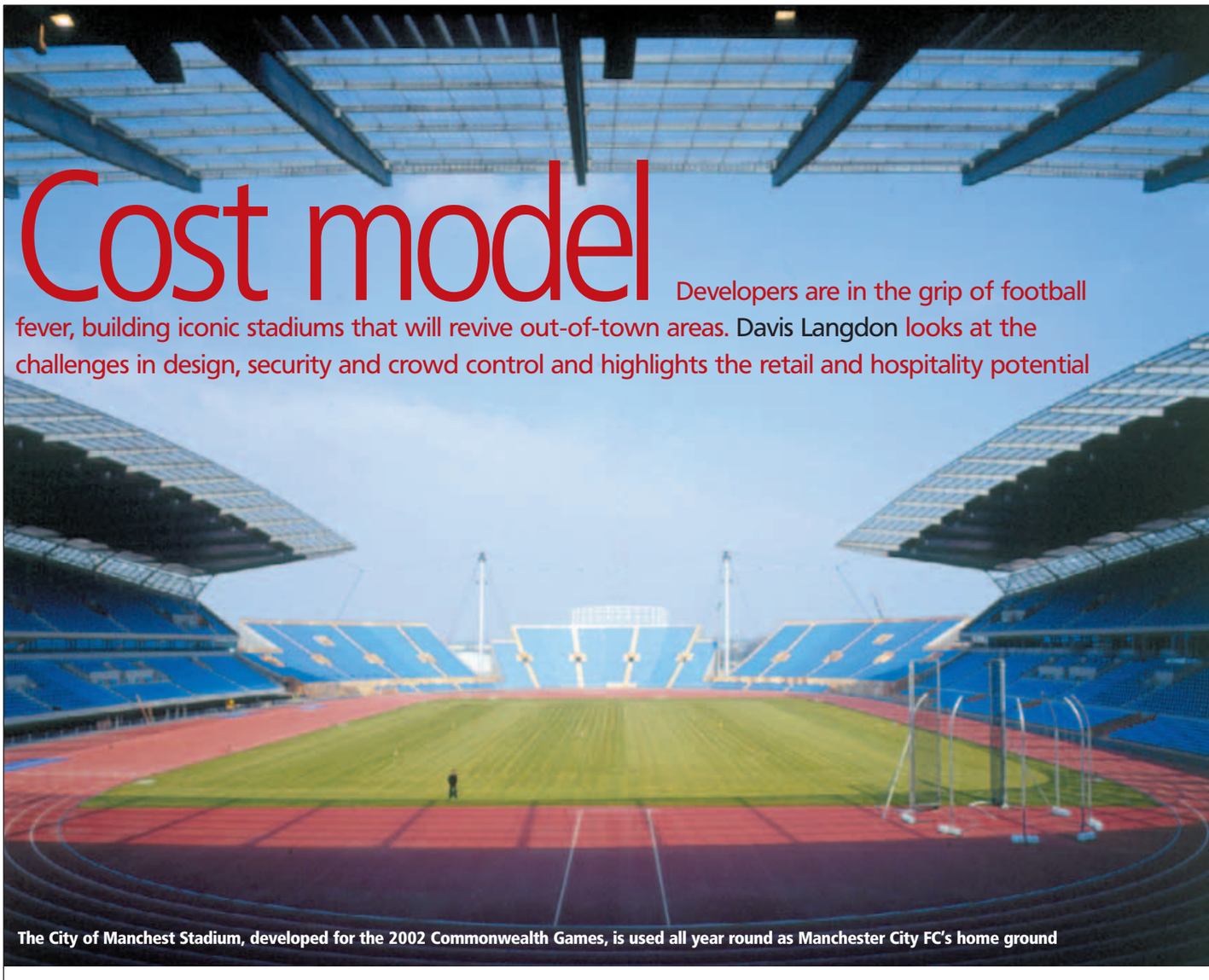
Cost model

Developers are in the grip of football fever, building iconic stadiums that will revive out-of-town areas. Davis Langdon looks at the challenges in design, security and crowd control and highlights the retail and hospitality potential



The City of Manchest Stadium, developed for the 2002 Commonwealth Games, is used all year round as Manchester City FC's home ground

Demand for stands and stadium development

Following the urgent safety-related works to create all-seater stadiums carried out in the aftermath of the Taylor report in the 1990s, a further wave of stadium development has occurred. While most premiership football clubs have made significant investments in their facilities, there is also potential for development in the Football League and in rugby, where gate receipts are critical to the financial health and competitiveness of clubs.

The strategic rationale behind redevelopment can be varied, but there is strong evidence that in addition to the benefits of increased capacity, stadium redevelopment has a powerful impact on a club's profile. Ground sponsorship, opportunities for revenue diversification, and the development of links between clubs and community are additional drivers behind projects. Local authorities have also become more actively involved in sponsoring relocation and redevelopment of grounds as part of wider regeneration projects.

A third potential player in the equation is a commercial developer, either motivated by opportunities to redevelop the existing site or keen to use sport to anchor a broader commercial development on an out-of-town site. The liberalisation of gambling in the UK may provide a further source of co-investment into sports stadiums.

Sport stadium development

In 2003 the mould-breaking KC Stadium in Hull opened, establishing a new model for multi-use stadiums and community involvement. While it is the quality of the team and the management that count on the pitch, the extra revenue that ticket sales and other uses can generate can make a huge difference to a club's ability to invest in its playing resources. Arsenal's £200m investment in a new stadium demonstrates the strategic importance of increasing ground capacity, while less fashionable clubs such as Reading FC show that through a combination of ground sharing and a diversified revenue stream, high quality facilities can be enjoyed in the lower divisions.

datafile

Key characteristics of stadiums

Grandstands and stadiums are a truly iconic building type. The scale and highly visible engineering of many stands makes them landmarks in their own right – a trend reinforced by the quality of venues such as the Telstra Stadium, Sydney, and the Estadio do Dragao, Porto, where the 2004 European Championships will open.

However, stadiums and grandstand buildings are deceptively complex and create a number of challenges for the design team, not least dealing with the sheer obtrusiveness of the typical stand. The main challenges associated with the stadium as a building type include:

- The inward focus of the building, a characteristic which is emphasised by perimeter security measures as well as the design of the stand. This can be partly addressed by incorporating public uses such as retail or leisure/hospitality;
- Massing of stands and the size of structural elements, which makes it difficult to reconcile any development with its surroundings. Furthermore, their size means that the viability of developments can be very sensitive to the cost of key visual elements, mainly the roof and structure, which encourages the use of economic materials;
- The size of key elements: tiers, concourses, stairs, ramps and roofs can all be large and, as a result, inflexible. For example, where there is a discontinuity in design – open corners in a football stadium, or the switch from a double to a single tier beneath a continuous roof, then it is difficult to achieve an economic, visually satisfying and durable design solution.

Meeting the needs of the users

Getting the right development can be a complex process. Inevitably, there are trade-offs between the development, the range of facilities offered and overall affordability, which increasingly depends upon the success of turning a stadium into a year-round operation. Feasibility issues are particularly important for "event" venues such as the City of Manchester Stadium, originally developed for the 2002 Commonwealth Games. Guaranteeing the sustainability of these investments by maximising regeneration benefits and by ensuring regular use is an essential aspect of project success.

Stadium project teams are concerned with satisfying the needs of three main interest groups. Spectators are motivated by the quality of the event experience and, to a lesser extent, by the range of facilities provided, comfort, safety, and crowd control issues.

The prime concern of the players will be the quality of the pitch, predictable playing conditions and atmosphere, together with back-of-house facilities.

The final stakeholder is the owner, driven by the need to sustain revenue and profitability derived from a number of sources including:

- Maximising capacity
- Maximising event days. This may involve ground sharing arrangements, together with investment in durable pitch surfaces
- Generating premium income through club seats and boxes
- Optimising non-gate sports income related to hospitality, concessions, ground sponsorship, advertising and parking
- Diversifying operations to provide a 365 days a year income – such as hotels, conferences.

In most instances, the needs of the three groups are compatible. Areas where conflicting requirements may need to be resolved include:

- Achievement of optimum viewing distances for different sports in a multi-use stadium. This is not a significant problem in the UK as the two prime users – rugby and football – use similarly-sized pitches. In stadiums where alternative uses are less compatible – football and athletics are commonly co-located in Europe, for example – temporary stands can be used to reconfigure seating for different sports, albeit with potential time and cost penalties.
- Achievement of comfortable sightlines and seating rakes. The requirement to maximise seating capacity in a confined site may result in requirements for steeply raked multi-tier stands. By contrast, where budget, rather than site area, is constrained, the pitch of stands may be reduced to minimise costs of structure and vertical circulation, together with overall visual impact.
- Provision of good quality playing conditions. Steeply raked bowl stadiums create a great atmosphere but at pitch level, uneven natural light, rainfall and ventilation can play havoc with pitch quality. These problems have been particularly noticeable in high-sided stadiums or schemes with retractable roofs such as Cardiff. Design features to remedy these problems include "perforating" the bowl to encourage natural ventilation, mechanical pitch ventilation and, in extreme cases, provision of mobile or palletised pitches, such as the mobile pitch at the Arena Auf-Schalke, Germany.

Making the stadium work: Functional design drivers

Stadiums need to be highly functional buildings, providing safe and satisfactory viewing conditions and facilities for large crowds using minimum resources. Cost and value drivers affecting stadium design are dealt with below and this section sets out the key practical design criteria for a stadium.

Sightlines and viewing distances

Sightlines and viewing distances are determined by the sport, the size and layout of the stadium and the orientation of stands relative to the pitch. Distance from the action, the ability to see over the heads of spectators and the absence of obstructed views are key drivers.

The optimum viewing distance for rugby or soccer, taking into account the height of stands, is 90 m diameter from the centre circle. The ability to see over the heads of spectators is determined by the "C" value, which measures the height difference between lines of sight to various parts of the playing area. A "C" value of 90 mm is the good practice benchmark for acceptable viewing, with higher values of up to 150 mm requiring steeply raked tiers.

In practice, complex geometries using dished tiers with higher "C" values at the rear are specified, achieving the optimum balance between sightlines, tier rakes and viewing distances.

Layout and circulation

The design principles for planning of circulation include:

- Clear routes to get people to their seats;
- Providing concourse space and exit routes to allow for safe evacuation in panic conditions;
- Subdivision of stand, concourse, concessions, and facility areas to break crowds down into manageable numbers. This subdivision provides the module for planning such features as exits, gangways and WCs.

Online cost briefing

Readers can now search our unrivalled four-year archive of Davis Langdon & Everest's cost models and specific, cost-based project studies, by clicking on the Cost Briefing section of our recently-upgraded website, www.building.co.uk. Cost briefing itemises all the articles by subject and includes data correct up to the date of publication.

Generating venue value: Cost and value drivers in stadium design

Reconciling the needs of different stakeholders, different sports and the need to either exploit or minimise the visual impact of a stadium all have a potential impact upon the cost and revenue streams associated with a stadium scheme and the quality of the spectator experience. In putting together the business case for a project, a wide range of cost and value drivers need to be considered. The primary drivers are as follows:

Capacity

Seat capacity is driven by the business case and the ambition of the club and will determine the following key areas of expenditure:

- The number of tiers
- The type of roof and the extent of shelter provided
- The total size of building in terms of footprint and floor area
- The extent of support facilities and concession areas required.

Gross floor area

Gross floor area is closely related to capacity and also directly drives cost. Schemes with a high area per seat will generally be more expensive. Where extra area delivers value though hospitality, retail or club facilities, the additional capital cost can be tested in a business case. However, if the space does not generate revenue (such as concourses) or if it cannot be used (such as below tiers), the spatial arrangement needs to be carefully tested. For example, below a capacity threshold, construction of one large two tier stand in a mainly single tier stadium is likely to be more cost effective than the construction of a lower-capacity continuous two tier arrangement, with its extra concourses and vertical circulation.

Pitch level

In a new build stadium, it may be possible to excavate the playing area and lower tier below ground level. The advantages are considerable and include:

- Reduced overall height and massing of the development
- Avoidance of requirements for framed structures to lower tiers, including vertical circulation and below tier void space.

However, opportunities to construct sunken pitches may be constrained by groundwater level and the ability to excavate and remove large volumes of excavated material. Costs may be very high if the material is contaminated or below the water table.

Shape and arrangement of stands

Arrangements range from continuous bowl arrangements, through stands with infill corners, to conventional straight stands. Bowl designs are only feasible on complete redevelopments and typically incur a cost premium of up to 5% associated with structural complexity, curved/facetted components, reduced space efficiency and an increased footprint.

Advantages of the bowl arrangement include:

- Improved sightlines
- Improved atmosphere associated with the enclosed bowl
- Improved aesthetics based on a single dominant element (for example the roof or external facade).

Disadvantages other than cost also include increased viewing distances at the rear of side stands and issues relating to pitch quality.

Straight stands are cheaper to construct due to simpler structures, repetitive detailing and more efficient space planning. Adopting a plan based on separate straight stands also enables capacity to be added incrementally.

The main disadvantages of straight stands relate to the piecemeal nature of the overall stadium, together with unsatisfactory options for "closing" corners. "Atmosphere" can also leak from grounds that do not have a continuous perimeter roof.

Tier arrangement

Requirements for multiple tiers are determined by overall ground capacity and, to a lesser extent, by the available development footprint. Single tier stands are more cost-effective but offer

Venue sustainability and long-term use

With stadiums projects now being used to anchor regeneration programmes and out-of-town development, the link between sporting facilities and the long-term social and economic sustainability of the investment are key issues. With stadiums developments, the long-term objectives are firstly, to ensure that the facility is used as intensively as possible, and secondly, to optimise the use of facilities for either community or commercial use.

Stadiums constructed for one-off events, rather than for a club with an established programme, have to find a long-term use. Examples include the City of Manchester stadium, which has been converted into a football venue, following the Commonwealth Games in 2002. Issues associated with the successful transition from initial use to long-term use include:

- The planned ability to reconfigure the stadium from an event use to general use through changes to tier arrangements
- Provision of event facilities for media and VIPs in temporary space that can be adapted for permanent use in the final configuration
- Identification of and investment in facilities required for initial event and general use.

Where a range of community-based facilities are provided as part of the stadium development, as in the KC Stadium in Hull, it is vital to ensure that infrastructure is in place to promote and provide access to the facilities upon completion of the development.

Another aspect of the sustainability of a stadium is whole life performance. While the operating costs of stadiums are not a significant component of a club's expenditure, the liability associated with long-term maintenance and replacement can be considerable – particularly for elements of the building that are subject to wear and tear or those which are exposed to the elements. Accordingly, the consideration of long-term performance compared with initial cost is an important but often ignored aspect of the development equation.

Indicative costs of stadium development

	£/m² gross floor area	£/seat
Regional stadium: back-of-house facilities, WCs, concession areas and hospitality:	**850 – 1,200**	**1,000 – 1,700**
Regional feature stadium: high quality design, back-of-house facilities, retail, hospitality and conference facilities:	**1,200 – 2,000**	**1,500 – 3,000**
National iconic stadium: landmark design, full facilities including retail, hospitality and conferencing:	**2,000 – 3,000**	**2,800 – 5,000**

Costs are at 2nd quarter 2004 based on a South East England location. Costs exclude: fitting out, external works, professional fees and VAT.
Gross floor area is calculated by adding the area of seating tiers to the gross internal floor area of the building.

poorer sightlines as capacity increases.
By contrast, while multiple tier stands enable more intensive development of the site, negative cost and efficiency drivers include:

- Structural complexity
- Vertical circulation requirements – including issues of fire safety
- Issues associated with height massing and planning generally.

Roof

Clear span structures are required to provide unobstructed views and weather protection to all seats. As the roof is the dominant element, design statements are often made with either the roof or its structure. The primary structural options available to the project team, in order of cost and complexity, are:

- Goal post/arched trusses
- Cantilevers
- Tension structures.

Solutions based on goal post trusses are only suitable for straight stands. Cantilevers and tension structures are suitable for all stand arrangements. Cost drivers affecting the overall cost of the roof include:

- Spans, determined primarily by the depth of the stand
- The overall roof area, determined by factors such as stand height and depth
- Dimensional restrictions on cantilevers
- Solutions at corners
- Requirements for architectural detailing – which may result in a sub-optimal structural solution
- Wind loads.

Spectator comfort

The primary determinants of spectator comfort relate to space standards on the tier, provision of facilities and ease of navigation. Quality of seats may also affect spectator satisfaction. Better quality accommodation may attract larger gates, justifying investment associated with spectator comfort driven by:

- Higher costs for increased footprint, gross floor areas, tier and roof area to provide equivalent capacity
- More extensive fit-out to provide more facilities such as WCs
- Requirements for dedicated access facilities for boxes and club seats
- Design of circulation and signage to facilitate safe movement of crowds.

All year operation

Addition of facilities to increase event days and extend the range of uses of a stadium is a significant cost and value driver. The benefit is in diversified revenue streams which need to be offset against commercial risk together with increased costs in the following areas:

- Gross internal floor area – additional accommodation for services/concessions that may extend beyond the boundaries of the stadium
- Additional changing, club administration facilities and concessions associated with ground sharing
- Premium fit out to executive boxes to enable year-round usage as meeting suites.

Concessions

Space planning and services provision for catering, retail and other concessions can result in over-provision or abortive works unless early input is received for consultants/franchises.

Capacity for expansion

Designing in structural capacity for the expansion of the basic stand will result in premium costs for frame and superstructure, and potential abortive costs of roofs if demolished within their design life. It is more economic to design to the full capacity of the intended long-term use, so provision for expansion should only be considered if growth is anticipated with a defined timescale.

Other drivers associated with a development include infrastructure costs associated with new sites, or the demolition, access and phasing costs associated with working with an existing stadium.

Procurement and funding

With joint ventures between clubs, developers and local authorities becoming more common, procurement issues have become more complex and, in particular, the management and transfer of risk has taken a high profile.

Clubs are occasional developers and are unlikely to have the specialist management skills in place to deliver a major project. Accordingly, the selection of advisers and delivery route will affect not only the completed stadium, but also the impact of the construction project on the day-to-day running of the club.

The key steps that need to be taken to ensure successful delivery of the project are as follows:

- The development of a clear project vision and objectives
- The completion of a business case that tests the balance of facilities
- The identification of a project owner with decision-making powers within the client organisation
- The production of a brief, setting out organisational issues, development parameters, budgets and timescales
- The appointment of a specialist project team.

Due to the utilitarian nature of much standard stadium construction work, design and build has been a commonly adopted procurement route. With full control over the design, contractors are able to offer low cost schemes with a high degree of product certainty. However, for clients seeking strategic advice, or aiming to develop a solution which optimises value-added and accommodates the needs of a range of stakeholders, the involvement of a specialist design team, at least up to scheme design stage, can realise long-term benefits. The development of a high quality scheme may also assist with the planning issues.

In these circumstances, a develop and construct route, possibly involving the novation of the professional team, should deliver a product that is closely focused on the client's needs and which takes full account of the cost and value drivers affecting the project.

Risk is a key element of the stadium procurement equation. As club revenues are relatively inelastic, cost overruns or delays in completion can have a significant effect upon the long-term viability of a scheme. Similarly, the vulnerability of clubs to changes in revenue related to promotion and relegation mean that contractors and consultants have to secure their position, either through bonds or through risk premiums built into contracts which often pass most of the financial risk to the project team.

In the circumstances, it may benefit the client to review the extent of risk transfer inherent in the form of contract adopted, as a more equitable balance of risk between the parties may deliver a better value solution to the client.

Other issues associated with procurement include the fit out of hospitality and concessions areas, where interfaces between the shell works and the concessionaires' requirements should be resolved at the earliest opportunity to minimise over-specification, co-ordination problems or abortive works.

Cost breakdown

The cost model is based on a regional stadium with a total of 25,000 seats. The development has a gross floor area, which includes the area of the tiers, of 35,800 m².

The stadium features a continuous roof enclosing one two-tier stand, with the rest of the seating arranged on a single tier. The scope of works described in the cost model excludes the fitting out of back-of-house areas, hospitality areas and concessions. The total value of the fit-out works is approximately £4.25 million. Included in the scheme are costs for the pitch and floodlighting, totalling £1.15 million.

Rates in the model are at 2nd quarter 2004 price levels, based on a lump sum contract and a location in South East England. Costs of site preparation, fit-out, external works, loose equipment and catering equipment are excluded, as well as professional fees and VAT. The model also excludes allowances for site of project and normals.

Rates in the model may need to be adjusted to account for specification, site conditions, procurement route and programme.

REGIONAL STADIUM COST MODEL

	element cost	cost/m² gfa £	% of total cost
Substructure	1,592,200	44.47	5.10%
Excavate and fill site generally to an average depth of 500 mm; disposal; allowance for breaking out 20,000 m² @ 7.00 Ground bearing slabs; excavate to reduced levels; blinding; polythene DPM; hardcore; variable thickness concrete slab with mesh reinforcement; ground beams and lift pits 10,600 m² @ 50.00 Piling and pile caps: 600 mm diameter piles; 15 m deep; complete 10,600 m² @ 57.00 Excavation for column bases / pile caps; 1.5 m deep including reinforced concrete; blinding; reinforcement; formwork; etc. 10,600 m² @ 30.00			
Frame	3,798,000	106.09	12.17%
Main fram, structural steel columns, beams, rakers and bracing; tonnage based on allowance of 50 kg/m² 1,800t @ 2,000 Intumescent paint / fireboard and architectural finishes, 18,000 m² @ 11.00			
Upper Floors	2,073,000	57.91	6.64%
In situ upper floor slabs to concourse areas; waffle construction with perimeter beam strips 14,000 m² @ 45.00 Precast concrete seating units: supply and erection of precast concrete L units; 15 m long with 875 mm x 475 mm section; stainless steel locating pins; waterproofing 11,100 m² @ 130.00			
Roof	4,136,000	115.53	13.26%
Steel frame; grade 50 structual steel main roof structure; high performance paint system; tonnage based on allowance of 68 kg/m², 1,080t @ 2,500 Roof access cat ladders 2 nr @ 1,500 Roof access stairs 2nr @ 3,000 Latchway systems and walkways 680 m @ 115.00 Camera gantries Item @ 12,000 Safety balustrades / handrails 560 m @ 170.00 Roof coverings; roof cladding system to main bowl comprising aluminium standing seam roofing; clear sections and overhangs; complete 15,800 m² @ 70.00 Allowance for canopies Item @ 25,000 Roof drainage: rainwater installations generally 15,800m² @ 7.00			
Stairs	680,000	18.9	92.18%
Aallowance for reinforced insitu concrete stairs and landings with power float finish and non-slip inserts to nosings; rates exclude finishes, balustrades and handrails 1,000 m² @ 250.00 Allowance for precast concrete step units; bolted to precast concrete seating units; forming gangway steps Item @ 30,000 Stair balustrades and handrails 2,000 m @ 200.00			
External walls, windows and doors	1,352,000	37.77	4.33%
Facing quality blockwork cavity wall to external elevations and bowl elevations to box areas 3,100 m² @ 100.00. Aluminium profiled sheet cladding including secondary steelwork & insulation 3,300 m @ 170.00 Extra over sheet claddding for double glazed aluminium framed, facetted cladding sysem to walls; structural mullions 250 m² @ 230.00			

Location Factors

Inner London	1.07
Outer London	1.02
South East	1.00
South West	0.91
East Midlands	0.90
West Midlands	0.93
East Anglia	0.95
Yorkshire & Humberside	0.89
North West	0.91
Northern	0.91
Scotland	0.88
Wales	0.89
Northern Ireland	0.74

	element cost	cost/m² gfa £	% of total cost
Extra over sheet cladding for openable single glazed units in metal frames 250 m² @ 300.00 Glazing and glazed doors to executive boxes; aluminium framed double glazed units 450 m² @ 340.00 Galvanised steel weld mesh; 8m x 4m panels, including support steel 1,700 m² @ 115.00			
Windows and external doors	200,000	5.59	0.64%
Main entrances: single pane laminated glazed screens; doors and ironmongery 30 nr @ 3,500 Escape doors; double escape doors and frames; ironmongery 20 nr @ 3,500 Shutters; allowance for: power operated security shutters Item @ 25,000			
Internal walls and partitions	1,427,000	39.86	4.57%
Insitu concrete walls; 200 mm thick to lift and stair core walls 1,500 m² @ 115.00 Insitu concrete parapets to seating area 700 m² 115.00 Insitu concrete walls; 200 mm thick to vomitories 40 nr @ 3,500.00 Blockwork division walls; average 190mm; including reinforcement and head restraint 15,000 m² @ 50.00 Proprietary vandal resistant metal faced toilet cubicles 300 nr @ 450.00 Allowance for full height glazed screens generally, including screens to hospitality areas and media boxes 150 m² @ 300.00 Front screens and privacy side panels to executive suites/boxes 26 nr @ 4,000			
Internal doors	470,000	13.13	1.51%
Single doors and framesets; fire resisting; ironmongery 200 nr @ 900.00 Double doors and framesets; fire resisting; ironmongery 100 nr @ 1,400 Fire shutters to concession/bar fronts 20 nr @ 6,000 Rolling shutters generally 10 nr @ 3,000			
Wall Finishes	536,500	14.99	1.72%
Render and tiling 4,000 m² @ 60.00 Plaster and paint 14,400 m² @ 10.00 Plaster and decorative coverings 100 m² @ 85.00 Paint finish on concrete or block walls 36,000 m² @ 4.00			
Floor Finishes	439,000	12.26	1.41%
Vinyl sheeting/tiling; levelling screed; skirtings 3,500 m² @ 30.00 Contract grade carpet, levelling screed; skirtings 4,500 m² @ 30.00 Stone/ high quality ceramic tile; levelling screed; skirtings 500 m² @ 110.00 Paint and epoxy finish to concrete slabs; skirtings 16,000 m² @ 6.00 Tiled ceramic flooring, levelling screed; skirtings 800 m² @ 60.00			
Ceiling finishes	465,500	13.00	1.49%
Suspended ceilings; mineral fibre 5,100 m² @ 40.00 Plasterboard ceilings; skim cost and decorations; edge trims 3,300 m² @ 30.00 Spray insulation 16,250 m² @ 10.00			
Furniture and fittings	1,115,000	31.15	3.58%
Padded upholstered seats; fixed units 21,000 nr @ 20.00 Padded upholstered seats; club seats 4,000 nr @ 25.00 Safety rails and barriers; to fixed seating bowl 1,750 m @ 150.00 Allowance for signs; generally 1 Item @ 100,000 Security and crowd control gates; generally 150 m² @ 750.00 Turnstiles 40 nr @ 3,000			
Sanitary appliances	340,000	9.50	1.09%
Sanitary fittings; generally 850 nr @ 400.00			
Disposal installations	413,200	11.54	1.32%
Below slab foul drainage; complete system, including allowance for suspension of services below ground slab (area based on Building Footprint) 10,600 m² @ 25.00 Sanitary fittings; IPS; above ground soil and waste installation to toilets, concession areas, locker rooms etc. (area based on gross internal floor area excluding area of seating tiers) 24,700 m² @ 6.00			

	element cost	cost/m² gfa £	% of total cost
Water Installations	332,000	9.27	1.06%
Water supply; mains connection; booster set; storage tanks Item @ 85,000 Cold water service; distribution to toilets, concessions, etc. 24,700 m² @ 6.00 Hot water services; local electric heating; service to toilets, concessions, boxes, etc 24,700 m² @ 4.00			
Heating with air treatment	1,733,600	48.42	5.56%
Space heating; boilers, flues, pumps; plant room and riser distribution 24,700 m² @ 12.00 Space heating; LTHW heating to public areas generally 10,600 m² @ 20.00 Localised cooling to hospitality areas; DX units Item @ 160,000 Air treatment and ventilation installations; tempered air distribution only; air handling; supply and extract installations 10,600 m² @ 70.00 Extract installations; extract fans and ductwork to kitchens, toilets etc 2,500 m² @ 70.00 Smoke extract Installations: 24,700 m² @ 6.00			
Electrical installations	2,586,500	72.25	8.29%
HV/LV; mains connection; high voltage switchgear; mains switchboard & busbars 24,700m²@9.00 Sub mains distribution; switchboards/distribution boards; mains cabling 24,700 m² @ 5.00 Small power installation 24,700 m² @ 15.00 Power supply to mechanical plant Item @ 50,000 Lighting and luminaires 24,700 m² @ 40.00 Emergency lighting 24,700 m² @ 6.00 Under Roof Lighting 15,800 m² @ 6.00 Seating Bowl Lighting 11,100 m² @ 10.00 Illuminated signs Item @ 50,000 Allowance for external "feature" lighting Item @ 170,000 Containment installations 24,700 m² @ 6.00 Diesel standby generator Item @ 110,000			
Gas Installations	30,000	0.84	0.10%
Gas installation to boilers and kitchen Item @ 30,000			
Lift installations	240,000	6.70	0.77%
13 Person Lifts 2 nr @ 85,000 Goods Lifts 1 nr @ 70,000			
Protective installations	125,000	3.49	0.40%
Hose Reel Installations Item @ 20,000 Dry Riser Installations Item @ 20,000 Lightning protection; earthing installations: Item @ 85,000			
Communications installations	1,013,300	28.30	3.25%
Public address and voice alarm system; complete; main bowl PA 24,700 m² @ 15.00 Fire alarm system 24,700 m² @ 12.00 CCTV / security installations 24,700 m² @ 12.00 Allowance for card access and intruder alarm installations Item @ 50,000			
Special installations	1,397,000	39.02	4.48%
Floodlighting installaton Item @ 300,000 Playing surface; Fully heated pitch with drainage, irrigation, service ducts etc Item @ 850,000 BMS installation complete 24,700 m² @ 10.00			
Builder's work in connection	170,000	4.75	0.55%
Pads, bases, holes, chases, motices, cat ladders, supports, walkways and painting to pipework Item @ 170,000			
Preliminaries and contingencies	4,534,000	126.65	14.53%
Contractor's site establishment and site supervision Allow 8% Item 2,133,000 Allowance for commissioning management Item 50,000 Contractor's overheads and profit allow 3% Item @ 865,000 Contingency sum allow 5% Item 1,486,000			
Total building costs	**31,198,800**	**871.47**	**100%**