

FOCUS ON: DETAIL

VOLUME 1





FOCUS ON DETAIL

THE FOCUS ON DETAIL SERIES OF DOCUMENTS REPRESENT EXAMPLES OF HOW DETAIL HAS BEEN USED TO CONTRIBUTE TO THE OVERALL FORM OF BUILDINGS COMPLETED BY DLA.

SPECIFIC ELEMENTS OF A BUILDING HAVE BEEN SELECTED WHICH ARE CONSIDERED TO BE OF PARTICULAR INTEREST OR WHICH MAY HAVE PROVEN CHALLENGING TO THE DESIGNER. SOME DEMONSTRATE NEW AND INNOVATIVE TECHNIQUES AT THAT TIME, WHERE AS OTHERS BUILD ON MORE TRADITIONAL TRIED AND TESTED METHODS OF CONSTRUCTION.

THIS DOCUMENT WILL HOPEFULLY REPRESENT A SOURCE OF LEARNING FOR ALL, TO PROVOKE THINKING AS TO HOW A PARTICULAR TECHNICAL PROBLEM CAN BE RESOLVED AND ULTIMATELY A MEMENTO OF DLA'S TECHNICAL ACHIEVEMENTS WHICH WE CAN ALL BE PROUD OF....

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#### ■ STAGE @ LEEDS : LEEDS UNIVERSITY

# FOCUS ON DETAIL I RAINSCREEN CLADDING

The £3.3 million RIBA award nominated 'stage@leeds' building provides a range of facilities for the School of Performing Arts and Cultural Industries at the University of Leeds. Located on the city campus, the building provides a main theatre for public performances, smaller teaching theatre, multi-media entrance foyer, teaching space, faculty offices and staff areas from the relocated Bretton campus.

The distinctive design concept for the building takes its inspiration from the Victorian Street patterns previously present on site with a strong linear theme to the external façade. The use of dark coloured cladding, set against the adjacent glazed entrance/atrium space creates a sense of drama and makes a prominent architectural contribution to the campus and wider city.

The most recognisable feature of this building is the 3 subtle shades of random horizontal rainscreen cladding, making this building instantly recognisable. The

original scheme was to have an all black façade, but as black shows dirt up easily, muted tones were introduced to ensure the building always looks clean.

A Trespa TS400 Invisible fixing system was selected for the facade. A 200mm Metsec structural framing system first creates the internal skin, with a cementitious board facing being applied prior to a Kingspan Kooltherm rainscreen insulation. This cementitious board was applied early on site to make the building water tight and forms the perimeter air seal line with an EPDM being trapped into the window frames and taped to the board. Aluminium helping hand brackets are then fixed to this cementitious board (with a thermal isolator to the rear face) and T sections added to these via a slotted connection to take up any installation tolerance. A Sika chemically bonded adhesive and tape is then applied to the flat face of the T section and an 8mm thick laminate faced, phenolic resin

bonded panel applied. This fixes the panel to the backing system without the requirement for any visible fixings.

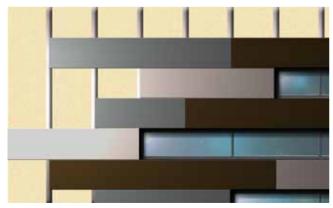
Now, although Trespa advertise this system as invisibly fixed, they also recommend that the panel be fixed with the use of mechanical fixings. Trespa have no problems warranting an invisible fixed system on the continent where the climates are predominantly warmer, but here in the UK, with our colder climate, Trespa recommend that at least 2 mechanical fixings are applied to each panel. These fixings would ruin the aesthetics of the building that we were trying to create so we had to enter into negotiations with Trespa. By using an approved contractor, increasing site supervision and imposing constraints on temperatures to which the system would be installed, Trespa signed up and agreed to warrant an invisible fixed system.

The backing system for the Trespa is installed at 600mm centres, and so to create the 'random' pattern, varying panel sizes of 600, 1200, 1800 and 2400mm lengths were used, with windows also kept within these size constraints. Panels were installed with 10mm vertical joints and a 5mm horizontal joint to take out any deflection loads and vertical aluminium sections behind the main panels were painted black to blend in.

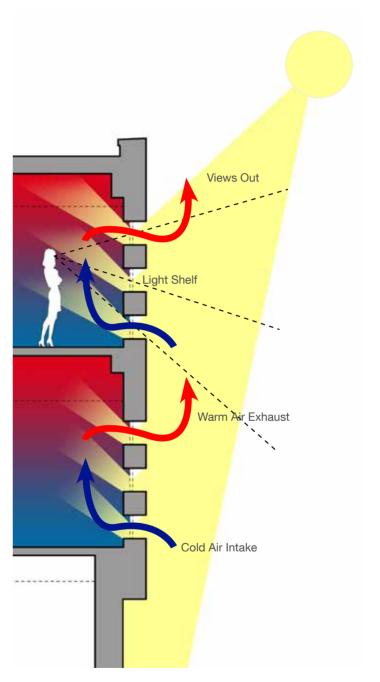
The 3 narrow slot windows per floor gives the internal user framed views downwards and straight out, as well as a view of the sky. Because the sills are the same depth as the window height, views into the building from outside are restricted. The deep reveals are designed to reduce solar gains, giving self shading from the sun on this south facing elevation, with the light coloured sills acting as light shelves to give an even and natural diffused light into the office space and keeping energy costs low.

Natural ventilation is the main source of cooling in this building. Opening windows in the offices provide natural ventilation and the positioning of the windows encourage low level intake with high level exhaust. This type of single sided ventilation is only effective up to a room depth of 6m, so the office depths were limited to 4m to ensure efficiency.





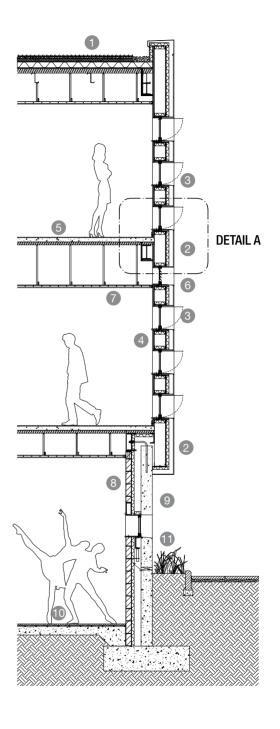
**ELEVATION SCHEMATIC** 



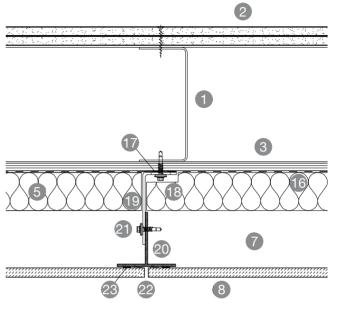
- GREEN SEDUM ROOF ON INSULATION AND PROFILED METAL DECK.
- 2 TRESPA TS400 INVISIBLE FIXED RAINSCREEN SYSTEM
- 3 OPENABLE DOUBLE GLAZED ALUMINIUM WINDOW.
- 4 200MM METSEC SFS WITH 25MM PLASTER FINISH INTERNALLY AND 10MM CEMENTITIOUS BOARD.
- PROFILED COMPOSITE FLOOR DECK.
- 6 LOUVRED VENTILATION PANEL TO MATCH WINDOWS FOR VENTILATION EXTRACT.
- SUSPENDED CEILING
- 8 EXPOSED BLOCKWORK
- EXPOSED FAIRFACED WATERPROOF CONCRETE WALL.
- WATERPROOF CONCRETE FLOOR WITH SPECIALIST SPRUNG FLOOR.
- **11** EXTERNAL LANDSCAPING AND PATH.







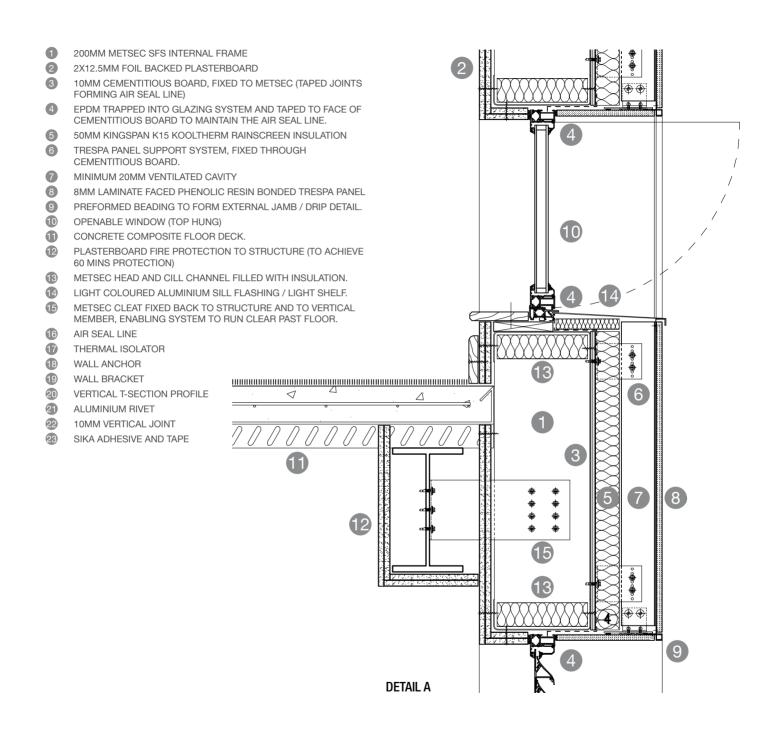




**PLAN DETAIL** 

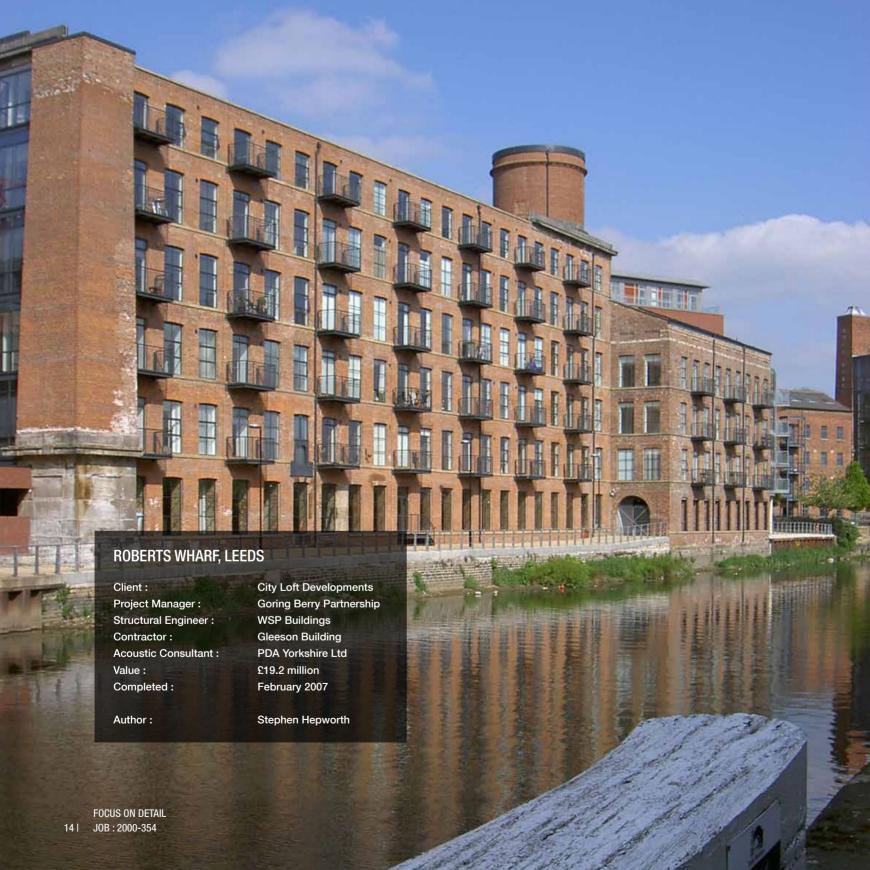














## ROBERTS WHARF, LEEDS

# FOCUS ON DETAIL I ACOUSTIC FLOOR SOLUTIONS

Designed for residential developers City Loft Developments Limited, the scheme comprised the refurbishment of the Grade II Listed Roberts Mart 'Bank Mills' and the construction of two new build blocks. Located overlooking the River Aire to the east of Leeds city centre, the completed works provide 198 one and two bedroom apartments and 11,700 ft² of open plan office space, located on the ground floor of the refurbished mill. This mix of uses aimed to form a living and working community and reflects a sustainable approach to the development.

As the city centre boundaries were rapidly expanding, Bank Mills (Roberts Wharf), sited in close proximity to the East Bank Regeneration area, was a natural opportunity for re-use of a previously industrial area. This once brown field

site is within walking distance of the City Centre and the neighbouring Clarence Dock development.

The client brief was to create contemporary loft style apartments, whilst retaining the historic character of the mill, with designs not constrained by standard apartment living.

As the nature of the mill buildings are deep plan in area the design called for deep plan bedrooms, maximising natural light through the vast expanse of the mill windows, whilst ensuring an inventive use of space including utilising the roof structure in one block for duplex apartments.

The new build elements were carefully inserted on the footprints of more modern printing sheds within both the courtyards bordering East Street.

The existing mills were sensitively transformed to incorporate the exposure of existing brick vaulted ceilings and cast iron columns whilst providing spectacular open plan living spaces. The two new build blocks are of concrete frame construction with exposed brickwork and a lightweight rainscreen to higher levels with one block connected back to the existing mill by a lightweight curved glazed extension.

The completed works offer an intimate feeling of space against the sheer scale of the historic working mill. It encapsulates a truly industrial and urban feel in the 21st century with a whole new community. A new life to an old mill!

#### ACOUSTIC FLOOR SOLUTIONS

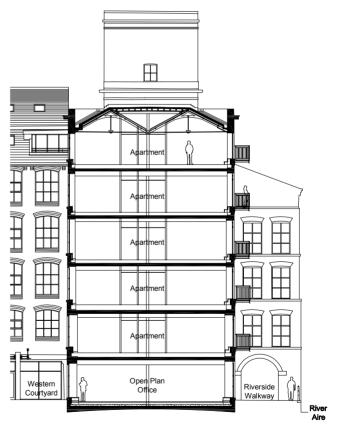
Records of the Bank Mills complex (Roberts Wharf) date back to the 1790's but the current listed building stock was constructed in three main phases dating from the 1820's to the 1890's during which time construction methods evolved depending upon technological developments and available materials.

At the time of construction there would have been very little (if any) requirement to prevent the passage of sound from one floor of the mill buildings to another.

Therefore, when the mill buildings were to be refurbished and converted into prime commercial and residential space to current exacting standards and legislation, the challenge was set. As the buildings were Grade II Listed, the structure and fabric of the buildings were to be left untouched and therefore solutions were investigated to form acoustic isolation between floors accounting for the differing existing floor build ups depending upon the historical method of construction.

The two following examples of existing floor construction from two different mill buildings offer an insight into the complexities faced and highlight the solutions arrived at in providing the required sound reduction levels between floors for the end users.

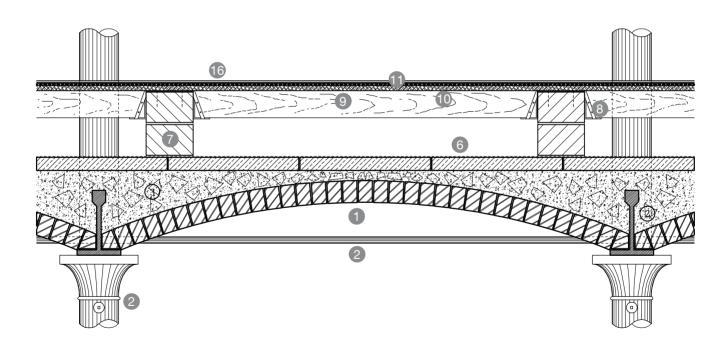
The first example is from the original 1820's mill building when the structure was formed using cast iron beams and tie rods forming bays spanning the width of the mill supported on cast iron columns down the centre of the mill and padstones built into the external mass masonry wall. The stone slab floors were simply laid on ash and rubble infill to the structural brick vaults spanning between the cast iron beams. Due to the mass of the structure it was determined that much of the sound transfer would be absorbed. Therefore, a new floor could be formed directly onto the existing floor using flooring grade chipboard on floor joists supported via saddle joist hangers on blockwork masonry laid flat. 'Regupol', a tough rubber sound insulation matting, was laid over the chipboard in order to reduce the effects of impact sound and the floor was finished with solid timber or carpet.



TYPICAL SECTION THROUGH 1820'S MILL BUILDING

- EXISTING STRUCTURAL BRICK BARREL VAULT BLASTED CLEAN AND SEALED
- 2 EXISTING CAST IRON BEAMS, COLUMNS AND TIE RODS CLEANED AND TREATED WITH INTUMESCENT PAINT TO ACHIEVE 1 HOUR FIRE RESISTANCE
- EXISTING STONE SLABS ON ASH AND RUBBLE INFILL
- 4 EXISTING SOLID TIMBER BEAMS ENCASED IN GLASROC FIRECASE S PLASTERBOARD TO ACHIEVE 1 HOUR FIRE RESISTANCE
- EXISTING TIMBER FLOORBOARDS UNDERDRAWN WITH GLASROC FIRECASE S PLASTERBOARD ON TIMBER BATTENS TO ACHIEVE 1 HOUR FIRE RESISTANCE
- 6 BUILDING PAPER
- BLOCKWORK LAID FLAT SLEEPER WALLS

- 8 SADDLE JOIST HANGERS
- 9 FLOOR JOISTS
- **10** FLOORING GRADE TONGUE AND GROOVE CHIPBOARD
- REGUPOL RUBBER SOUND INSULATING MATTING
- (2) ACOUSTIC PLASTERBOARD CEILING SUSPENDED ON MF TYPE SYSTEM
- 13 DENSE ACOUSTIC MINERAL WOOL INSULATION
- TREATED SOFTWOOD SUPPORTS OVER LINE OF EXISTING BEAMS TAPERED AND PACKED TO FORM COMMON LEVEL
- 15 HUSH RESILIENT BATTENS AND CRADLES
- 6 SOLID TIMBER OR CARPET FLOOR FINISH



1820'S BRICK VAULT FLOOR CONSTRUCTION

The second example is from the subsequent 1850's addition to the mill complex when the structure was formed using massive solid timber beams forming bays spanning the width of the mill supported again, on cast iron columns down the centre of the mill and padstones built into the external mass masonry wall. The floor was simply formed using timber floor boards (approx. 50mm thick) spanning between the timber beams. This construction provided very little in the way of sound reduction between floors as well as presenting a fire hazard. The added complication with this floor build up was the twisting and warping of the timber beams over time which resulted in serious and random differences of floor levels across the floor plate. The new floor would not only have to offer the required sound reduction but also the required fire compartmentation without imposing too much additional load on the existing structure. Firstly there was a requirement to provide a level floor which was achieved by fixing timber supports over the lines of the existing beam which were painstakingly tapered or built up to a common level. An intermediate floor comprising flooring grade chipboard on floor joists was laid across the new timber supports. A system of 'Hush' resilient battens and cradles were laid over the chipboard floor and the space between the cradles filled with a dense acoustic mineral wool insulation. The floor build up to the upper side was completed by a further floor of flooring grade chipboard to receive a floor finish of solid timber or carpet. The underside of the existing floor construction was lined with 'Glasroc Firecase S' to provide the required fire resistance and the columns throughout were treated with intumescent paint. The entire floor was under drawn with an acoustic plasterboard suspended on an 'MF' type system incorporating a dense acoustic mineral wool insulation.







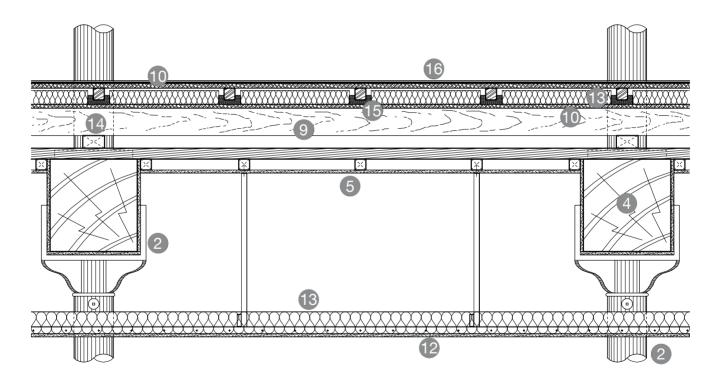






- EXISTING STRUCTURAL BRICK BARREL VAULT BLASTED CLEAN
  AND SEALED
- EXISTING CAST IRON BEAMS, COLUMNS AND TIE RODS CLEANED AND TREATED WITH INTUMESCENT PAINT TO ACHIEVE 1 HOUR FIRE RESISTANCE
- EXISTING STONE SLABS ON ASH AND RUBBLE INFILL
- EXISTING SOLID TIMBER BEAMS ENCASED IN GLASROC FIRECASE S PLASTERBOARD TO ACHIEVE 1 HOUR FIRE RESISTANCE
- EXISTING TIMBER FLOORBOARDS UNDERDRAWN WITH GLASROC FIRECASE S PLASTERBOARD ON TIMBER BATTENS TO ACHIEVE 1 HOUR FIRE RESISTANCE
- 6 BUILDING PAPER
- BLOCKWORK LAID FLAT SLEEPER WALLS

- 8 SADDLE JOIST HANGERS
- 9 FLOOR JOISTS
- **10** FLOORING GRADE TONGUE AND GROOVE CHIPBOARD
- REGUPOL RUBBER SOUND INSULATING MATTING
- ACOUSTIC PLASTERBOARD CEILING SUSPENDED ON MF TYPE SYSTEM
- 13 DENSE ACOUSTIC MINERAL WOOL INSULATION
- TREATED SOFTWOOD SUPPORTS OVER LINE OF EXISTING BEAMS TAPERED AND PACKED TO FORM COMMON LEVEL
- 15 HUSH RESILIENT BATTENS AND CRADLES
- 6 SOLID TIMBER OR CARPET FLOOR FINISH



1850'S TIMBER BEAM FLOOR CONSTRUCTION



# TYPICAL FLOOR AND SITE PLANS











## RIVERSIDE ELEVATION



**COURTYARD ELEVATION** 









# ONE BREWERY WHARF, LEEDS

# FOCUS ON DETAIL I INNOVATIONS IN CURTAIN WALLING

The 'One Brewery Wharf' development forms the final component of the overall Brewery Wharf masterplan - a redevelopment of brown field land to the south of the River Aire and comprising of a variety of buildings containing office, leisure/retail, hotel and residential uses.

One Brewery Wharf is a 13 storey development consisting of four self contained ground floor office units located above two basement storeys. The basements have a capacity of 89 cars. The upper levels consist of 151 residential apartments with access from ground level via a manned concierge.

At the eastern end, the building rises dramatically by virtue of its unique signature feature, a glazed prow. This is composed of a Schuco FW50+SG frameless curtain walling system,

but softened by the incorporation of intermittent vertical feature glazing bars and a palette of coloured glass, conducive to its residential backdrop. The glazed element extends from level 1 to roof level.

The glazed prow, owing to its unique design, presented a number of challenges to the design team, contractor, subcontractor and manufacturer alike. As the element necessarily extended past each floor level, acoustic and fire separation considerations were key drivers for resolution by DLA Architecture.

Design sub-contractor involvement introduced further considerations, namely system drainage and incorporation of structural frame deflection, both of which required significant Schuco design input.



Owing to variable positioning of the mullions which altered with the height and width of the prow, continuous vertical drainage could not be achieved between floor levels. Acoustic separation also required some form of physical break in the system at each apartment level. Both of these performance parameters were addressed by means of Schuco split transoms.

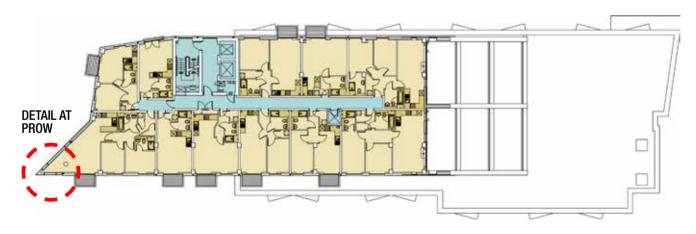
Early discussions with Schuco identified a minimum frameless glass pane size in any direction of 670mm. This dimension was considered to be too wide to visually demarcate each floor level. Therefore the glazing was reduced to 460mm but consequently required physical restraint in the form of conventional transom caps. The split transom was located to the rear of the lowest transom cap at each floor level.

Thermal performance of the prow was a concern, with residential criteria being more onerous than non-residential. Some offsetting was therefore undertaken with increased levels of insulation accommodated within other external wall elements. Nonetheless it was discovered relatively early in the design process a fully transparent prow would not be feasible. Insulated look-alike glazing was therefore introduced at each apartment level creating a dado wall internally.

Samples of the intended glazing products were obtained early in the design process. This identified a potential issue with the white look-alike glazing which appeared too stark. Replacing the clear outer pane with an etch effect glass achieved the desired softer tone. The look-alike glazing still achieved the same reflectance as conventional glazing, maintaining the overall desired aesthetic.

The building has been well received in the City of Leeds and is a prominent landmark south of the river. This has been recognized by the fact the development won the 'new building' category of the Leeds Architecture Awards 2008. The scheme also won a Bronze Award in the regional RIBA White Rose Awards 2009.



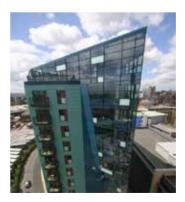


#### TYPICAL FLOOR PLAN



**ELEVATIONAL EXTRACT** 

- FEATURE GLAZING TO HAVE 10% ACID ETCHED OUTER AND CERAMIC COATED INNER. SPEC: SAINT GOBAIN SGG CLIMAPLUS DOUBLE GLAZED SEALED UNITS TO BS5713 CONSISTING OF 6MM THICK SATINOVO OUTER PANE, 12MM AIR CAVITY AND 6MM THICK SGG EMALIT APPLIED TO SURFACE 4 (COLOUR: BS14C31 POLAR WHITE) + FOIL BACKED INSULATION TO REAR.
- OPENING LIGHT.
- SCHUCO FW50+SG EXTERNALLY FRAMELESS CURTAIN WALLING SYSTEM. FRAME COLOUR: RAL 7016 DARK GREY.
- 4 20MM WIDE RECESSED DRY JOINT.
- S VERTICAL T-SECTION FEATURE CAP, ARRANGED TO GIVE RANDOM APPEARANCE. SCHUCO REF:V8-80122.
- 6 LOW PROFILE STANDARD CAPS EITHER SIDE OF FLOOR EDGE SPANDREL (CAPS REQUIRED IN THESE LOCATIONS AS GLASS SIZE IS LESS THAN 670MM RECOMMENDED MIN DIMENSION. GLASS THEREFORE TO BE RETAINED TO AVOID DOUBLE GLAZED UNIT SHEAR AND FAILURE).
- SAINT GOBAIN SGG CLIMAPLUS DOUBLE GLAZED SEALED UNITS TO BS5713 CONSISTING OF 6MM SGG SECURIT PLANITHURM FUTURN OUTER, 20MM AIR SPACE AND 10MM THICK SGG SECURIT INNER.
- SPANDREL GLAZING AT FLOOR EDGE AND DADO POSITIONS TO HAVE CLEAR OUTER AND CERAMIC COATED INNER. SPEC: SAINT GOBAIN SGG CLIMAPLUS DOUBLE GLAZED SEALED UNITS TO BS5713 CONSISTING OF 6MM THICK SGG SECURIT COOL-LITE SKN174 OUTER PANE, 12MM AIR CAVITY AND 6MM THICK SGG EMALIT APPLIED TO SURFACE 4 (COLOUR BS18C39 BLUE GREY) + FOIL BACKED INSULATION TO REAR.
- GLOSS P.P. COATED ALUMINIUM FASCIA PANEL GLAZED INTO CURTAIN WALLING SYSTEM. COLOUR BS18C39 BLUE GREY.
- GLAZING AT HIGH LEVEL TO HAVE CLEAR OUTER AND CERAMIC COATED INNER. SPEC: SAINT GOBAIN SGG CLIMAPLUS DOUBLE GLAZED SEALED UNITS TO BS5713 CONSISTING OF 6MM THICK SGG SECURIT COOL-LITE SKN174 OUTER PANE, 12MM AIR CAVITY AND 6MM THICK SGG EMALIT APPLIED TO SURFACE 4 (COLOUR BS18C39 BLUE GREY) + FOIL BACKED INSULATION TO REAR.



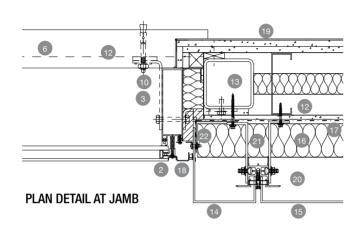


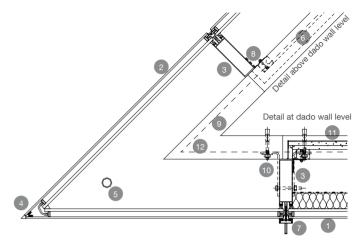
- SAINT GOBAIN DOUBLE GLAZED UNIT WITH CERAMIC COATING TO INNER FACE. FOIL BACKED RIGID INSULATION BONDED TO REAR TO ACHIEVE U VALUE OF 0.35W/M²K
- 2 EXTERNALLY FRAMELESS GLASS JOINT WITH DRY GASKET INSERT. TOGGLE RESTRAINTS INTO RECESSED GLASS SPACERS.
- 3 SCHUCO MULLION.
- SCHUCO GLASS TO GLASS CORNER DETAIL INCORPORATING CRANKED RESTRAINT.
- 5 POLYESTER POWDER COATED TUBULAR STRUT SUPPORTING TRANSOMS WHERE CANTILEVERED BEYOND MULLIONS.
- 6 MDF WINDOW BOARD ABOVE DADO WALL.
- SCHUCO T SECTION CAP.
- DADO WALL RESTRAINED TO CURTAIN WALLING SYSTEM WITH VERTICALLY SLOTTED ANGLES BONDED TO MULLIONS WITH 3M-VHB TAPE.
- MDF WINDOW BOARD AT FLOOR LEVEL.
- 10 MULLION RESTRAINT AT FLOOR LEVEL.
- 1 2 X 15MM THICK PLASTERBOARD DADO WALL.
- EDGE OF R.C. SLAB.
- 13 INTUMESCENT PAINTED SECONDARY STEEL MEMBER SUPPORTING RAKING INTERFACE BETWEEN GLAZING AND RAINSCREEN CLADDING.
- SYNTHAPULVIN COATED RAKING ALUCOBOND JAMB TRIM.
- (I) SYNTHAPULVIN COATED ALUCOBOND PANEL (KINGSPAN INTERLINK RAINSCREEN SYSTEM).
- 6 80MM THICK KINGSPAN K15 RIGID INSULATION TO ACHIEVE OVERALL U VALUE OF 0.27W/M²K
- VAPOUR BARRIER, WITH ALL JOINTS TAPED AND LAPPED.

- POLYESTER POWDER COATED ALUMINIUM CLOSER, MASTIC SEALED TO JAMB TRIM.
- LIGHTWEIGHT INTERNAL LEAF CONSISTING OF KINGSPAN KINGFRAME STUD SYSTEM. OUTER LAYER OF 10MM PYROC BOARD, 50MM THICK 16KG/M³ ACOUSTIC MINERAL WOOL BETWEEN STUDS, 2 X INNER LAYERS OF 15MM THICK LAFARGE FIRECHECK WALL BOARD.
- 20 VENTILATED ZONE.
- 21 ADJUSTABLE ALUMINIUM BRACKET.
- 22 EPDM MEMBRANE.
- LOW PROFILE TRANSOM CAP. HIT & MISS EPDM SEAL TO U/S OF CAP ALLOWING SYSTEM DRAINAGE AT EACH FLOOR LEVEL.
- SCHUCO SPLIT TRANSOM. LOWER SECTION BRACKETED TO SLAB SOFFIT.
- SPLIT & VERTICALLY SLOTTED BRACKET, ALLOWING FOR SLAB DEFLECTION.
- 26 SCHUCO TRANSOM.
- 27 LOW PROFILE TRANSOM CAP.
- 28 R.C. SLAB.
- ROCKWOOL SP120 CAVITY BARRIER SYSTEM. SPIKED AND FIXED TO SLAB EDGE.
- RESILIENT LAYER BELOW FLOOR FINISH.
- POLYESTER POWDER COATED ALUMINIUM BOX PROFILE TO
   ALIGN BACK OF SPLIT TRANSOM WITH REMAINDER OF CURTAIN
   WALLING SYSTEM AND SIMPLIFY INTERFACE WITH FINISHES.
- 32 12.5MM PLASTERBOARD MF CEILING SYSTEM.
- 33 CURTAINS OR BLINDS BY OCCUPIER.

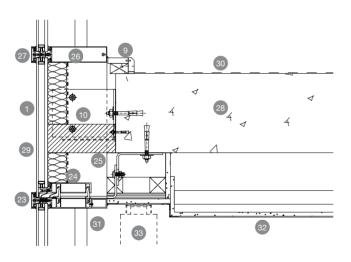








PLAN DETAIL AT PROW



TYPICAL SECTION DETAIL











# ■ STAGE @ LEEDS : LEEDS UNIVERSITY

# FOCUS ON DETAIL | GREEN ROOFS

The £3.3 million RIBA award nominated 'stage@leeds' building provides a range of facilities for the School of Performing Arts and Cultural Industries at the University of Leeds. Located on the city campus, the building provides a main theatre for public performances, smaller teaching theatre, multi-media entrance foyer, teaching space, faculty offices and staff areas from the relocated Bretton campus. A showpiece of this building is its green roof.

The use of a green roof was high on the agenda at inception, and consideration was given to which types would be best suited. There are two types of green roof: extensive and intensive. An extensive green roof is constructed using low maintenance planting such as sedums, herbs and grasses which provide cover and increased protection to the underlying waterproofing system. These roofs are not for leisure purposes and are primarily

used for their ecological benefits and aesthetic appearance. This type of roof can be applied in 4 different methods:

Sedum Sprout mix: The most economical solution, seeds are scattered evenly and flower after one growing season.

Sedum Plugs: Planted 15 per square metre, growing will be fully established after one growing season.

Fully Grown Matting: The most expensive option, a fully cultivated matting is laid to obtain an immediate lush finish.

Sedum Honeycombs: A pitched roof is covered using sedum honey combs which have already been cultivated for 12 months.

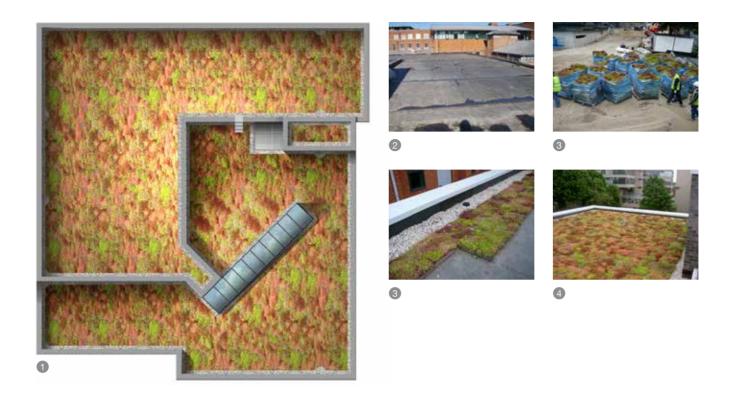
An intensive system is an accessible roof garden that can be used for recreational and leisure purposes, and works on a similar basis as an extensive system.

The landscape variations are practically limitless as it is feasible to create an

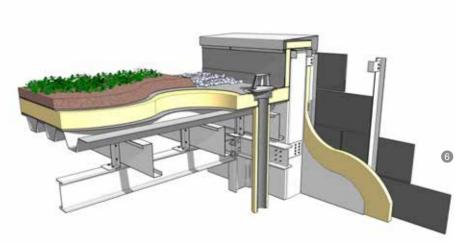
environment at roof level similar to any typically designed landscaped area at ground level. This system requires a much deeper substrate and due to its weight, increases load on the structure.

The system and method used on stage@ leeds is an extensive system with a fully grown matting. As the building footprint stands over a former green space, it was the natural choice to use a green roof system to replace it. As the building is located on the city campus and has several buildings over looking this area, the green roof provides a more aesthetically pleasing vista for the surrounding occupants.

Stage@leeds is a structural steel framed building. Roof trusses and purlins were installed level, with falls to facilitate drainage being provided by tapered insulation.



- **ROOF PLAN**
- THE WATERPROOF MEMBRANE FULLY INSTALLED
- THE SEDUM MATTING ARRIVING TO SITE
- 4 THE SEDUM MATTING BEING INSTALLED
- 5 THE COMPLETED ROOF
- 6 ISOMETRIC OF BUILDING



To form the green roof, firstly a galvanised steel profiled deck was laid onto the flat roof structure, prior to the application of a vapour barrier and tapered Kingspan TR27 insulation boards forming 1:60 falls. A Firestone fully adhered single ply waterproofing membrane was then applied before the laying of a McLaw vegetation mat. This vegetation mat is a recycled CFC free foam mat incorporating clay minerals and plant nourishing elements. It acts as a long term fertilizer, protects the roof and serves as a drainage and water filtration layer retaining water for the sedum and keeping the roof moist for longer periods. Finally an established sedum mat is installed in a turf like manner.

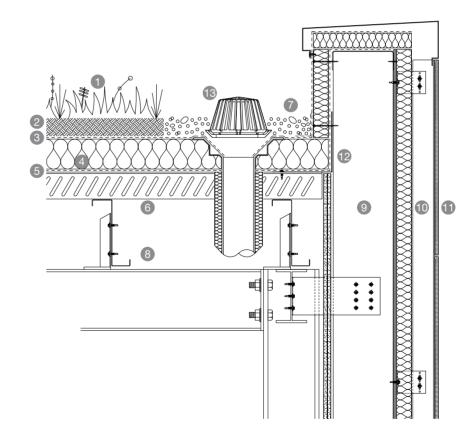
The specialist contractor providing the system had to liaise closely with the structural engineer. As the system retains a certain amount of water when saturated, additional load applied to the structure needed factoring into their design. Following a heavy rainfall, the roof initially retains much more water than a conventional roof, minimising the initial heavy runoff and easing the pressure upon the existing sewers.

This system requires very little maintenance, but a mansafe system was installed to allow for access to glazed areas of the roof and for periodic inspection of the green roof for any damaged or dead patches. However, the main reason for using a green roof was for its acoustic properties. As this building is used for public theatre performances, it was critical to introduce methods of reducing the sound transfer of heavy rainwater falling on the roof. Without a green roof to absorb the 'drumming' effect of this rainfall, there would have been a risk of pollutant sound causing a performance to be abandoned.

The green roof also increases the thermal insulation of the building, making it warmer in winter and cooler in summer therefore reducing energy costs.

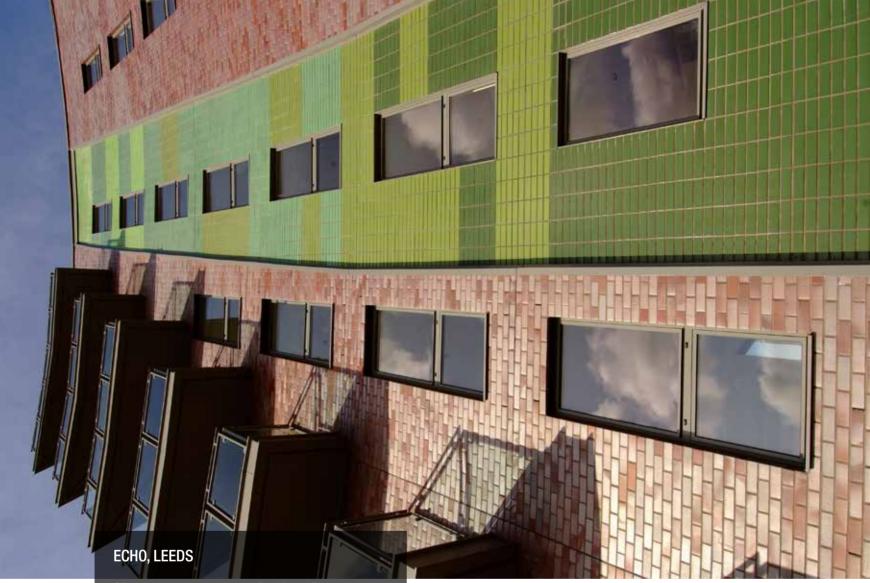
Finally, a very important environmental benefit is that green roofs encourage biodiversity of an area. Green roofs can help compensate for the loss of green areas, sacrificed to building developments. They help to provide an environment for the development of wildlife, especially bird, plant and insect life, increasing biodiversity in our towns and cities.

- FULLY GROWN SEDUM MATTING.
- 2 MCLAW VEGETATION MAT.
- FIRESTONE SINGLE PLY MEMBRANE FULLY ADHERED TO INSULATION.
  LAPPED INTO DRAINAGE POINT AND TAKEN UP INSULATED UPSTAND.
- 4 KINGSPAN TR27 TAPERED INSULATION TO FORM 1:60 FALLS
- 5 VAPOUR BARRIER.
- GALVANISED STEEL PROFILED DECK LAID FLAT. ALL JOINTS TO BE TAPED AND SEALED TO MAINTAIN CONTINUITY OF AIR SEAL.
- 300MM GRAVEL MARGIN (500MM AT DRAINAGE POINTS).
- 8 PURLINS AND STRUCTURAL STEEL FRAME INSTALLED FLAT.
- 9 METSEC STRUCTURAL FRAMING SYSTEM.
- 10 50MM INSULATION.
- TRESPA RAINSCREEN SYSTEM.
- 12 GALVANISED METAL UPSTAND
- DRAINAGE OUTLET COMPLETE WITH GRAVEL GUARD. DOWNPIPE TO BE WRAPPED WITH 25MM INSULATION.









Client: Rushbond Plc

Project Manager: RBA
Structural Engineer: Robinsons
Services Consultant: Silcock Dawson
Contractor: GB Design Solutions
Value: £10.55 million

Completed : January 2009

Author: lain Jones



# **■ ECHO. LEEDS**

# FOCUS ON DETAIL I INNOVATIONS IN BRICKWORK

Located on a highly visible prime site on the eastern corridor approach to Leeds City Centre, this development provides a dramatic and eye-catching focal point for the city, whilst helping to kick start the strategic regeneration of the surrounding area.

This development places 'art' very much at the heart of the design concept. The architectural feel of the completed development is highly sculptural - not only creating space to live and work but also providing the city with its very own piece of architectural art work. The sculptural form has taken its inspiration from the nearby river, the areas industrial past, sailing barges and nautical themes from the 1900's.

Echo Central 2 contains 122 one and two bedroom residential apartments over 9 storey's with 2 levels of Basement that contains parking, Cycle and Bin Store facilities. The overall build cost was £10.55m.

To achieve the original design concept of fluidity and curved shapes and to ensure the architecture is grounded within the East Bank and its industrial history, the choice of brick as a module allowed the facades of Echo Central 2 to be faceted on a 4 brick set out.

EC2 is constructed with an insitu concrete frame, externally clad with the innovative use of walled brickwork and a coloured Corium glazed brick slip cladding system by Wienerberger Ltd to form the recess, and inner skin formed with a structurally insulated panel system.

The main body of the external envelope is a Janinhoff Blue-Blue-Red smooth facing brick which has a sinter glaze finish, which shimmers in almost any weather. The bricks are made from high quality clay mixtures which are fired up to the sintering of the body, guaranteeing a high level of quality which is frost resistant, dirt repelling and completely insensitive to aggressive environmental impacts such as acid rain.

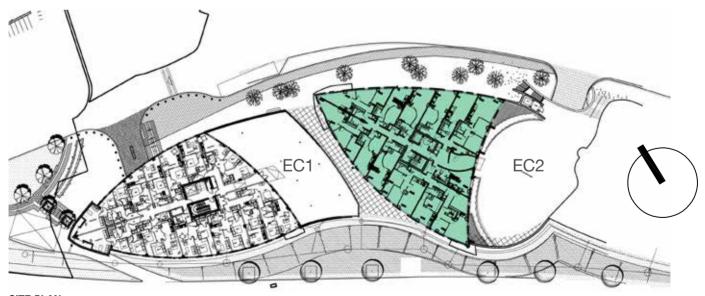
The Corium system consists of brick slips clipped and adhered into a galvanised steel backing tray which is in turn mechanically fixed to an internal structural wall system, in this case 'Panablok'. This system allows us to continue the 40mm Kingspan insulation that is used in the more traditional adjoining masonry construction. The overall thickness of this system is 35mm, and as only 25mm cavity space is required, this forms a 100mm recess from the main face of masonry.

The continuation of insulation behind allows for all joints to be taped and sealed, meaning that the air seal can be transferred from the glazing system to the face of insulation via an EPDM and then transferred to the floor slab, again by an EPDM to ensure the continuity of the air seal line.

The setting out of brickwork proved challenging, due to the masonry curving both horizontally and vertically on the recessed corium element. Varying facet lengths were considered, but in the end decided that due to the tight radius of the building in plan, a 4 brick facet would prove the most apt solution, in terms of both economics and speed of construction. Centre points for the 3 arcs were selected and each facet point given a 'northing and 'easting point that was established by inserting the building plan into the original CAD survey and identifying the exact points around the building.

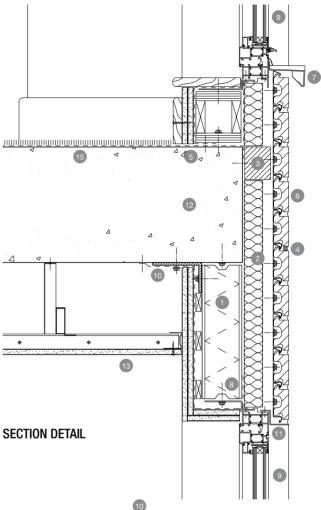
The eye catching building, which is visible from various vantage points around the city, creates a strong setting for the eastern gateway to the city centre. This is 'echoed' in the Leeds Civic Trust April 2009 Newsletter which described the scheme as 'One of the most striking pieces of architecture the city has seen for some time', and Peter Baker, Chairman of Leeds Civic Trust commenting "DLA are to be congratulated on producing a high quality landmark building of which Leeds can be proud".

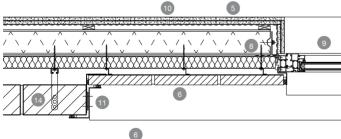


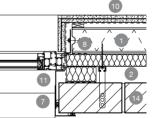


SITE PLAN

- PANABLOK SYSTEM FIXED BACK TO SLAB ON ACOUSTIC SEALANT. VAPOUR BARRIER TO BE TRAPPED UNDER.
- 40MM KINGSPAN KOOLTHERM CAVITY INSULATION, ENSURE ALL JOINTS IN INSULATION BOARDS ARE TAPED.
- 3 CONTINUOUS HORIZONTAL FIRE BARRIER TO PROVIDE 90MINS FIRE RESISTANCE AT ALL LEVELS. ROCKWOOL SP120 FIRESTOP SYSTEM. FIXED AS MANUFACTURERS RECOMMENDATIONS.
- CONTINUOUS HORIZONTAL MOVEMENT JOINT AT ALL LEVELS. JOINT TO BE FULLY FILLED WITH MIERS MIOTHENE 70, SEMI-RIGID JOINT FILLER TO SUIT MOVEMENT JOINT WIDTH OR SIMILAR WITH SEALANT BY ADSHEAD RADCLIFFE-ARBOKOL 2000, COLOUR TO MATCH ADJACENT MORTAR.
- INTERNAL PLASTERBOARD ACOUSTICALLY SEALED AROUND ALL EDGES.
- 6 CORIUM BRICK CLADDING SYSTEM FIXED BACK TO 25MM DEEP ZED SECTIONS.
- PPC FLASHING GLAZED INTO WINDOW SYSTEM.
- 8 EPDM GLAZED INTO WINDOW SYSTEM AND BONDED BACK TO PANABLOK.
- 9 ALUMINIUM GLAZING SECURED BACK TO PANABLOK INTERNAL LEAF.
- VAPOUR BARRIER ON INTERNAL PLASTERBOARD LINE. ENSURE THAT BARRIER IS SEALED BACK TO SUITABLE SUBSTRATES AND GLAZED INTO FRAMES WHERE APPLICABLE TO MAINTAIN AIR SEAL LINE.
- 11 METAL REVEAL TRIM
- 250MM THICK INSITU FLOOR SLAB MINIUM DENSITY 2400KG|M3
- M/F PLASTERBOARD CEILING
- 14 FACING BRICKWORK
- THERMAL ECONOMICS 3MM ISORUBBER RESILIENT LAYER FOR IMPACT SOUND INSULATION.

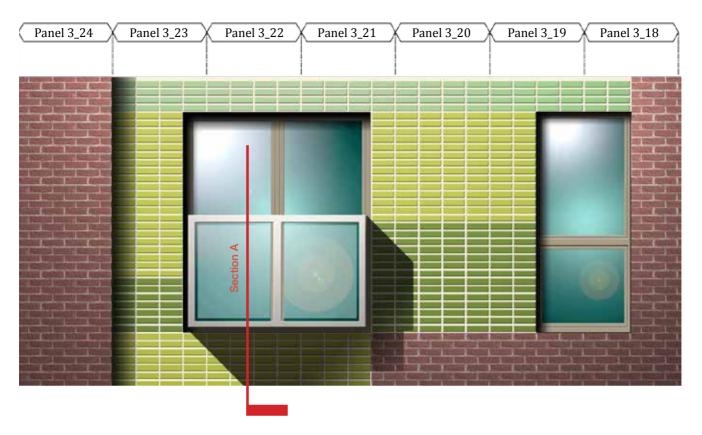


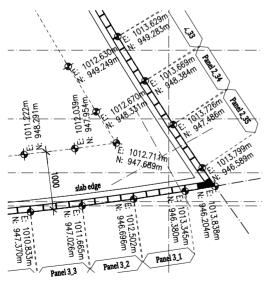




**PLAN DETAIL** 





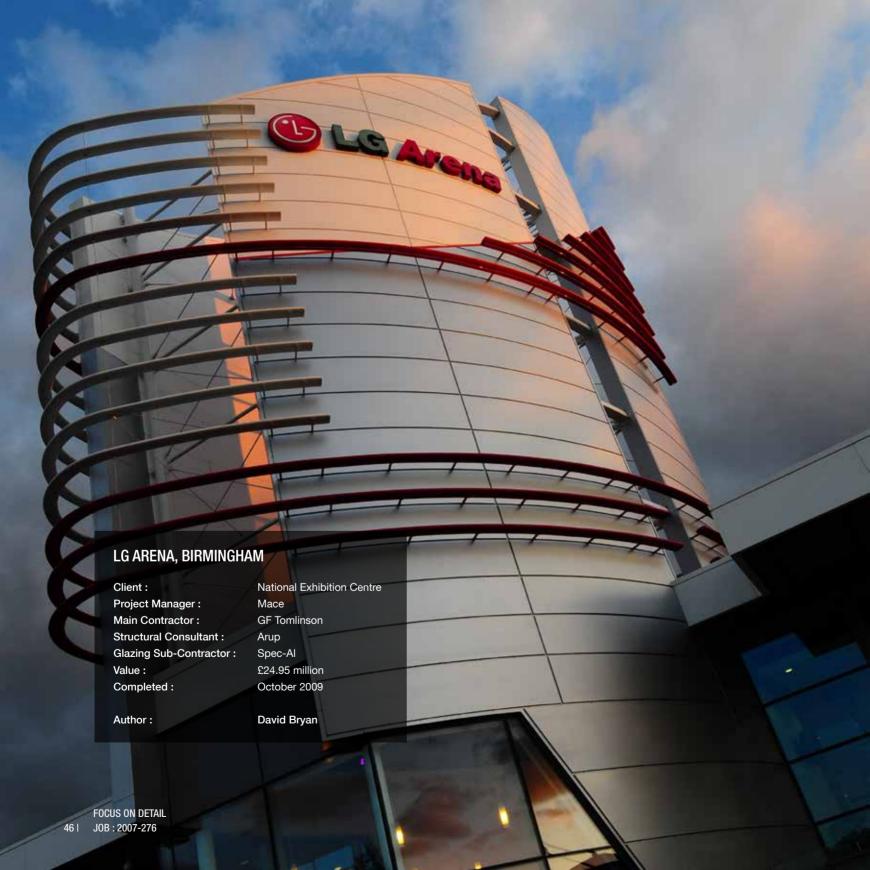




TYPICAL FACET SETTING OUT PLAN









# LG ARENA, BIRMINGHAM

# FOCUS ON DETAIL | CURTAIN WALLING

The lakeside frontage of the LG Arena Forum building has been dramatically transformed as part of the c. £25 million redevelopment of the NEC.

In addition to the 28 metre high signature tower, a full length two storey extension has been constructed to create a new main entrance, ground floor self service restaurant and first floor hospitality restaurant bar.

A key design driver was to maximise the transparency of the new frontage by locating the lakeside facilities behind a glazed curtain wall. This clearly states the venue is inclusive to all and provides an enticing glimpse of the welcoming, yet dynamic, environment within. Light spill from the building interior, coupled with imaginative external architectural feature lighting serves to combine the internal and external spaces. This concept is further enhanced by the LG red spine wall, which is located externally at one end of the glazing; the feature then runs

internally through the main entrance lobby, with elements continuing onwards into the restaurant areas.

As a concert venue, the building offers a spectacular night time approach, indeed the lighting scheme can be manipulated to enhance or subdue the mood, conducive to the event.

As one of the principle elements of the new building fabric, the curtain walling was required to be a high quality, tried and tested system. The Schuco FW50+SG system has been used successfully by DLA Architecture on a number of high profile schemes in the north of England and was therefore recommended as the basis for the glazing system at the NEC Forum.

An early design directive stipulated the structural grid and floor zone should be apparent within the facade, in the form of a series of vertical and horizontal panel interventions. This imposes a sense of scale and rhythm into the

elevation. Projecting aluminium box caps located either side of the composite panelling serve to create exaggerated channel profiles. 100mm deep vertical box caps are incorporated at principle gridlines.150mm deep box caps allocate visual prominence to the horizontal spandrel at floor level, which continues across the double storey height entrance foyer, in order to conceal the warm air curtains located internally above the main entrance doors. All remaining fenestration joints utilise the externally capless characteristics of the FW50+SG system, which employs a dry applied recessed rubber seal achieving a simple 20mm wide recessed glass joint.

Intermediate transoms are positioned primarily to afford views out of the glazing when the restaurant occupants are seated. Double glazing within 1100mm of first floor level was specified as barrier glazing to prevent falls from height.

- POLISHED BLOCKWORK. REF:LIGNACITE POLISHED BLACKSTONE.
- SYNTHAPULVIN MATT POLYESTER POWDER COATED ALUMINIUM RAINSCREEN SYSTEM WITH 20MM HIGH RECESSED JOINT. COLOUR: RAL9016 TRAFFIC WHITE.
- HEAVY DUTY SECTIONAL LOUVRE SYSTEM (50% FREE AREA). SYNTHAPULVIN MATT COLOUR COATED RAL9007 GREY MUIIMIMUIA
- RENDER SYSTEM, COLOUR: DARK GREY, DULUX COLOUR PALETTE 7500n.
- ROOF COVERING PROTAN SINGLE PLY HIGH PERFORMANCE MEMBRANE. COLOUR: DARK GREY.
- SCHUCO FW50+SG, THERMALLY BROKEN, POLYESTER POWDER COATED, CURTAIN WALLING SYSTEM WITH NEUTRAL SOLAR CONTROL GLAZING. GENERALLY EXTERNALLY CAPLESS, BUT WITH FEATURE DOUBLE TRANSOM CAP DETAIL AT FIRST FLOOR LEVEL. AND FEATURE DOUBLE MULLION CAP DETAIL AT COLUMN POSITIONS. FRAME COLOUR: MATT RAL 9007 GREY ALUMINIUM.
- RENDER SYSTEM. COLOUR:LG RED DULUX COLOUR PALETTE 70RR 17/372 (CONTINUES INTERNALLY AS PAINTED PLASTERBOARD SPINE WALL)
- POWDER COATED GALVANISED MILD STEEL GRILLAGE SUPPORTED ON BRACKETS FROM BUILDING ENVELOPE. COLOUR: RAL9007 GREY ALUMINIUM.
- CHS COLUMNS TO RECEIVE GRP COLUMN SURROUNDS WITH RECESSED JOINTS. COLOUR: MATT RAL 9016 TRAFFIC WHITE. TOGETHER WITH CONTRASTING SILVER CAPITALS AND PLINTHS.
- 1000MM HIGH FASCIA TO CONSIST OF 3MM THK SYNTHAPULVIN COATED ALUMINIUM. COLOUR: RAL9016 TRAFFIC WHITE.
- FACETTED, SCHUCO FW50+SG, THERMALLY BROKEN, EXTERNALLY CAPLESS, POLYESTER POWDER COATED, CURTAIN WALLING SYSTEM, FRAME COLOUR: MATT RAL 9007 GREY ALUMINIUM.

- MATT POLYESTER POWDER COATED ALUMINIUM PANEL GLAZED INTO CURTAIN WALLING SYSTEM, COLOUR: RAL9007 GREY ALUMINIUM.
- CURVED GRP RAINSCREEN CLADDING TO FEATURE TOWER. COLOUR 9006 METALLIC SILVER TO LOWER PORTION AND RAL9016 TO UPPER LEVEL, DIVIDED BY 75MM HIGH LG RED BAND.
- TICKET OFFICE ENTRANCE WITH AUTOMATIC DISABLED COMPATIBLE DOOR AND BARRIER RAILS EITHER SIDE
- 13 MAIN ENTRANCE DOORS INCORPORATING AUTOMATIC DISABLED COMPATIBLE DOUBLE DOORSET AND BARRIER RAILS.
- ENTRANCE DOOR TO SPONSORS LOUNGE (AND FIRE EXIT) 16
- FIRE EXIT (WITH SECONDARY CIRCULATION FUNCTION TO EXTERNAL PAVED AREA)
- POLYESTER POWDER COATED ALUMINIUM, THERMALLY BROKEN WINDOW SYSTEM. COLOUR: RAL 9007 GREY ALUMINIUM.
- SPONSORS SIGNAGE SUSPENDED FROM CANOPY **OVERHANG** COLOUR COATED INSULATED METAL DOOR.

COLOUR: RAL 9007 GREY ALUMINIUM.



**ELEVATION** 

The interface between the curtain walling and the feature tower was a key detail. Initially DLA sought to highlight the interface by glazing-in composite panels into the curtain walling, in essence providing a solid margin either side of the signature feature. This could also be detailed with a plasterboard internal lining to achieve the necessary fire separation between the accommodation and the fire escape stair tower as normally required under the Building Regulations. During the construction drawing process it was realised this solution would not be as attractive as first thought and a more effective solution would be to extend the glazing into the tower, this would allow the internal curvature of the tower to be visible externally. Building Control confirmed the 1800mm wide fire resisting zone would not be required as the restaurant furniture was non-combustible. This allowed the revised detail to be implemented.

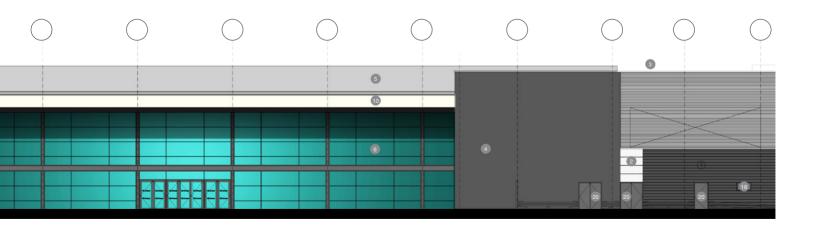
Early consideration was given to applying modesty etching film to the lowest glass panel at first floor level. This was however deleted on cost grounds, but in the knowledge that this issue would be partially addressed through the application of the sponsors etching film design.

Owing to the anticipated foot fall in close proximity to the glazing system, an upstand kickplate was considered a necessity. This was provided in the form of a brushed stainless steel skirting on a ply backing and was glazed into the system at low level to maintain the general externally frameless aesthetic.

Further cost consideration and in particular possible expensive reliance on interior cooling during the summer months introduced the provision of solar glazing to the general glazed frontage. Discussion with the glass supplier, Saint Gobain, followed by sample approval, ensured the revised specification matched the original as closely as possible, in order to maintain neutral transparency.

Access for the disabled was provided by means of a pair of automatic doors, within the bank of main entrance doors, which when opened provided a clear opening which far exceeded the minimum 1000mm requirement. The doors were activated by means of overhead motion detectors. Topscan G3 detectors also prevented inadvertent impact with pedestrians in close proximity to the door leafs whilst in motion.

Generally door handles were specified as full height with a contrasting nylon coated black finish to aid identification for the vision impaired. The door leafs were also highlighted from the general curtain walling background, by the provision of statutory manifestation according with Building Regulations requirements. The opportunity was however taken to incorporate the sponsors logo and 'LG Arena' text into the manifestation. No additional manifestation was deemed necessary to the curtain walling, as the horizontal transoms offered the necessary visual demarcation.

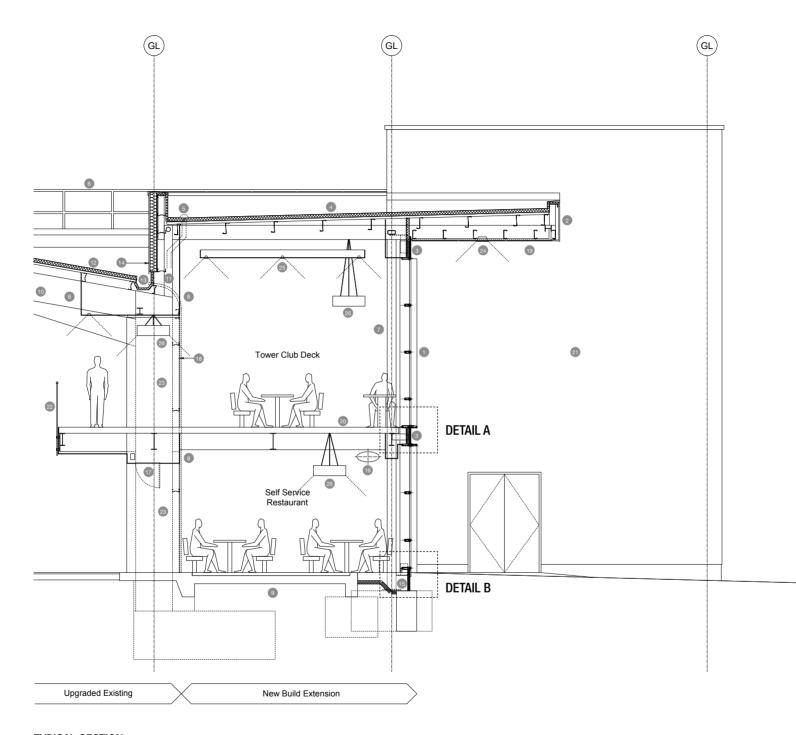








- SCHUCO FW50+SG, THERMALLY BROKEN, POLYESTER POWDER COATED, CURTAIN WALLING SYSTEM WITH NEUTRAL SOLAR CONTROL GLAZING. GENERALLY EXTERNALLY CAPLESS, BUT WITH FEATURE DOUBLE TRANSOM CAP DETAIL AT FIRST FLOOR LEVEL, AND FEATURE DOUBLE MULLION CAP DETAIL AT COLUMN POSITIONS. FRAME COLOUR: MATT RAL 9007 GREY ALUMINIUM.
- GRP FASCIA PANEL, COLOUR: BAL 9016 TRAFFIC WHITE.
- 2MM THK MATT POLYESTER POWDER COATED ALUMINIUM FASCIA PANEL GLAZED INTO CURTAIN WALLING SYSTEM, COLOUR RAL 9006 GREY ALUMINIUM.
- PROTAN HIGH PERFORMANCE SINGLE PLY PVC MEMBRANE ON 100MM THK KINGSPAN TR27 RIGID INSULATION ON VAPOUR BARRIER ON ROOF LINER.
- 5 RAINWATER OUTLET AND LEAF GUARD CONNECTING TO EXISTING SURFACE WATER SYSTEM.
- 6 GALV. M.S. GUARDRAIL TO PLANT DECK BEYOND.
- 7 EXPOSED CHS COLUMNS WITH SPRAY APPLIED INTUMESCENT PAINT APPLICATION AND SATIN FINISHING COAT.
- 8 WHITE PAINTED PLASTERBOARD BULKHEAD WITH DOWNLIGHTING TO SOFFIT.
- 9 EXISTING TOILET BLOCK SLAB RE-USED WITHIN FOOTPRINT OF NEW EXTENSION.
- 10 EXISTING PORTAL FRAME, STEELWORK, ROOF CLADDING SOFFIT, PURLINS AND DUCTWORK - PAINTED MATT BLACK.
- 1 NEW STUB COLUMN ABOVE EXISTING PORTAL STANCHION.
- 12 EXISTING ROOF UPGRADED WITH VAPOUR BARRIER, RIGID INSULATION AND HIGH PERFORMANCE SINGLE PLY MEMBRANE TO ACHIEVE U VALUE OF 0.25.
- EXISTING GUTTER REFURBISHED AND LINED WITH VAPOUR BARRIER. INSULATION AND 13 SINGLE PLY MEMBRANE.
- 14 PARAPET WALL AT INTERFACE OF NEW AND EXISTING ROOFS, WITH PVDF COATED BUILT-UP PROFILED METAL CLADDING SYSTEM.
- 1 NEW R.C. SLAB.
- 16 OVAL MECHANICAL DUCT
- 1 ACCESS PANEL
- 13 ORIGINAL PROFILED STEEL CLADDING AND CLADDING RAILS SHOWN DASHED
- 19 8mm THK MARLEY 'NATURA' SOFFIT PANELLING IN REGULAR SQUARE PATTERN. COLOUR: ANTHRACITE, FIXED WITH COLOUR MATCHED SCREWS AT PERIMETER AND CENTRE OF PANELLING.
- 20 COMPOSITE FLOOR SLAB.
- 2 RENDERED FLANK WALL TO END OF CURTAIN WALLING BEYOND
- 22 TOUGHENED GLASS FRAMELESS BALUSTRADE WITH STAINLESS STEEL HANDRAILS. ETCHING FILM APPLIED TO SPONSORS DESIGN.
- 23 LG RED PAINTED COLLONADE
- 24 SOFFIT LIGHTING
- 25 PLASTERBOARD CEILING RAFT CONTAINING DOWNLIGHTERS
- FEATURE LIGHT SHADE



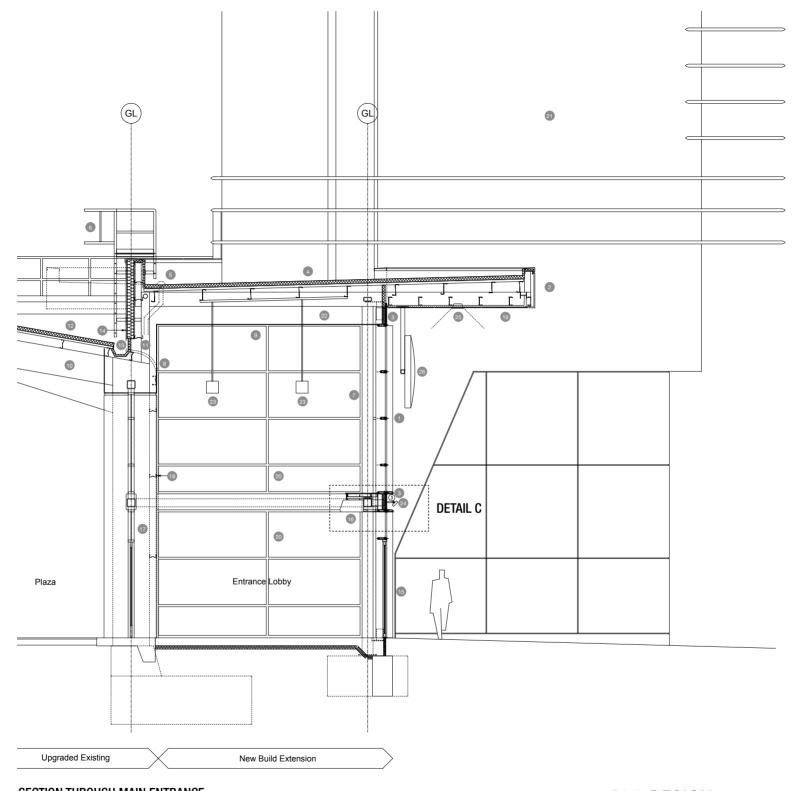
TYPICAL SECTION

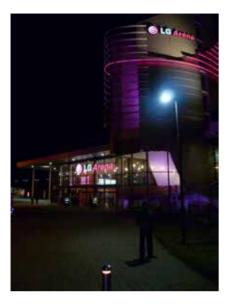






- SCHUCO FW50+SG, THERMALLY BROKEN, POLYESTER POWDER COATED, CURTAIN WALLING SYSTEM WITH NEUTRAL SOLAR CONTROL GLAZING. GENERALLY EXTERNALLY CAPLESS, BUT WITH FEATURE DOUBLE TRANSOM CAP DETAIL AT FIRST FLOOR LEVEL. AND FEATURE DOUBLE MULLION CAP DETAIL AT COLUMN POSITIONS. FRAME COLOUR: MATT RAL 9007 GREY ALUMINIUM.
- GRP FASCIA PANEL, COLOUR: BAL 9016 TRAFFIC WHITE.
- 2MM THK MATT POLYESTER POWDER COATED ALUMINIUM FASCIA PANEL GLAZED INTO CURTAIN WALLING SYSTEM, COLOUR RAL 9006 GREY ALUMINIUM.
- PROTAN HIGH PERFORMANCE SINGLE PLY PVC MEMBRANE ON 100MM THK KINGSPAN TR27 RIGID INSULATION ON VAPOUR BARRIER ON ROOF LINER.
- RAINWATER OUTLET AND LEAF GUARD CONNECTING TO EXISTING SURFACE WATER SYSTEM.
- 6 GALV. M.S. VERTICAL LADDER AND HOOP CONNECTING ROOF LEVEL MANSAFE SYSTEMS.
- EXPOSED CHS COLUMNS WITH SPRAY APPLIED INTUMESCENT PAINT APPLICATION AND SATIN FINISHING COAT.
- 8 PLASTERBOARD BULKHEAD FORMING PART OF LG RED SPINE WALL/COLONNADE.
- 9 M.F. PLASTERBOARD SUSPENDED CEILING SYSTEM. PAINTED DARK GREY TO MATCH EXTERNAL SOFFIT COLOUR.
- EXISTING PORTAL FRAME, STEELWORK, ROOF CLADDING SOFFIT, PURLINS AND DUCTWORK - PAINTED MATT BLACK.
- **a** NEW STUB COLUMN ABOVE EXISTING PORTAL STANCHION.
- EXISTING ROOF UPGRADED WITH VAPOUR BARRIER, RIGID INSULATION AND HIGH PERFORMANCE SINGLE PLY MEMBRANE TO ACHIEVE U VALUE OF 0.25.
- EXISTING GUTTER REFURBISHED AND LINED WITH VAPOUR BARRIER, INSULATION AND SINGLE PLY MEMBRANE.
- PARAPET WALL AT INTERFACE OF NEW AND EXISTING ROOFS, WITH PVDF COATED BUILT-UP PROFILED METAL CLADDING SYSTEM.
- DOORS, ALL DOORS FITTED WITH FULL HEIGHT TUBULAR HANDLES IN CONTRASTING NYLON COATED BLACK FINISH.
- 10 OVER DOOR AIR CURTAIN
- ENTRANCE LOBBY INTERNAL SCREEN AND DOORS
- 13 ORIGINAL PROFILED STEEL CLADDING AND CLADDING RAILS SHOWN DASHED
- 8mm THK MARLEY 'NATURA' SOFFIT PANELLING IN REGULAR SQUARE PATTERN. COLOUR: ANTHRACITE. FIXED WITH COLOUR MATCHED SCREWS AT PERIMETER AND CENTRE OF PANELLING.
- 20 30 MINUTE FIRE RESISTING GLAZED SCREEN SEPARATING PROTECTED STAIR BEYOND, FROM ENTRANCE LOBBY.
- 2 FEATURE TOWER BEYOND
- 22 VOID AND RAFTER ABOVE FIRE RESISTING GLAZED SCREEN TO BE FIRE PROTECTED WITH FIRE BOARD TO ACHIEVE 30 MINUTES SEPARATION.
- 23 SUSPENDED FEATURE LIGHTING ALIGNING WITH SOFFIT OF PLASTERBOARD BULKHEAD
- 24 EXTERNAL EMERGENCY LIGHTING MOUNTED ON PANEL ABOVE DOORS
- 25 SOFFIT LIGHTING
- 26 SPONSORS SIGNAGE SUSPENDED FROM CANTILEVERED RAFTER

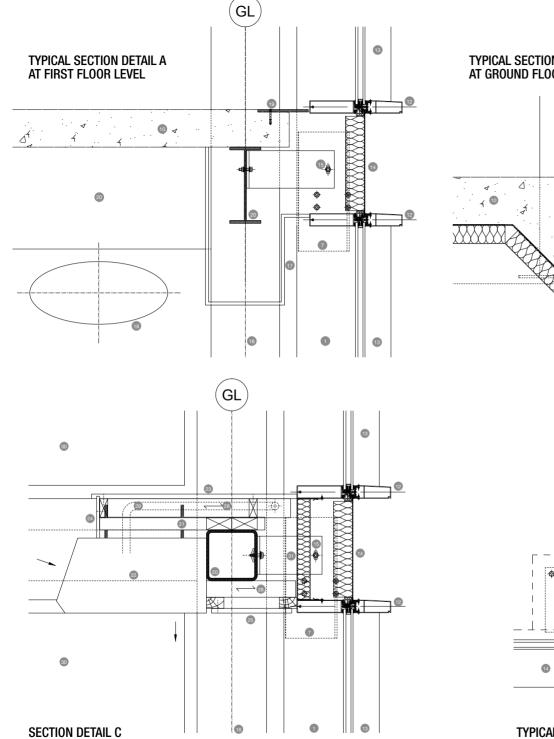






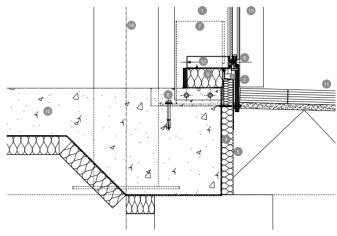


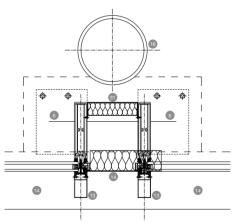
- SCHUCO FW50+SG THERMALLY BROKEN, POLYESTER POWDER COATED, CURTAIN WALLING SYSTEM
- 2MM THICK BRUSHED STAINLESS STEEL SKIRTING WITH 15MM WBP EXTERIOR GRADE PLYWOOD BACKING.
- EPDM BONDED OVER SLAB EDGE INSULATION
- 4 RIW SHEETSEAL 226 SELF ADHESIVE DPM APPLIED TO PRIMED CONCRETE.
- 6 50MM THICK JABLITE JABWALL INSULATION TO SLAB EDGE.
- 6 LOCALISED SLAB EDGE POCKET TO CONCEAL CURTAIN WALLING BASEPLATE RESTRAINT.
- 7 CURTAIN WALLING RESTRAINT, SLEEVED INTO MULLION AND ANCHORED TO STRUCTURE.
- EXTERNALLY FRAMELESS GLASS JOINT WITH DRY GASKET INSERT. TOGGLE RESTRAINTS INTO RECESSED GLASS SPACERS.
- 9 INSULATION INFILL.
- 10 R.C. SLAB.
- 1 MARSHALLS LA LINIA PAVIORS ON COMPACTED SHARP SAND BED.
- 12 SCHUCO TRANSOM CAP V8-99549 WITH INTEGRAL THROATING.
- 13 SCHUCO MULLION CAP V8-69985.
- 14 PANEL CONSISTING OF 2MM THICK P.P. COATED ALUMINIUM MATCHING CURTAIN WALLING FRAMING. 75MM THICK FOIL BACKED INSULATION BONDED TO REAR.
- BRACKET VERTICALLY SLOTTED TO ALLOW FOR STRUCTURAL FRAME DEFLECTION.
- CHS STRUCTURAL COLUMN WITH SPRAY APPLIED INTUMESCENT PAINT SYSTEM AND SATIN FINISHING COAT.
- 12.5MM THICK PLASTERBOARD BULKHEAD. PART CONCEALING MECHANICAL DUCT FROM EXTERNAL ASPECT.
- 13 MECHANICAL DUCT - PAINTED MATT BLACK.
- 19 SECTIONAL CLOSURE PLATE CLOSING TOLERANCE GAP BETWEEN SLAB EDGE AND CURTAIN WALLING SYSTEM, CAREFULLY NOTCHED AROUND BACKS OF MULLIONS, FIXED WITH COUNTERSUNK ANCHOR FIXING.
- INTUMESCENT PAINTED STRUCTURAL STEEL (PAINTED MATT BLACK WHERE EXPOSED AT SOFFIT LEVEL)
- 2 PROJECTING UNISTRUT SUPPORTING OVER DOOR AIR CURTAIN.
- 22 BIDDLE OVERDOOR AIR CURTAIN
- 23 REMOVABLE 18MM THICK MDF SECTIONAL LID. NEATLY SCRIBED AROUND CIRCULAR STRUCTURAL COLUMNS, PRIMED FOR SITE PAINTING, 'NO STEP' MARKINGS REQUIRED TO TOP SURFACE.
- 12MM THK MDF FASCIA PANEL WITH NO VISIBLE FIXINGS. PRIMED FOR SITE PAINTING.
- 18MM MDF SOFFIT PANEL FIXED TO BLACK PAINTED SHADOW BATTENS. TO BE NEATLY SCRIBED AROUND CIRCULAR STRUCTURAL COLUMNS, PRIMED FOR SITE PAINTING.
- **INTAKE AIR**
- 27 WARM SUPPLY AIR
- 28 TIMBER BEARER
- 29 LTHW PIPEWORK FEEDING AIR CURTAIN.
- 30 FIRE RESISTING GLAZED SCREEN TO PROTECTED STAIRCORE BEYOND
- 3 POLYESTER POWDER COATED PANEL WHERE APPLICABLE.



**ABOVE MAIN ENTRANCE DOORS** 







TYPICAL MULLION DETAIL

155

# ■ LG ARENA, BIRMINGHAM FOCUS ON DETAIL 56 I JOB: 2007-276







### ■ BLACKPOOL SIXTH FORM COLLEGE

# FOCUS ON DETAIL I SOLAR SHADING SOLUTION

The Blackpool Sixth Form College was established in 1988 and provides advanced level education for around 1,500 full-time 16-19 year old students. It serves an area within a radius of some twenty miles known as the Fylde Coast.

The original campus was built in the 1960's and the site's development potential had been stretched to the limits by the subsequent erection of a series of single and two-storey buildings/extension. The lack of a considered phasing strategy over this period had resulted in the compromising of facilities and a number of unsatisfactory relationships between blocks.

The Planned Maintenance Programme showed that the majority of buildings were also in a generally poor state of repair.

The highly utilitarian structures provided little in the way of visual impact, dramatic arrival or exciting teaching and circulation spaces, and so the College struggled to promote a strong identity to its potential future users.

The College was inefficient in energy terms, adding to its life-cycle costs, with even the most recent interventions failing to take advantage of any basic modernday passive heating and ventilation technological solutions.

The buildings are constructed with braced steel frames supporting permanent steel deck and concrete slabs at each upper level and a ground bearing ground floor slab. Bracing is positioned to avoid areas of specific architectural interest. This well-used construction method provides

ultimate flexibility to the buildings both now and in the future, thanks to carefully considered structural grid lines.

Materials are bold and contemporary but selected to ensure that the building ages gracefully and stands the test of time. The natural palette of ashlar stone, cedar boarding and landscaping materials contrasts elegantly with the crisp, clean lines of man-made metals and glass. The repeating heavy stone 'fins' or 'bookends' are conceived as giving an earthly presence to the development, anchoring the built form firmly to the ground, with lightweight infills of glass, metal and cedar boarding providing subtle and suitable counterpoints.

### SOLAR SHADING SOLUTION

The deep eaves overhang and louvre shading system are integral to the mechanical and electrical concepts in environmental control. This passive system on the east, west and south facing facades provides significant solar protection, limiting heat gains, minimising requirements for tinted glass and therefore helping to maximise the daylighting levels conducive for learning.

An assimilation model aided in proving this and derived further benefits included a reduction in the plant requirement and the reduction of service void depths, thus resulting in a lower overall structural height.

In addition, it was appreciated that the issue of 'overlooking' may have been an issue to owners of residential properties facing The College, though the distance between structures remains at least 45m.

Therefore, as well as providing invaluable passive solar protection, the louvre system on the west elevation had been devised partially in order to help alleviate this potential problem by directing views from classrooms, through fixed blades, down towards the new landscaped frontage.

BREEAM 'Very Good' was achieved.

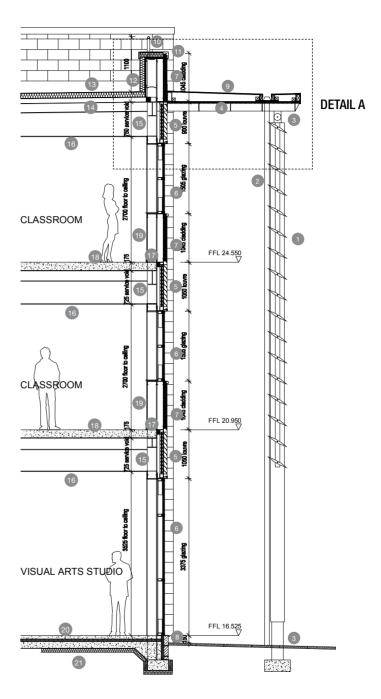


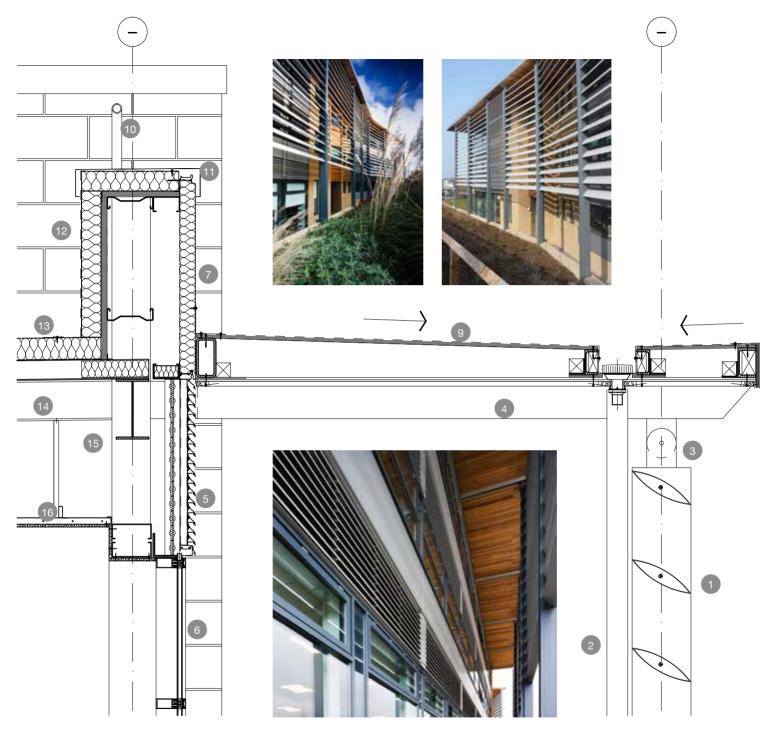






- 1 PPC EXTRUDED ALUMINIUM FIXED AEROFOIL SECTION BLADES TO FORM SOLAR SHADING ROD FIXED IN MATCHING FRAMEWORK AND FIXED TO MAIN STEELWORK WITH EXPRESSED CONNECTIONS
- PPC SQUARE ALUMINIUM RAINWATER PIPES SERVING GUTTER BETWEEN TWIN PROJECTING ANGLES AND FIXED TO REAR OF MAIN STEELWORK
- MAIN STEELWORK GALVANISED AND PAINTED WITH EXPRESSED CONNECTIONS TO BOTH TOP AND BASE
- TWIN PROJECTING STEEL ANGLES FIXED TO MAIN STRUCTURAL FRAME AND BRACED WITH TWIN CHANNELS (FORMING GUTTER) AND SOFFIT UNDERDRAWN WITH WESTERN RED CEDAR WEATHERBOARD WITH PPC ALUMINIUM FASCIA BONDED TO EXT GRADE WBP PLY FORMING A DRIP AND SHADOW GAP
- (5) EXTERNAL LOUVRE TO COMPRISE OF EXTERNAL FIXED WEATHER LOUVRE, INSECT SCREEN AND CONTROLLABLE MOTORISED INSULATED INTERNAL LOUVRES WITH BUTT HORIZONTAL JOINTS AND RECESSED VERTICAL JOINTS ON SECONDARY FRAMEWORK FIXED BACK TO METSEC SFS SYSTEM
- THERMALLY BROKEN PPC EXTRUDED ALUMINIUM FRAMING
  WITH HERMATICALLY SEALED GAS FILLED LOW-E GLAZED UNITS
  AND PPC ALUMINIUM FLASHING TO WINDOW HEAD AND PPC
  ALUMINIUM PROJECTING SILL
- COMPOSITE FLAT FACED ALUMINIUM PANELS WITH BUTT HORIZONTAL JOINTS AND RECESSED VERTICAL JOINTS ON SECONDARY FRAMEWORK FIXED BACK TO METSEC SFS SYSTEM
- 3 100MM FAIR-FACED RECONSTITUTED ASHLAR STONE FACING MASONRY WITH 5MM STRUCK JOINTS IN COLOUR MATCHED MORTAR
- SINGLE PLY ROOFING MEMBRANE ON EXT GRADE WBP PLY ON COLD ROLLED FRAME FORMING FALLS FIXED TO PROJECTING STEELWORK
- SATIN STAINLESS STEEL HANDRAIL AND BALUSTERS TO PARAPET FIXED THROUGH CAPPING (WEATHER SEALED) TO STEELWORK
- PPC ALUMINIUM CAPPING LAPPING OVER PARAPET UPSTAND FIXED ON RIGID INSULATION ON EXT GRADE WBP PLY WITH VAPOUR BARRIER AND FRAMED OFF STEELWORK
- SINGLE PLY ROOFING MEMBRANE FIXED UP RIGID INSULATED UPSTAND FORMED IN EXT GRADE WBP PLY WITH VAPOUR BARRIER AND FRAMED OFF STEELWORK
- SINGLE PLY ROOFING MEMBRANE LAID ON RIGID INSULATION ON VAPOUR BARRIER
- STRUCTURAL ROOFING DECK INCLUDING FR60 FIRE STOPPING PROFILED INFILLS WHERE REQUIRED
- 5 STEELWORK TO RECEIVE FR60 INTUMESCENT PAINT FINISH
- 16 SUSPENDED CEILING AND SERVICE ZONE
- FR60 CAVITY BARRIER AT EACH FLOOR
- (18) CONCRETE FLOOR SLAB ON METAL DECK
- PLASTERBOARD LINING TO SFS WITH HW WINDOWBOARD AND SKIRTING
- **20** UNDERFLOOR HEATING INSTALLED IN GROUND FLOOR SLAB
- 21 RIGID HIGH DENSITY BOARD BELOW SLAB INSULATION TO BUILDING PERIMETER





SECTION THROUGH EAVES DETAIL A









# ONE BREWERY WHARF, LEEDS

# FOCUS ON DETAIL | BALCONIES IN RAINSCREEN CLADDING

The £17.2 million 'One Brewery Wharf' forms the final component of the overall Brewery Wharf masterplan - a redevelopment of brown field land to the south of the River Aire and comprising of a variety of buildings containing office, leisure/retail, hotel and residential uses.

The 13 storey development consists of four self contained ground floor office units located above two basement storeys. The basements have a capacity of 89 cars. The upper levels consist of 151 residential apartments with access from ground level via a manned concierge.

A key sales particular was that each apartment should have a balcony or terrace, allowing owner occupiers to enjoy the vantage point and views over the City of Leeds.

At design stage it was concluded steel balconies would achieve a much lighter aesthetic when compared to other solutions such as in-situ concrete or pre-cast concrete. The client, Rushbond plc, was particularly keen to achieve crisp, well proportioned details, and for this reason polyester powder coated galvanized mild steel sections were specified.

To avoid damage to the coating, the main contractor, GB Building Solutions, elected to erect the balconies as pre-fabricated elements late in the construction program. This necessitated balcony support stub brackets being procured early in the contract to allow the brickwork and rainscreen packages to progress. When installed, the brackets presented a stub around which the external envelope could be constructed and also presented a flange onto which the balcony structure could be mounted. The brackets were designed and supplied by Halfen. Overall this method of construction was considered to be a success.





An early design directive stipulated the windows within the rainscreen system should be emphasized by setting them within relatively deep reveals. This created an interface issue between the sliding door threshold and the balcony as the two would be remote from each other. The solution was to picture frame the opening but extend the bottom of the frame around the underside of the balcony, this allowed the balcony decking and structure to run into the window opening and interface with the recessed sliding door as required.

To maximize visibility, the balcony balustrades were glazed. To provide necessary impact resistance and prevent spillage of glass onto the pedestrian thoroughfares below, fully framed laminated glazing was selected. The framing to the inside face of the balcony was removable (by a specialist) to allow the glazing to be extracted intact should any damage occur.

The materials palette dictated the balcony decking should be formed in hardwood boards. Timber decking was known to offer little resistance to slipping when wet, therefore boarding with integral anti-slip inserts was specified.

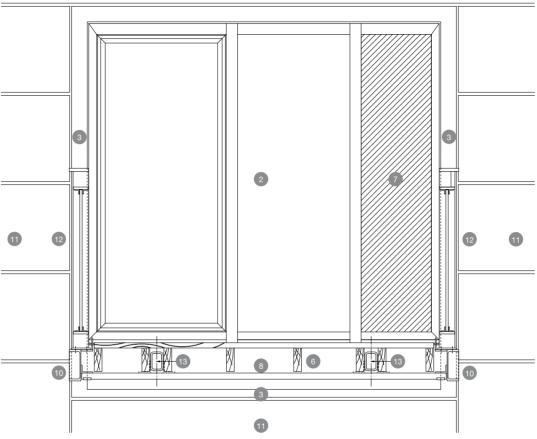
The decking boards were supported on preservative treated softwood joists spanning between the steel balcony members. It was noted through inspection of other completed developments in Leeds, the balcony soffit aesthetic was often overlooked, leaving the unattractive supporting structure clearly visible. This was addressed on One Brewery Wharf through the provision of a polyester powder coated, galvanized, mild steel grillage.

Overall the balcony design solution enhanced the elevation by creating shadow, especially at the balcony/rainscreen junction, adding depth and interest to the external envelope.





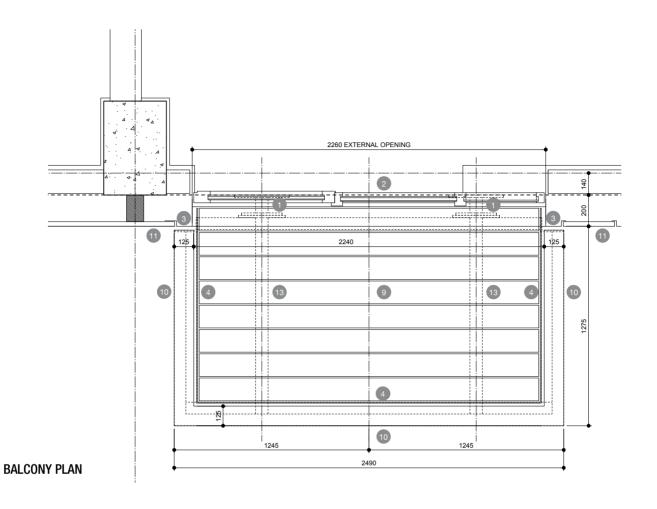




### **BALCONY LONG SECTION**

- HALFEN BALCONY SUPPORT BRACKET SERRATED WASHERS ALLOW FOR VERTICAL ADJUSTMENT.
- 2 TECHNAL FXI65 SLIDING DOOR SYSTEM
- WINDOW SURROUND CONTINUES BELOW BALCONY, FORMING A RECESS INTO WHICH THE BALCONY STRUCTURE EXTENDS.
- 4 CONTINUOUS WELDED MILD STEEL KICKPLATE.
- POLYESTER POWDER COATED GALVANISED BALCONY STRUCTURE.
- PRESERVATIVE TREATED SOFTWOOD JOISTS SPANNING FRONT TO BACK.
- ETERNIT LAMINA PANEL GLAZED INTO SLIDING DOOR SYSTEM FIXED FRAME.
- POLYESTER POWDER COATED, GALVANISED GRILLAGE, CLAMPED TO BALCONY STRUCTURE.

- 145 X 34MM THICK KNOTTY WESTERN RED CEDAR, TDA APPROVED AND DECKMARKED, DECKING BOARD WITH INTEGRAL ANTI-SLIP INSERTS - MAX. 10MM GAP BETWEEN BOARDS.
- 10 FEATURE PFC TO FRONT AND SIDES OF BALCONY DECK WITH NO VISIBLE FIXINGS.
- 1 SYNTHAPULVIN COATED ALUCOBOND PANEL (KINGSPAN INTERLINK RAINSCREEN SYSTEM).
- FULLY FRAMED. 13.5MM THICK LAMINATED GLASS INFILL PANELS TO BALUSTRADE.
- CONCEALED PRINCIPLE BALCONY SUPPORT MEMBERS ALIGNING WITH HALFEN BRACKETS.









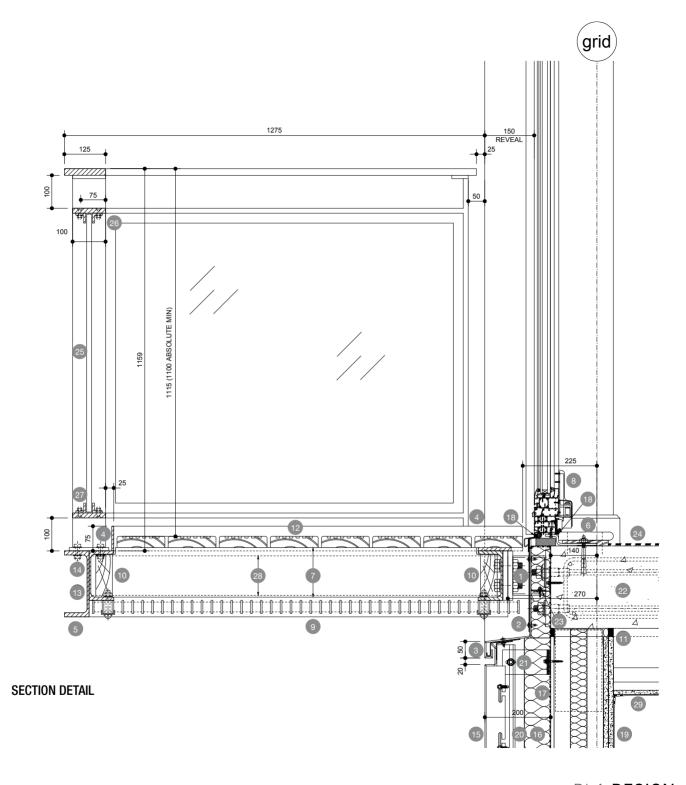


- HALFEN BALCONY SUPPORT BRACKET SERRATED WASHERS ALLOW FOR VERTICAL ADJUSTMENT.
- SYNTHAPULVIN COATED SPLIT COLLAR FLASHING AROUND BALCONY STUB BEDDED ON MASTIC AND RIVETTED TO CILL FLASHING UPSTAND.
- WINDOW SURROUND FLASHING CONTINUES BELOW BALCONY, FORMING A RECESS INTO WHICH THE BALCONY STRUCTURE EXTENDS.
- CONTINUOUS WELDED MILD STEEL KICKPLATE.
- POLYESTER POWDER COATED GALVANISED BALCONY STRUCTURE.
- MDF WINDOW BOARD
- PRESERVATIVE TREATED SOFTWOOD JOISTS SPANNING FRONT
- POLYESTER POWDER COATED ALUMINIUM TECHNAL FXI65 THERMALLY BROKEN SLIDING DOOR SYSTEM FIXED TO SLAB EDGE VIA CONTINUOUS CRANKED BRACKET.
- POLYESTER POWDER COATED, GALVANISED GRILLAGE, CLAMPED TO UNDERSIDE OF BALCONY STRUCTURE.
- PRESERVATIVE TREATED NOGGIN BETWEEN JOISTS.
- 1 DEFLECTION HEAD.
- 145 X 34MM THICK KNOTTY WESTERN RED CEDAR, TDA APPROVED AND DECK MARKED, DECKING BOARD WITH INTEGRAL ANTI-SLIP INSERTS - MAX. 10MM GAP BETWEEN
- FEATURE PFC TO FRONT AND SIDES OF BALCONY DECK WITH NO VISIBLE FIXINGS.
- DOME HEADED BOLTS.

- SYNTHAPULVIN COATED ALUCOBOND PANEL (KINGSPAN INTERLINK RAINSCREEN SYSTEM).
- 80MM THICK KINGSPAN K15 RIGID INSULATION TO ACHIEVE OVERALL U VALUE OF 0.27W/M2K
- 1 VAPOUR BARRIER WITH WITH ALL JOINTS TAPED AND LAPPED.
- 18 MASTIC SEALANT.
- LIGHTWEIGHT INTERNAL LEAF CONSISTING OF KINGSPAN KINGFRAME STUD SYSTEM - OUTER LAYER OF 10MM PYROC BOARD, 50MM THICK 16KG/M3 ACOUSTIC MINERAL WOOL BETWEEN STUDS, 2 X INNER LAYERS OF 15MM THICK LAFARGE FIRECHECK WALLBOARD.
- VENTILATED ZONE.
- 21 ADJUSTABLE ALUMINIUM BRACKET.
- 22 R.C. SLAB.
- 23 PROMAT PROMASEAL-RSB PERFORATED, INTUMESCENT COATED, CAVITY BARRIER SYSTEM.
- 24 RESILIENT LAYER BELOW FLOOR FINISH.
- FULLY FRAMED, 13.5MM THICK LAMINATED GLASS INFILL PANELS TO BALUSTRADE.
- REMOVABLE ANGLE TO INTERNAL FACE OF BALUSTRADE, FIXED WITH ALLEN KEY BOLTS, PERMITTING REMOVAL OF GLASS FROM BALCONY SIDE.
- ANTI-COMPRESSION RUBBER GASKET SURROUNDING GLASS.
- CONCEALED PRINCIPLE BALCONY SUPPORT MEMBERS ALIGNING WITH HALFEN STUBS.
- 12.5MM PLASTERBOARD MF CEILING SYSTEM.











# FOCUS ON DETAIL I ABOUT THE EDITORIAL TEAM



### IAIN JONES

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lain joined DLA Architecture in 2004 having worked for several small practice's in varying sectors, and has a wealth of experience in Retail, Stadia and Residential. With a BSc (Hons) degree in Architectural Technology, Iain specialises in technical detailing. He has implemented these skills on a range of projects at DLA in his role of a job runner, including the management of drawing packages from inception through to project completion, site / client liaison and co-ordination of specialist subcontractor packages. Previous project involvement at DLA include Trinity Walk - Wakefield, The Headingley Stadium redevelopment, St James' Boulevard - Newcastle, Echo Central development - Leeds and Monks Cross, York.



### STEPHEN HEPWORTH

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Stephen is an Associate and Project Leader in Studio 2 Wakefield. As a Senior Technician, he is currently leading the redevelopment of Blackpool Sixth Form College and Larchfield Mills, University of Huddersfield. He has past experience on a wide range of residential, commercial and educational schemes including Roberts Wharf, a city centre mixed use development, comprising a Grade 2 Listed mill, gaining particular experience with listed buildings and conservation. In addition, his portfolio includes the Harrogate House developments, St Ann's Quay Newcastle, Temple School Manchester, Canon Lee School York and Christie Fields Office Park Manchester.



### **DAVID BRYAN**

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David is an Associate and Project Leader in Studio 1. He has substantial experience in various sectors including industrial, office, leisure, residential and listed building types. He is currently performing the role of technical coordinator on the Clapham One project, a mixed use high rise development consisting of residential, healthcare and a library. His technical skills are wide ranging with an emphasis on job running and project delivery. Previous projects at DLA Architecture include New Portland Place, BBC Studios/Leeds College of Music, Yeovil Leisure, St John's Church conversion, various phases of Brewery Wharf, Leeds and the redevelopment of the NEC Arena, Birmingham.



### JASON CLARKE

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Jason is a Senior Associate and Contract Administrator with particular specialism in fire related issues. He has been involved in a large number of high profile projects including HSL Laboratories at Buxton, Derbyshire, The Lowry Galleria indoor shopping centre in Salford, UCLAN higher education facility in Preston, Carnegie rugby East Stand at Headingley and most recently fronting the Trinity Walk retail development in Wakefield. Jason has been with DLA since 1993 and in that time played a major role in the introduction and development of AutoCAD to the practice.



### ANDREW HARGREAVES

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Since joining DLA Andrew has trained and qualified as an Architectural Technologist and has advanced through the practice to Director level. He is responsible for leading studio 3 in the delivery of major projects and including sports architecture schemes. In addition to day-to-day managerial duties, his role involves ensuring all projects are working to achieve excellence in design and technical competence and are adequately resourced. He also works to assist in the development of new improved office policies and supports staff through the CPD process.





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