

Podium Level Walls

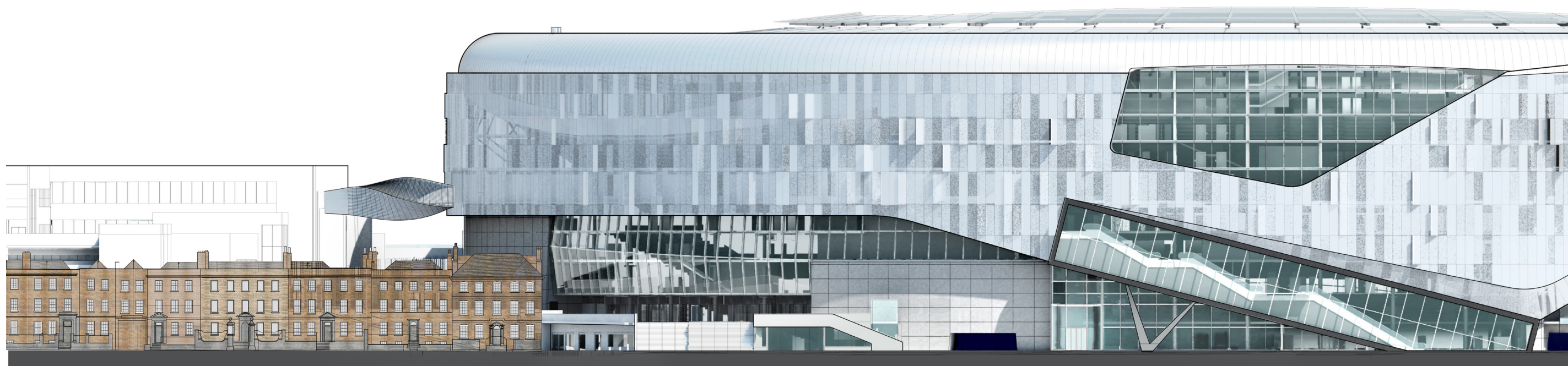
Precast concrete panels give the building the durability it needs where the building touches the ground and podium and where it could be liable to damage and vandalism. At escape locations, the precast concrete cladding is recessed and coloured to break the monolithic appearance of the cores.

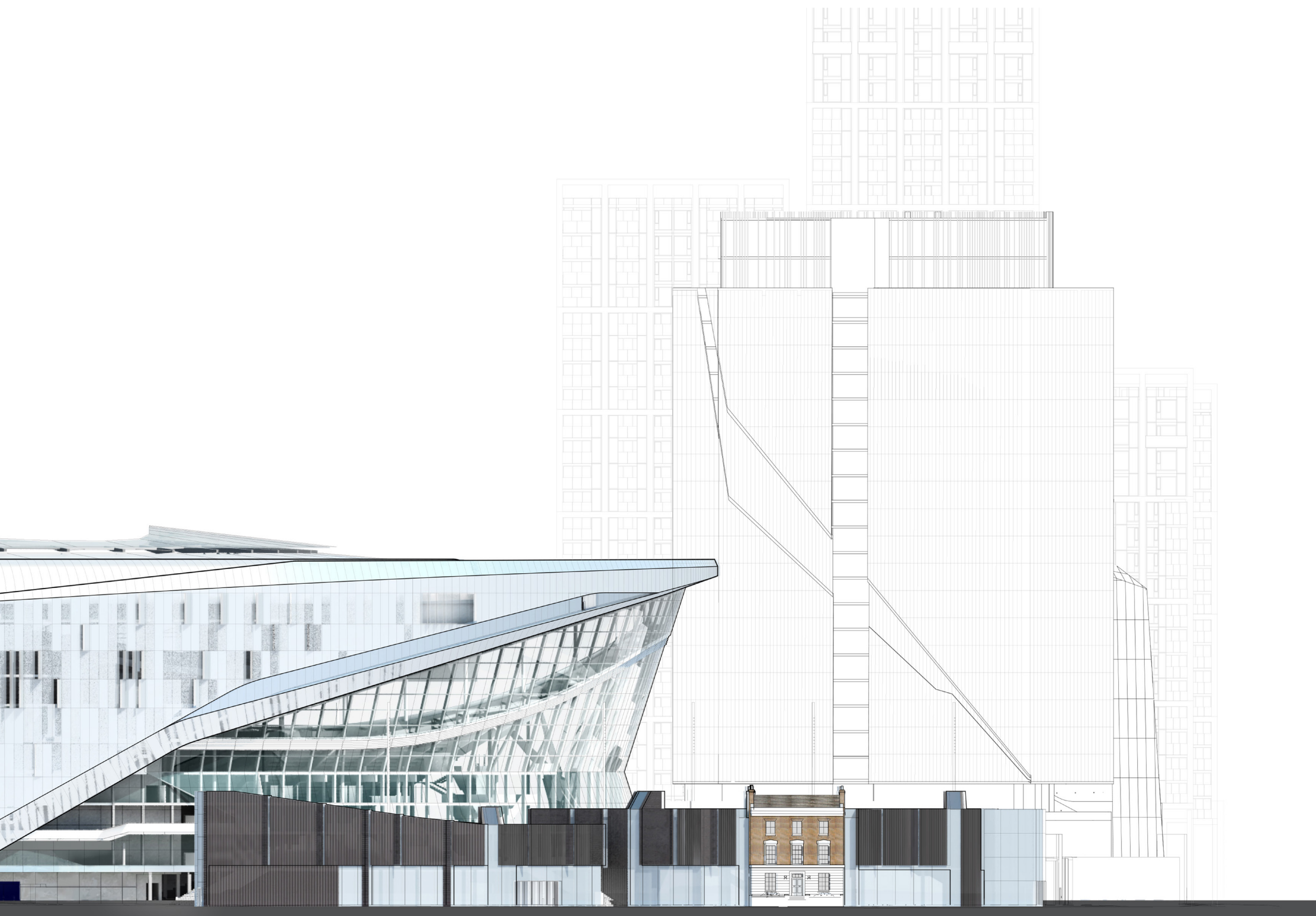
South Elevation

The single glazing provides the GA concourse and spaces beyond similar environmental conditions as the adjacent South podium, so blending the boundary between the public square and the stadium. The glazing enables the approaching spectators to get a sense of the scale of the South stand which is a critical part of the design as the 'heart-beat' of the stadium, sitting behind the glazed façade.

Wrap

The perforated aluminium clad screen wraps around the whole stadium and helps to unify the external façade – creating a dynamic and flowing form. It allows for large areas of plant to be open to the elements and to be screened from the view at the same time.





WEST FACADE

7.7.4 WEST FACADE

The west elevation of the stadium sits framed between the historically significant northern terrace and the contemporary new terrace to the south of the Tottenham Experience. This structure of cool metal and glass will contrast with the warmer tones of the historic brick and the cast iron panels of the adjacent terraces.

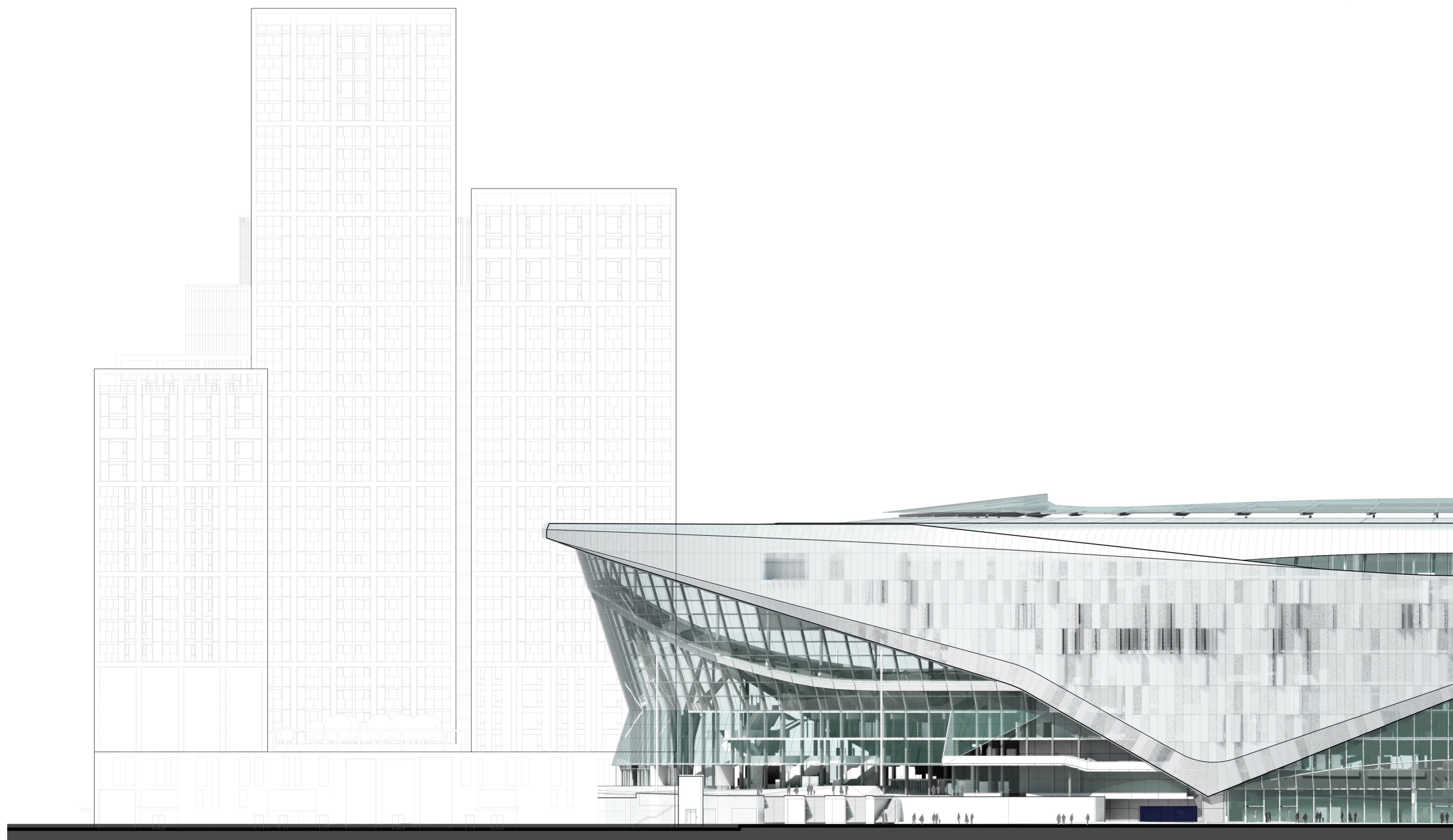
The identity of the stadium will be captured by the perforated steel panel screen which will flow across the elevation from north to south and around the whole building, dividing the façade. The lower portion will related to the scale of the streetscape and perforated metal screen will hover above. This allows the massing to be broken into elements that respond to the street scale and define specific conditions.

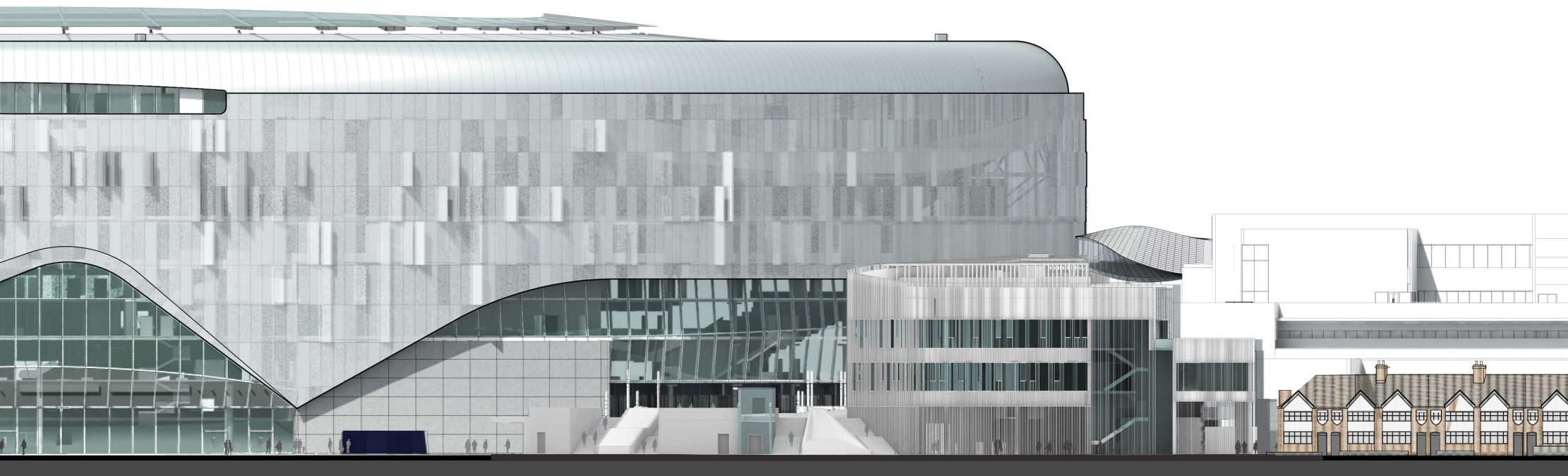
To the north, lower single storey elements of the Media café mediate the streetscape to the mass of the stadium beyond. As the elevation moves south, the escalator box creates the movement along the elevation as it drops to a single storey to create entrances to the hospitality spaces at either end.

The escalator box is a dynamic addition to the streetscape of the High Road, articulating the movement of spectators on the journey within the stadium to the seating bowl. It celebrates and puts on show the activity within, the fans becoming the actors within a performance.

To the south, the fluid metal screen flows back upward to expose the south glazed façade and the single tier stand beyond. This dramatic wall of glass rises from just a single storey to 35m high.

A dramatic slash in the metal screen creates an oculus in the façade, an opportunity in the elevation occupants to enjoy dramatic views over London and to be seen.





EAST FACADE

7.7.5 EAST FACADE

The setting of the eastern side of the new Stadium is a substantially different context to the western side, that addresses the busy and more public High Road. Worcester Avenue is a street of a more domestic residential character, quieter and less civic in scale. The street elevation starts from the lower northern end with a terrace of two storey Edwardian houses. The Community Heath building mediates the massing of this smaller scale to the mass and bulk of the stadium.

This building establishes a datum from which the perforated screen flows round from the north, dividing the façade into the lower portion relation to the street and the upper perforated screen which floats above it. This descends down to almost touch the street before peeling upwards again to create a dramatic asymmetrical arch marking the main eastern entrance to the stadium.

The arch defines the east hospitality entrance and provides views in and out from the double height conference and banqueting suite. A more discreet eyelet than the slash to the west is located in the eaves to reveal glazing to the Skylounge. The perforated metal screen dips down to frame the east entrance once more before flowing up to the dramatic culmination of the south façade.

The elevation to Worcester Avenue is book ended by the residential development of the south, it's scale mediated by the residential plinth that acts as a street datum matching the scale of the houses to the north.

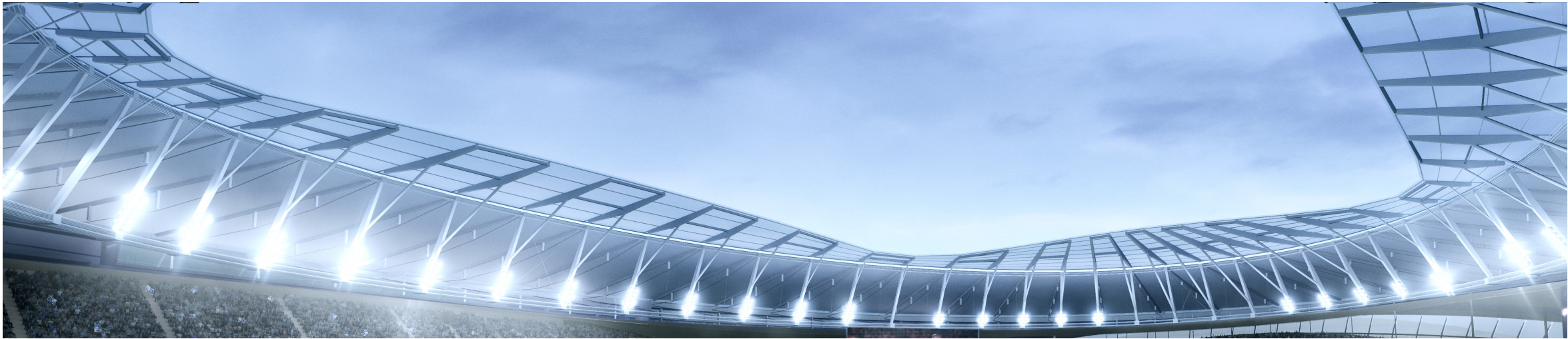
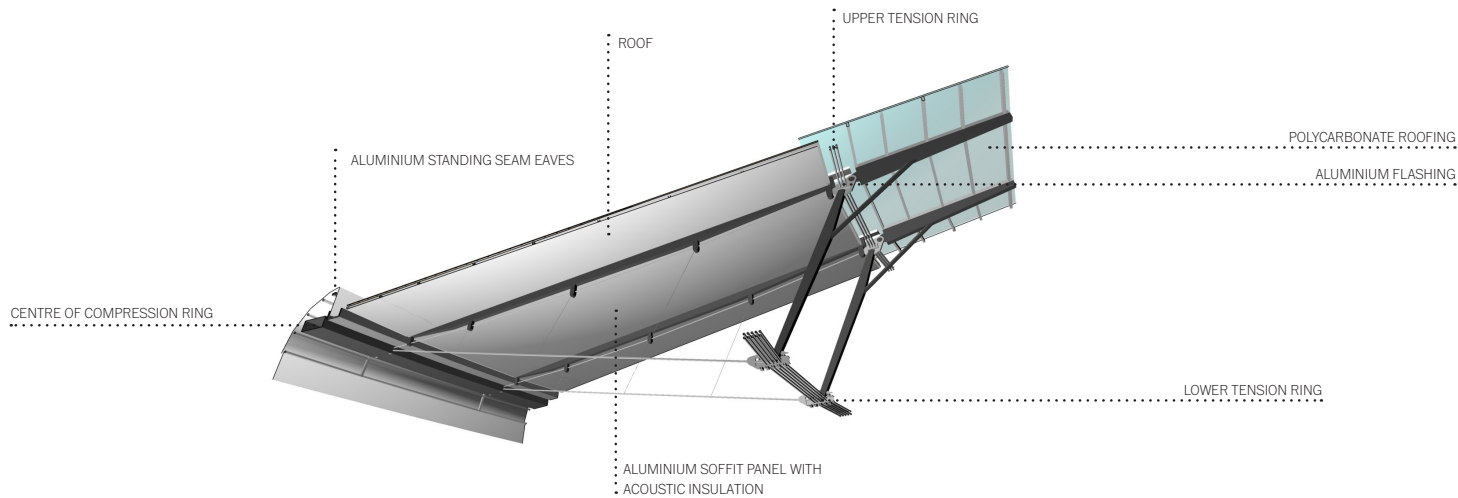
7.7.6 ROOF BUILD UP

The stadium roof is a cable net structure with a compression ring at the rear of the roof consisting of a steel box beam and two cable tension rings inboard to create a stable net structure onto which rafters and purlins are added to complete the overall roof structure.

The cladding elements of the roof fall into four areas;

- The curved eaves detail which acts as a transition from the stadium elevations and the main roof surface. The secondary steel structure for these eaves are supported off the compression ring to support purlins to which is fixed a curved and tapered aluminium standing seam cladding system.
- The main roof surface is an aluminium standing seam cladding system supported on a structural trapezoidal deck supported by purlins spanning between the main steel rafters which are supported by the cable net.
- The area of the main roof surface has a soffit made from powder coated pressed aluminium panels to create an architecturally clean soffit. The rear portion of this soffit is perforated with a layer of acoustic insulation between the perforated surface and the underside of the trapezoidal deck to improve the acoustic performance of the stadium bowl.

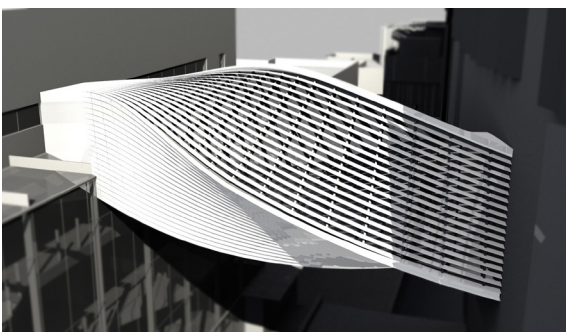
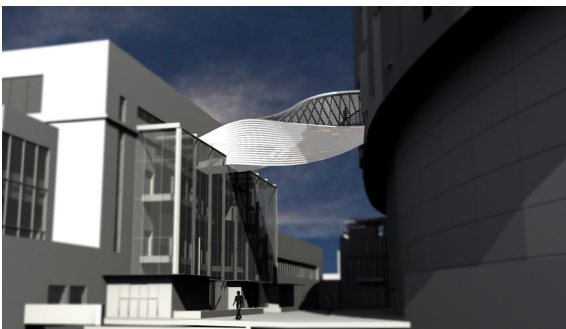
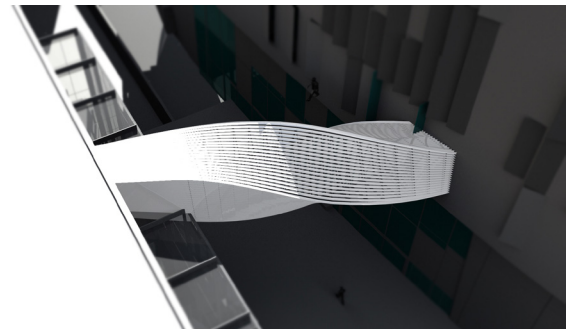
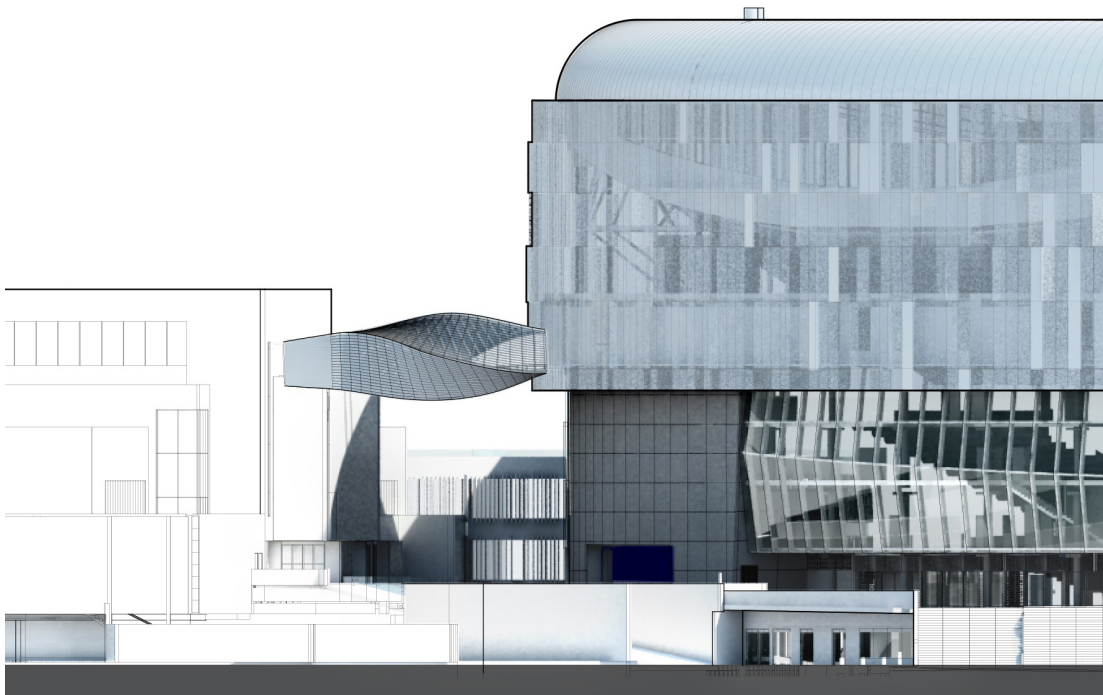
- The leading edge of the roof is clad in polycarbonate sheeting to improve the amount of light energy entering the stadium bowl and to assist in the lighting transition of the pitch surface for TV cameras. This polycarbonate layer sits on purlins supported off cantilevered beams which are supported and propped off the upper tension ring and the struts between the two tension rings. The very leading edge of the roof is clad with a shaped powder coated pressed aluminium nosing.



7.7.7 LINK BRIDGE

The link bridge to the north of the stadium will form an enclosed link from the executive offices within the new stadium to the main club offices in the completed Lillywhite House. The bridge links level 4 of Lillywhite house to level 5 of the stadium, allowing club officials to direct between the two buildings.

The bridge is conceived of as a sculptural structure that mediates the dynamic structure of the stadium with the more sedate architecture of Lillywhite House. The outer skin of powder coated aluminium louvres of varying densities, rotate around the inner glass enclosure and aluminium deck to create a form that reveals differing views into and from within the bridge. The linear nature of the louvres accentuate the form an directionality of the movement within.



7.8 Mechanical, Electrical and Plumbing

GENERAL

The Building Services for the new Tottenham Stadium have been developed in tandem with the Architectural and Structural design and are summarised below:

Utilities:

Water:

Thames Water have undertaken a network analysis of their local infrastructure and it has been agreed that a new connection can be made to serve the new stadium and Tottenham Experience off the high road with limited disruption to the existing systems and opening existing valves (currently closed) on the existing trunk main. It is intended that a new connection sized to suit the stadiums requirements will be extended on to site before the main stadium contractor will be appointed.

Gas:

The National Grid has approved a new connection into the low pressure gas main in the High Road to serve the new stadium. This low pressure main will be extended on to site before the main stadium contractor is appointed. The approved gas installer will return to site once the gas meter room is constructed to install the short length of pipe required between the temporary plugged end and the gas meter.

Electricity:

UKPN have been consulted and have planned into their local infrastructure works to extend a new dedicate HV supply cable from Bruce Grove Substation to serve the New Stadium. In addition the on-site generators are of sufficient size to enable the stadium to operate in the event of a mains failure. On a match day the generators will run for the majority of the day to supplement the mains supply.

Communications:

The Club have started direct negotiations with BT to provide the necessary connectivity to the new stadium via two new intake rooms on the North end of the Stadium.

BEMS:

The client requires full integration of the IT and BEMS systems so it is proposed to provide outstations at each plant area and in IT rooms throughout the stadium which will interface with

the Stadium IT Ethernet “backbone”. The BMS will be fully integrated with the other IT based systems.

VENTILATION

Ventilation levels providing fresh air to occupied areas are compliant with Part F of the Building Regulations as a minimum and are enhanced in areas which require it for occupancy comfort or process loads such as kitchens, Concessions and WCs.

Stadiums have quite diverse loads peaking on match days but needing to ensure comfort conditions throughout the year as clubs look to maximise the non-match day use of the building. The ventilation plant for Levels 1 and above will be located at levels 6/7. Level 0 and basement will be served from ventilation plant on those floors, the exception being WC or kitchen extracts which will be taken to the higher level plant rooms to avoid odour issues. It was agreed at an early stage that the boxes would have stand-alone ventilation systems (MVHR units and 4 pipe FCUs) as this reduces centralised plant and riser congestion but also allows individual operation on non-match days and potentially facilitate modular construction.

The main Club Restaurant and bar areas are predominantly air systems and were necessary perimeter heat emitters to mitigate against condensation and counteract downdraughts on the large glazed elevations. Trench heating and Transom heaters on larger glazed areas may be required.

Kitchens are provided with mechanical supply and extract in accordance with industry guidelines and also catering specialist advice, based on the equipment provisionally selected. Supply air to the kitchens will be tempered and provided with some comfort cooling.

The thermal model is being revised to reflect the latest layouts but the principle that was proven in practice at Arsenal's Emirates stadium was that when 15l/s per person is provided to the Club areas at 10deg below room condition comfort conditions can be maintained. This approach enables free cooling to be utilised during most of the football season whilst managing duct and plant sizes. This is currently being refined and initial indications are that either flowrates or temperature

differentials can be reduced in certain areas.

The IT rooms and Catering/ cellar coolers are not connected to the central chilled water system. The IT rooms are grouped with the heat rejection units located in the upper level plant rooms. The catering chillers are grouped into 5 packaged units serving level 0 CPU and 4 quadrants for Kitchens and cellars. Final details of the catering offer and equipment are being developed but initial proposals suggest the CPU condenser was in the North level 6 plant room and the 4 quadrant units were located in the level 6 plant areas.

General Admission areas are provide with mechanical extract from WCs and Concessions with make-up air from the Concourse with openings to outside via vomitories and openings in the façade.

HEATING AND COOLING

The Central gas fired boiler plant is located in the East Level 6/7 plant area. The stadium is provided with centralised gas fired boiler plant as it enables the connection to a future District Heating Network to be accommodated, in the future, with an adjacent riser to ground level for the pipework.

The boilers are located in the East stand plant room and the intake room for the future district heating connection is located directly below it in the basement. With the future development of the Southern part of the site it may be better to locate the central district heating connection point within the Southern development.

The heating will distribute horizontally at level 6 and drop within each of the 6 risers to lower level plant rooms and loads. Distribution temperatures of 80/50 Deg C, are proposed as this achieves a efficient balance as far as hot water generation and pump/ pipe sizing design.

The Chilled water system is more zonally separated. Whilst the East and North upper plant rooms have adequate space for these large items of equipment the West stand with its need to accommodate the Office areas on level 6 and 7 does not. For this reason the East Stand has two chillers each sized at approximately 75% of the East stand load and the North stand has space allocation for 5 Chillers (each sized for 25%). It is

intended to link the distribution system at level 6 so that it will be possible to take a chiller off line for maintenance and improved resilience while still maintaining environmental conditions.

The IT rooms and THFC West Offices will be provided with cooling/heat pump VRF systems. In the case of the Offices this will avoid the need to run the main chillers on non-match days.

Options are also being considered for the potential to connect to a future District Energy Network.

DOMESTIC HOT AND COLD WATER

200m3 of cold water will be stored in the basement and distributed via a boosted ring main at basement or Ground level to the risers. This equates to about 66% of match day consumptions and will offer a balance between resilience and tank turn over. Chlorine Dioxide and UV will be used to ensure wholesome water is available from all potable outlets. The Client was keen to avoid multiple electric water heaters so there are 10 LTHW/HWS Calorifiers/ Plate Exchangers with Buffers located within plant spaces to serve hot water outlets in a zonal arrangement (6 Cores, 2 South stand, Main Kitchen, Home and Away Players Changing). The hot and cold water is distributed via the vertical risers alongside each core to zones around the cores and this will provide a logical distribution pattern and facilitate a rational maintenance and problem solving strategy for the future.

There will be certain areas which shall be unheated (basement, Upper and lower Concourse, South stand, level 4 North) and all domestic cold water services (and hot water deadlegs) shall be trace heated in these spaces.

SPRINKLER

It is intended to provide Sprinkler protection over most of the stadium as the building is over 30m tall and therefore space allocation has been made for a 185m3 water tanks in the basement and dual booster sets for the sprinkler system. Distribution will generally by a ring main at level 0 and then rise vertically via the risers in each core. There is a mix of wet and dry zones to minimise trace heating of pipework in unheated areas. Where dry zones are required a Compressed Air supply

will need to provide to “charge” the main.

LIGHTING

All areas will be provided with low energy lighting systems, LED based, and appropriate controls, as part of the measures to comply with Building Regulations Part L1A.

User interfaces and switches will be located in areas with no public access and zoned to accommodate differing operating patterns. The overall control system will be zoned to enable areas to be independently commissioned and amended at a later date.

FIRE DETECTION AND ALARM SYSTEM

The Stadium will have a fire detection system to BS5839 Pt 1, and an extensive PA/VA system for notification of alarms. Defined operating modes will vary, under differing levels of management control, dependant on the use of the stadium at the time. On match days evacuation procedures will be manually controlled.

SECURITY SYSTEMS

The security systems in the Stadium will have multiple control points, the permanently manned Security Office, the Match Day Control Room and fall-back Emergency Control Room. Information will also be made available at reception desks and other positions to assist with the management of the Stadium. The systems will include elements of electronic access control, CCTV and Intruder Alarms, plus event specific systems such as Fire Telephones and Private Mobile Radio.