment of this listed building, which included the re-organisation of circulatory areas. This required the insertion of a new footbridge across the existing library at the gallery level and a new staircase in the Members Room area.

The footbridge is supported by the existing steel structure of the gallery in the library and suspended via structural hangers, which are connected to the existing structure of the floor above. The use of the hangers minimises the size of the beams. A horizontal viereck truss in the bridge deck provides its lateral stability.

The new staircase is a cantilever stair with a single steel stringer attached to the wall side only. The timber treads are supported by cantilever steel frames which are rigidly connected to the side of the stringer. The uprights of the balustrade are rigidly attached to every third tread. The insertion of this new staircase also made it necessary to remove part of an existing floor, and to insert a new steel beam to provide lateral stability to the existing wall that was no longer restrained by that floor.

The project was completed in 2009.
Gormley Studio, Vale Royal, London
Client: Antony Gormley  Architect: David Chipperfield Architects

This appears to be a simple two storey building, with double height spaces in the three central bays which provide the main studio for the sculptor, Antony Gormley. He and David Chipperfield spoke about the building which should appear to be as smooth as possible on both the inside and the outside - in a way it was to be an extraction of the typical shed.

The structure is made using structural steel which is hidden within the blockwork cladding. The columns in the double height spaces need to be larger than those which are laterally restrained by the first floor. In addition, they carry the lifting beams for the crane in that space. So they set the thickness of the blockwork throughout.

A previous owner of the site had installed piles for a four-storey building that was never built. We were able to use those piles using new ground beams, and only needed to install, smaller, piles and ground beams under about a third of the building.

The main staircases span from ground to first floor level, using steel trusses which are hidden within the balustrades.

The project was completed in 2003.

Venice Cemetery Island
Client: The Municipality of Venice  Architect: David Chipperfield Architects  Local Engineer: Romeo Scarpa

David Chipperfield Architects won a competition to provide more tombs at the Island of San Michele in Venice. The masterplan drawing on the right shows the first phase, in the north-west corner of the existing island, and the second phase, which will be placed on a new island. The original island is bounded by a high brick wall, whereas the new island will step down to the water, giving it a less introverted feel.

Because the water level is so high, all the coffins have to be above ground level. They are housed in reinforced concrete containers that are arranged, like bookshelves, around courtyards. Cloisters are provided with a series of roof slabs that are raised above the level of the tombs to allow breezes to flow through, and provide shade to the visitors.

The first phase of the project was completed in 2010.

Ernsts Family Campus, Coesfeld, Germany
Client: Herr Ernsten  Architect: David Chipperfield Architects  Services Engineer and Lead Structural Engineer: Arup Germany

This building is the headquarters of a company that manufactures clothing, built within a campus of factory buildings.

The plan is laid out around three courtyards, two of which are internal. The architectural idea was that the spaces would be framed by horizontal and vertical bricks walled that would form blade columns and continue the floor plans. Constructed in reinforced concrete, we needed to consider how the slabs could extend from inside to outside the building without forming old bridges. The use of Schock's block product, which puts insulation around the reinforcing steel, allowed this.

We carried out the scheme design for this project.

The project was completed in 2002 and shortlisted for the Stirling Prize.
Des Moines Public Library, USA

Client: Public Library of Des Moines  Architect: David Chipperfield Architects  Services Engineer: Arup  Local Structural Engineer: Shuck-Britton

The new public library building lies at the east end, and is one of the first projects of the Des Moines Western Gateway Park, an extensive urban-renewal development.

Built to a tight budget, it is constructed using reinforced concrete flat slabs which provide thermal mass, and allow a flexible arrangement of internal partitions and book stacks. The roof is designed to support a green roof, which is visible from most of the high-rise buildings that characterise downtown Des Moines. The slabs are supported by circular columns on a square grid, with smaller columns that are placed at equal spacing along the perimeter.

The length of the building required an expansion joint run across the building. Double columns, each with a half circle cross-section, support the slabs on either side of the joint.

A copper wire mesh within the double glazing provides thermal shading.

We carried out the scheme design for this project which was completed in 2006.

BBC Scotland, Glasgow

Client: BBC Scotland Land Securities  Architect: David Chipperfield Architects  Services Engineer: Arup  Lead Structural Engineer: Oscar Faber

This building houses all the activities of BBC Scotland, including television, radio and internet, and incorporating production facilities, studios, technical support and offices. The design provides linkages between the communities within the building, connecting the spaces with a central atrium, that climbs over the main studios, providing spaces for meeting, working and circulation.

The majority of the building is constructed using reinforced concrete on a lift-slab grid. The floors are designed to carry the high loadings required by the different uses, including neat high recording suites that are supported on acoustic bearings, that can be re-positioned as required. The studios under the central atrium and the floor above them are constructed using structural steel, as is the main public recording studio. Steel-truss transfer trusses are required over that main studio to support the accommodation above.

We carried out the scheme design for the scheme, and the detailed design for the studios and atrium roof.

The project was completed in 2007.

Figge Museum of Art, Iowa, USA

Client: Davenport Museum of Art  Architect: David Chipperfield Architects  Services Engineer: Arup  Local Structural Engineer: Chuck Saul Engineers

This art centre in the downtown regeneration area of Davenport was designed to replace an existing museum and provide a temporary gallery, as well as studios for the local community.

This was one of David Chipperfield’s first projects to use structural steel, partly in response to the local construction industry. This meant that it was much easier to use transfer trusses, which allowed the lower level to be set back from the facade line above. As can be seen in the photos, those trusses were eventually covered by the cladding.

The building lies close to the North bank of the Mississippi River. The city of Davenport had decided not to build high flood defences but to keep the occupied levels above the 1 in 300 year flood level, accepting that the basements would flood. So the car park is housed in the lower ground level that is constructed in concrete.

We carried out the Schematic Design and Design Development stages of work, and then handed over to local engineer Chuck Saul Associates. The project opened in 2005.
This project was the result of a competition to renovate or rebuild the Young Vic Theatre, which was originally built 38 years ago as a temporary structure on a bomb site on the Cut, London SE1.

It was built to bring classical and contemporary theatre to young people, using theatre-in-the-round.

The entrance was through the ground floor of the remaining building of a Victorian terrace—al butcher’s shop. The audience entered an octagonal space and sat in un-numbered seats around the central stage. A number of other buildings and porticos were introduced to support the theatre. Technically there were grave problems of lack of thermal and acoustic insulation, poor space planning and lack of flexibility in the main auditorium.

The competition entry aimed to maintain the aura of the theatre, whilst significantly improving the quality of the spaces, the working conditions for the company, and the flexibility in the types of shows that could be produced.

The existing auditorium and the butcher’s shop are retained in the new building as far as possible within a new three storey complex that includes two further performance spaces, together with a new double height foyer and bar and all the back of house facilities. The foyer extends onto a new external balcony that looks out over the Cut. The main auditorium is enhanced with an new, higher roof, new technical gallery, get-round facilities, a second gallery and general improvements to seating and stage facilities.

This project was constructed to an extremely tight budget of £2m, and the actual cost matched that budget. To achieve this, finishes were kept to an absolute minimum, which means that all the structure is exposed, and the detailing had to be carefully considered. Where fire protection is required, intumescent paint is used. By retaining parts of the structure, such as the lower half of the auditorium, we were able to keep costs down. Of course this was also good for sustainability.

The new theatre opened in 2006 and was shortlisted for the Stirling Prize.
Cremorne Boating Centre, London

This is a facility for children in the borough to learn boating on the River Thames. The two small buildings have been designed so that, in the event of a breach of the river wall, they will be able to be craned off the site within 48 hours, to enable the Environment Agency to be able to carry out repairs to the wall. The structure of the two buildings has therefore been designed in two halves that can each be lifted off the site, by attaching straps to ring beams at the floor level, once the Corten cladding has been removed. Careful checks of the weight of the structure were made to ensure that each half was within the loading limits of the crane that would be able to access the site.

The project was completed in 2007.

Potters Fields, London

This project consists of two kiosks. The larger one houses the clearing machine for the GLA building, as well as a café, a disabled toilet, and a ATM banking machine. It is partly set over the basement and exhaust vents of the GLA building, and partly on grade. The smaller kiosk, beside the approach ramp to Tower Bridge, provides another café. Both structures are constructed using structural steel, to which the cladding is attached.

The kiosks were completed in 2008.
Maggie’s Centre, Fife

Client: Maggie’s Centre Trust  Architect: Zaha Hadid Ltd.  Services Engineer: K J Tait

This project is one of a series of buildings that have been provided for patients suffering from cancer. Each is located within a hospital campus, and is designed to provide an environment, domestic in scale, where patients can receive support and advice. The late Maggie Jeness conceived the project when she was suffering from cancer, and persuaded her then oncolgist, Laura Lee, to help her realise her vision.

The site for this project, squeezed between a car park and a disused “gulch”, led to a design which looks out over the green space below. An underground sewer and drainage pipe cross the site. In addition, the ground conditions are fairly poor, and so the building is founded on reinforced concrete piles that were installed from the flat part of the site, and which support ground beams that can span over the underground services.

The inclined side trusses provide stability from front to back. In the transverse direction the steel columns of portal frame are hidden within the curved internal partitions. The mullions for the glazing also act as columns to support the roof.

The project was opened in 2006.

Bergisel Ski Jump, Innsbruck

Client: The Austrian Ski Federation  Architect: Zaha Hadid Ltd.

This ski jump was designed to replace the existing jump with one that met the current Olympic standards, and also incorporated a lift, press room and cafe.

The brief stipulated that the old ski jump should be demolished immediately after the competitions in January, and the new jump be in place for the following January. So it was proposed that the shaft be constructed using reinforced concrete, with a basement structure proportioned so that it could resist overturning of the superstructure without the need for ground anchors. The main part of the shaft could be constructed using jump framework. At the same time the steelwork for the jump itself, and the accommodation at the top of the shaft, could be fabricated off site and flown in by helicopter. The fit-out could be carried out the following year.

We carried out the competition design and feasibility study.
Living Architecture

Living Architecture is a not-for-profit organisation that has been set up to offer the public the opportunity to rent out holiday houses that have been designed by some of the best contemporary architects. Their aim is to transform the public’s view of modern architecture. This board describes three of the first five houses.

The Balancing Barn, Thorington, Suffolk

Architect: MVRDV with Mole Architects

This building gives the appearance of balancing precariously over the edge of a hill. The structure is a five-sided 20m long trussed steel tube which encloses the living space. The trussed tube is supported for only 15m of its length, with the end 15m cantilevering out over the sloping ground below. To stop the building from tipping over the cantilever is counterbalanced with the additional weight of a 400mm thick reinforced concrete slab.

We checked the deflections and vibrations of the structure. So long as deflections do not cause damage to the finishes and cladding of the building, it is our human perception of vibrations that is most important to consider. From our analysis this was found to be marginal, and so we designed the structure so that dampers could be installed if required. Now that the cladding is on, it has been agreed with the client that they will not be needed.

In-Between House, Thorpeness, Suffolk

Architect: Jammund/Eigens Architects with Mole Architects

The structure of the house is made up of two distinct elements: the concrete base and the timber roof structure. The base sits directly on the sand and consists of a concrete core, walls around the stair and fireplace, and very slender steel columns at the perimeter, which support a concrete slab at first floor. The concrete walls provide stability and the steel columns prop the slab to provide wide unobstructed views at ground floor.

The complex shape of the first floor walls and roof structure is made up of flat planes, which lend themselves to be formed from large panels of solid cross-laminated timber. The panels’ in-plane stiffness inherently provides stability. The panels were factory fabricated to close tolerances and were quick to erect.

We carried out a finite element analysis of the first floor slab, in order to check stress distributions and deflections. The analysis allowed us to refine the thickness of the slab to 250mm, which is very aim for a 4m span.

A Secular Retreat, Chivelstone, Devon

Architect: Atelier Peter Zumthor

This project was conceived as a place that a group of like-minded people could visit to relax and perhaps work together. So as well as the four bedrooms, a studio is included.

The structures are built up of a series of massive rammed concrete walls that support the overlapping roof plates, which are of reinforced concrete. The architect wants both the top and bottom surfaces of the roof plates to be of concrete and so there will be two layers with insulation between. To avoid cold bridging the top layer will cantilever past the glazing line, which is set in from the plate perimeters. The soffit of the slab is to be curved. The design of these structures is an ongoing iterative process, in which the architect makes physical models and in which we bounce ideas for how best to achieve a good solution between us. It will also be necessary to involve the local builders who will be making samples and prototypes of the critical elements.
Cypher House, London N7

The client claire for this building idea was the late architect and writer whose most famous project is his own, self-build house. They found a small North London site which could only get planning permission for a property that is no taller than the existing garages. So David’s proposal was for a house that is carved out of the ground, with an external courtyard at the basement level. By creating views between all the rooms he has managed to produce a design that gathers a surprising amount of daylight.

Apart from the steel sheet piling retaining wall that was required along the pavement edge, the structure is reasonably conventional and appropriate to domestic construction.

Sack’s Maguire Architects completed the meticulously detailed final design.

The house was occupied in 2006.

Spaniards End, London NW3

This house was built in the garden of the house that Nicky grew up in and that had been commissioned by her parents. It is arranged on three levels: lower ground, ground and first, with the bedrooms on the first floor. He agreed with the architects at the beginning of the design process that the concept should be that we would use reinforced concrete up to the first floor, and that the walls and roof of the top floor should be constructed in timber.

The house opens up to the garden as much as possible and so there are minimal walls or columns along those edges. In fact the glass walls on two sides of the kitchen can slide back and there is a large skylight over the dining area. The bedrooms are expressed as an almost separate volume that is balanced on a blade wall at one end.

The clients moved into the house in 2008.
Weinfluss Connecting Link, Vienna

Client: The Municipality of Vienna
Architect: Faiko Schmidt and Dirk Krolikowski

This was the winning entry for a new 50m long lifting footbridge over an inlet off the River Danube. We worked with the architects to develop a very slim and undulated bridge, made as a fabricated box section, with the lifting mechanism hidden in a chamber below ground level. This is partly because it should not conflict with the historic baroque bridge behind. Detailed design should start towards the end of 2010.

Footbridge, University of North London

Client: The University of North London
Architect: Zaha Hadid Ltd.

This was the competition winning entry for a footbridge to link the main campus on the east side of the Holloway Road with the proposed development on the west side.

Because two landing points were required at each end of the road the design was conceived as a tube that bifurcates, with the sides of the tubes being trusses. The arrangement of diagonsals could irregular, and form part of a pattern of layered planes containing lighting, balustrades, and structure.

The bridge will not now be built as the university, now known as London Metropolitan University, decided to build instead a new graduate centre on the east side, designed by Daniel Libeskind.

Olympic Park Footbridge, London

Client: Olympic Delivery Authority
Architect: McDowell + Benedetti

This was one of the six short-listed entries for the bridge in front of the main stadium. It crosses a canal, and was required to be 25m wide during the 2012 Olympic Games and just 5m wide thereafter.

The idea for the design was based on a triangular fabricated section that formed a large loop, stiffened by bicycle wheel type spokes. The cross section was optimised in response to the stress levels.

Basildon Bridge

Client: English Partnerships
Architect: Marks Barfield Architects

This bridge over the A127 was to be both a means to access a regeneration area, and a landmark. The bridge geometry was established to provide a smooth transition, which can be seen as part of an overall landscaping design. A clear span bridge of about 120m is formed using a steel box section, in which the deck is inset so that crash barriers are hidden by the overall form. In this way a slender edge to a very shallow arch is presented to those driving along the road. Unfortunately funding was not provided and the project stopped at the end of the feasibility study stage.
Windrush Lights, Brixton Square Central, London

We were asked to design these 15m high lamp posts for the new square in Brixton. We worked in close collaboration with Gross Max and Simon Smith, who fabricated the pieces.

The square was completed in early 2010.

Toby Paterson Sculpture, BBC Scotland, Glasgow

Toby Paterson was commissioned to produce this piece to be placed by the entrance to BBC Scotland. We worked with him to produce a structure which would be as clear as possible, with no visible bolts. Scott Associates carried out load tests on the plywood panels and their fixings to the structure.

The piece was completed in 2007.

Liverpool Rotunda

This pavilion was constructed for the 2008 Liverpool Biennial International Festival of Contemporary Art. It is constructed using weathering steel, using where possible generic products that the fabricator already had developed.

Singing Ringing Tree, Burnley

This musical sculpture was designed for Bury's Panopticon. It's sits on Crown Point and is visible from the town centre. Sticks in 25 of the pipes allow them to act as flutes which play as the wind blows.

The method of assembly was developed in conversation with the fabricator before we could start on the analysis. We used a simplified model of the structure as a cantilever spiral that follows the centre of each of the connecting rings.

The project was completed in 2007.

Clearwater, Chelsea Flower Show, 2002

This temporary garden included a canopy that collected rainwater to run off into a reed bed. The roof was made of panels of plywood and glass, in a folded plate. It was supported by three beam-like structures made of fabricated steel plates. The main uprights had a tapering triangular cross-section that spread out into three branches that were fabricated T-sections. The bases were welded to sheet metal boxes that were filled with sand to prevent overturning in the wind. They were hidden in the garden build-up.

Turville Sundial

This is a stainless steel sundial that sits in the landscape on a concrete base. The gnomon is 4m long. It was completed in 2009.
In the 1970s the King of Bhutan had proposed that we should measure the success of a society as much by its happiness quotient as by merely measuring GDP. Then, in the late 1990s, a fairly new discipline, the economics of happiness, came into being as a result of research by economists and social scientists. This showed that over the last fifty or so years the percentage of people in the comparatively wealthy countries, who say that they are happy with their life has stayed pretty constant, despite the fact that their financial wealth has increased enormously. One of their key findings was that there is a well-developed democratic framework, coupled with a good degree of local democracy, people are more satisfied with their lives.

In 2005 Richard Layard produced a book called ‘Happiness: Lessons from a New Science’ that carried out a wide-ranging review of the areas in which happiness was being studied, including some research on the effects of the built environment. I am a member of a think tank at the Royal Institute of British Architects called Building Futures. This group tries to take different topics that make us think about what might be happening in 20-30 years time. So I proposed the topic of Building Happiness. In November 2006 we hosted a seminar, which was attended by a cross-section of policy advisors, researchers, architects, and social workers, where we discussed issues such as ‘Why do some villages work and not others?’ ‘Should we design cities?’ ‘Should every project have a happiness champion?’ and ‘How can the public contribute to decision making if they feel engaged with a local democratic process?’ We actually decided that the subject was broad enough to justify a book and Black Dog Publishing agreed. The book is a collection of essays by practitioners in the built environment, as well as some short pieces by well-known people about places that really do give delight.

What I think this book shows is that there are many ways of thinking about what the effects of what we construct can be on the human psyche. At the same time a number of consistent threads emerge: People are happier if they feel engaged with how their local community is run. If the way we design them encourages this – so much the better. Now we feel about a place is affected by many things. As the landscape architect Martha Schwartz says: although a visit to the Grand Canyon is thrilling, her childhood memories mean that her backyard rates higher as a Happy Place. Several of the architects show the benefits of generosity in the designing of spaces that allow for social interactions. There are two papers based on quite systematic research about how students suffer if their rooms open onto long, closed corridors, or how it matters if strangers can pass your bedroom window. The environmental engineer Max Fordham examines quite carefully the physical conditions of daylight, warmth, and noise.

Our responsibility should be to try to bring delight with everything we design. Now, as it becomes more obvious that increasing GDP will inevitably lead to more consumption of our planet’s scarce resources, it is surely imperative that we concentrate more on how the way in which we design our built environment impacts on our emotional well-being. Rather than measuring how much money our projects can make for our clients, let’s measure how many smiles they can bring about!

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