UEFA GUIDE TO QUALITY STADIUMS

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UEFA's role as the governing body of European football is to assist and motivate our member associations and help improve standards in all areas, on and off the pitch, in the European football community as a whole.

Stadiums are at the heart of the professional game; they are where the action is played out, where the highs and lows are experienced, where history is made. Top quality stadiums are vital to the comfort, safety and security of the spectators, players, officials, media and staff.

As such, our vision was to develop a comprehensive but accessible step-by-step guide to stadium design and construction that lays out the various processes and many of the issues involved.

Stadium design in Europe is already of a very high standard and a number of excellent quality venues have been developed. This is not only good for the sport but also for the communities in which the stadiums are located.

In this sense, everything that we can do as UEFA to help support, nurture and encourage good and conscientious stadium design and building will be of enormous benefit to football and to local communities.

I wish you all the very best in the pursuit of better stadiums in which to play this wonderful game of football.

Gianni Infantino
UEFA General Secretary

Who should read this guide and why?

This guide is designed to assist anyone who is involved in the commissioning, design or (re)construction of a stadium.

The objective is to provide an easy-to-read set of guidelines covering all of the issues involved in stadium design and construction, from inception through to the opening ceremony.

Associations and clubs wishing to build a stadium often lack the personnel with the relevant skills or experience to undertake a project of this nature. This book is therefore primarily aimed at those who have never before developed a football stadium, or been actively involved in a design and construction project of this size and complexity, seeking to provide them with an insight into exactly what is required.

Although the content is quite extensive, it should not be taken as literal advice. A whole host of factors, many of which are identified in this book, will cause each project to be unique. It does, however, give guidelines based on the experiences of specialists involved in other stadium projects and, importantly, indicates potential pitfalls to be avoided.

The book is structured to show the chronological sequence of events in the process, providing simple and concise recommendations on a comprehensive range of issues, from assembling a project team and choosing an architect, to evaluating design options and resolving legal, financial and technical issues, also understanding all stadium facilities and finally selecting a contractor and managing the works up to the opening day ceremony. The book ends up with case studies of different sized successful European stadiums.

Our objective is to improve the quality of both new and existing stadiums in Europe, not only in terms of functionality and design, but also in the way that they contribute to their communities.

The glossary at the end provides definitions and further explanations on the various topics covered in this book, and a bibliography has also been included for those seeking further reading and more detailed information on specific topics.

Mark Fenwick
RFA Fenwick Iribarren Architects

Guide to Quality Stadiums working group

Mark Fenwick (Senior Partner Fenwick Iribarren Architects), Trygve Bornø (Member of the UEFA Stadium and Security Committee), Thierry Favre (Head of National Associations Development, UEFA Administration), Joan Tusell (Senior Partner, Tusell Arquitectura)

The stadium: from its origins to the present day

Stadium origins

The word “stadium” originates from the town of Olympia in Ancient Greece. The Olympians used to run a race over a distance of 192m, which in Greece was a unit of measurement called a “stadium”, which in turn gave its name to the venue.

The stadium at Olympia featured seating in the form of earth embankments, as well as a “VIP” section, comprising stone seats for local dignitaries.

The architects of Ancient Greece and, subsequently, Ancient Rome were adept at designing theatres tailored to meet the needs of large numbers of spectators. These structures provided the inspiration for a new type of sports arena – the amphitheatre – many examples of which can still be found to this day.

The stadium involved the juxtaposition of two semicircular theatres to produce a venue where the spectator area completely surrounded the “stage”, creating what was, in effect, a stadium bowl. The Coliseum in Rome, which dates back to 70AD and is one of the most iconic sporting venues in the world, provides an excellent example of the bowl concept. Not only was it an exceptional building for its time; it remains in use today, and surprisingly little has been changed from the original design.

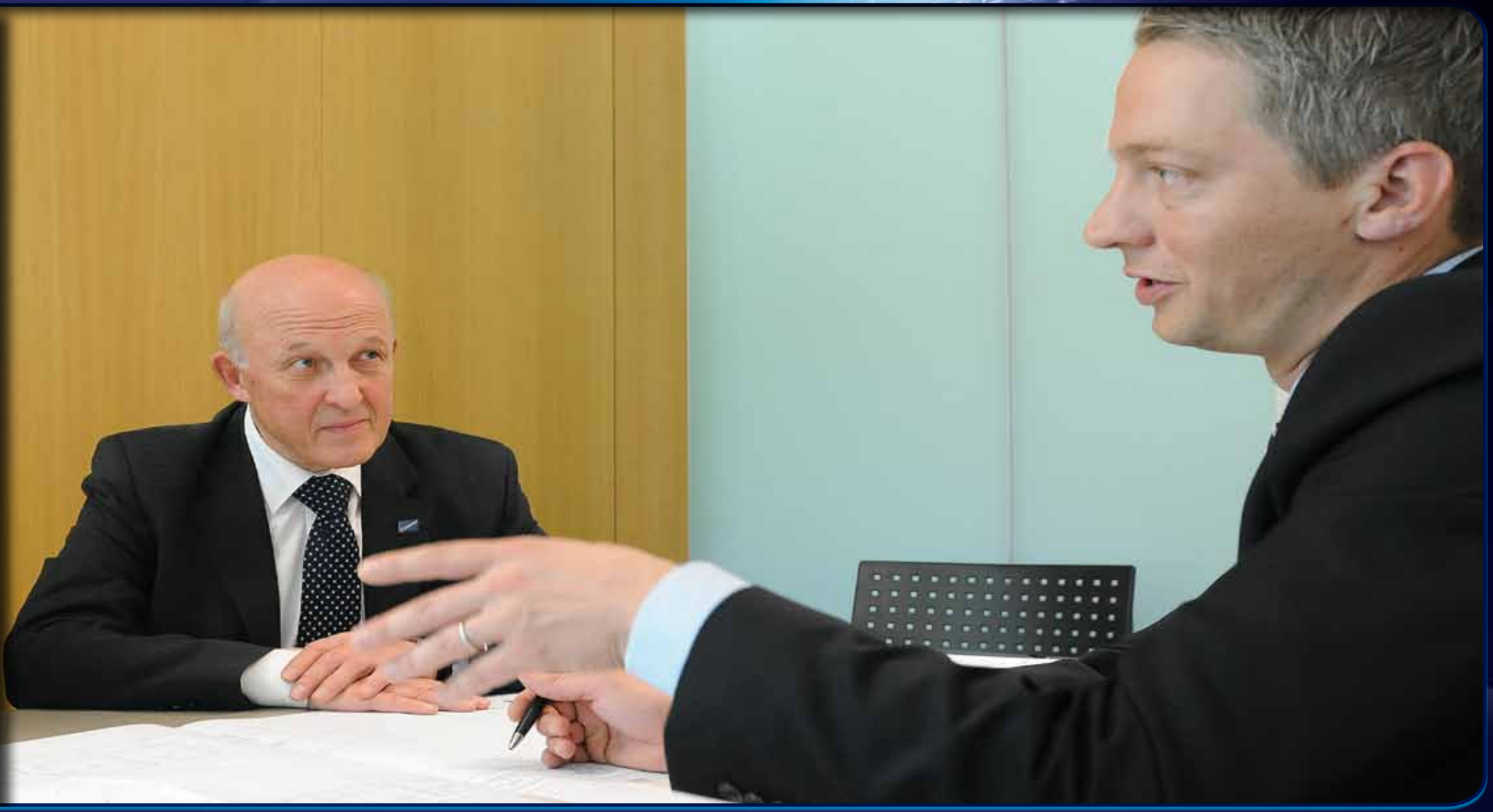
Modern stadium design

Since the days of Ancient Greece and Rome, the stadium concept has developed considerably, however, to reflect the specific requirements of a wide variety of sporting disciplines. In the last few decades alone there have been radical changes in the approach to stadium projects. Whereas 30 years ago, football stadiums were often designed to be used for other sports too (e.g. athletics), the emphasis in modern-day design is on the specific needs of the game. In the past, many football stadiums were built with running tracks around the perimeter of the pitch, for example. This does not make for a good match atmosphere, as it reduces the “cauldron” effect. The stadium structure should hug the pitch in order to maximise this cauldron effect without, of course, compromising the safety of the players and coaching staff, match officials or spectators.

This book sets out to explore every aspect of modern stadium design and construction. Here are some of the key themes and considerations that stadium developers in the 21st century need to be aware of:

- Stadium design should focus on the need to create people-friendly structures which provide maximum levels of comfort and safety.
- Increasingly, football stadiums are regarded as architectural icons within the urban landscape that have a massive impact on the surrounding communities and infrastructure.
- Impressive venues can be built on relatively limited budgets, meaning that even smaller clubs are able to make a bold design statement.
- Stadiums should aim to serve the community at large, and should be designed as family-friendly destinations, both for football matches and other events.
- Stadiums should be developed to maximise their commercial potential, by incorporating a broad range of facilities and usages.
- Stadium design should incorporate the latest technological advances in order to offer the best possible facilities to a match-going public that expects more and more from the matchday experience.

A THE PROCUREMENT STRATEGY



A:1

The stadium developer

Understanding the nature and needs of the stadium developer

By “stadium developer” we mean the organisation that is responsible for commissioning the stadium project. This might be a club or other private body (e.g. investor or sponsor), the national association, a local authority or even the national government.

The stadium developer needs to understand its own requirements, objectives and priorities. These may vary, depending on whether the venue is wholly publicly owned (e.g. a national stadium) or privately owned (e.g. by a club), in which case commercial considerations have greater prominence. Achieving the correct balance between sporting and commercial objectives is something that requires careful and thorough analysis.

The construction of a new stadium is, without doubt, one of the most important moments in the life of any club or national association. In the case of the latter, it is, quite literally, an event of national significance.

The decisions taken at the beginning of any project are vital for its future success. Great care should be taken when allocating specific roles and responsibilities. It is paramount that everyone involved should fully understand the needs, objectives and limitations. The selection of specialist consultants and contractors must be carefully managed to ensure that every stage of the project is implemented to the highest possible standards, on time and within budget.

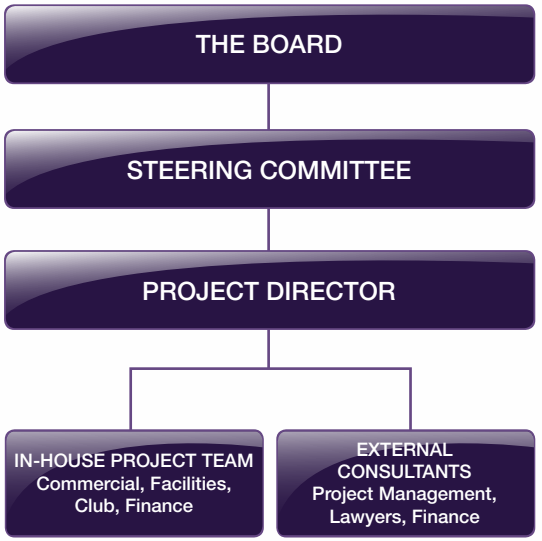
Each stadium is its own special case. In addition to a specific set of current and future needs, each is defined by its own unique history, its traditions, and the community it represents. All of these considerations are key to the design process.

Key personnel

It is recommended that, at the outset, a project director is appointed, who can take overall responsibility for guiding the project from inception through to completion. The project director should be someone in whom the stadium developer has total confidence and is willing to entrust authority and power to act on its behalf throughout the project cycle. They should also be capable of managing a large number of internal staff, as well as consultants and contractors. A steering committee may be established to monitor and approve the decisions of the project director.

Other key appointments are likely to be a finance director and commercial director, who, between them, can oversee stadium expenditure and budget, and income generation from core activities (e.g. ticket sales and merchandising) and other revenue-generating initiatives (e.g. sponsorship deals and venue hire).

Depending on the organisational and operational structure, a stadium manager (or facilities manager in the case of smaller venues) may also be needed to oversee facilities, operations and maintenance.



Stadium Project Organisation

Once a core personnel team has been assembled, and their roles and responsibilities clearly defined, the next task is to appoint external consultants (e.g. architects, engineers and legal and financial specialists) and, subsequently, the various building contractors.

The diagram above shows a possible organisational structure.

A:2

Key objectives

Defining the objectives

It is important to have a clear rationale for a stadium upgrade or construction project. Clear justifications should be provided before embarking on what is certain to be a complex and financially onerous adventure, and one that can take several years.

The reasons can vary widely. It may be that there is a recognised benefit to be derived from increasing capacity, there may be a need to improve comfort and safety levels, new facilities may be required to generate additional revenue, or it may simply be a case of providing the venue with a much needed facelift.

Central to the success of any new stadium or stadium upgrade will be the creation of a revenue generation model that means the venue's feasibility is not dependent on the team's fortune's on the pitch.

At the end of this guide we have included a series of case studies that demonstrate how every stadium project needs to be tailored to reflect a very specific set of objectives.

The starting point

There are several key questions that anyone embarking on a new stadium project needs to ask themselves. First of all, certain basic parameters need to be established. How big does the stadium have to be? What is the available budget? And what are the overall time frame and key milestones for the project?

What do we want?

This emotive question tends to be the starting point for any plans for a new stadium. The focus on the dream venue can sometimes give rise to unrealistic targets. However, it can also be a healthy way to kick-start the process, as it helps to fuel the enthusiasm of the project team. But the focus will soon need to shift to a more analytical and pragmatic discussion, which is driven by the next question...

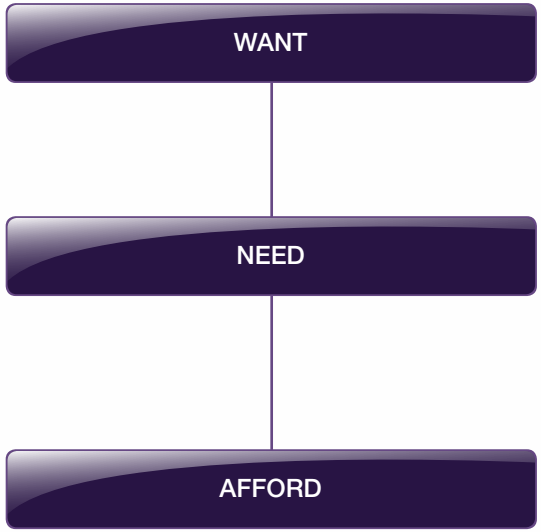
What do we need?

This question helps to identify actual requirements and define the parameters of what is feasible. The stadium developer, in consultation with other stakeholders, needs to agree a definitive set of objectives. This may be significantly influenced by a third question...

What can we afford?

A sober analysis of available finances will enable a realistic budget to be defined and help ensure the viability of any future projects. Without this, the dream can soon turn into a nightmare. There are many examples of stadium projects that, due to a variety of factors, have sent clubs into financial meltdown, leaving them in dire straits for years to come, or even forcing them out of business altogether.

In summary, a balance needs to be established between the dream, the needs and the financial reality. If this is achieved from the outset, a successful outcome is much more likely.



Refurbish or start over?

The answer to this key question will determine the framework for a series of more detailed decisions made later during the project cycle.

A club or national association may feel that their existing stadium is too small, or that it has become outdated or dilapidated.

In certain cases, extending an existing venue to increase capacity is a more financially viable option than a new build. However, refurbishments can still be expensive, and it may be preferable to either demolish the existing stadium and redevelop the site, or go for a new build elsewhere. Relocating to a new site may also be made necessary by physical restrictions that prevent expansion of the existing venue.

The decision will depend on a huge number of variables and project-specific considerations. While it would be wrong to suggest that one option is better than the other, a new stadium generally offers the advantage of not being constrained by outdated bowl configurations, and has the flexibility to facilitate functions and activities that can make the venture more economically viable.

In the case of refurbishment, the objective should be full or partial renovation to a standard that will make the stadium a viable venue for many years to come. Clubs/national associations may opt for refurbishment because they do not have the financial resources to purchase a new site and build a brand new stadium. In this case, a strategy determining the design and cost implications of all future upgrades is needed. This is defined within a document known as the master plan.

Relocation to a new site and stadium may be motivated by the opportunity to exploit the prime real estate value of the current site. If the stadium developer has political backing and a good business plan in place, it may be possible to identify an alternative site, for example on the outskirts of town or in the suburbs. This will allow the existing site to be redeveloped for either commercial or residential use. Hence, there is a growing trend for clubs to move from high-value city-centre locations to new venues on the outskirts of towns and cities. The decision to relocate may also be driven by the local authorities, who might wish to free up the current site for alternative use, or to use a new stadium project as the catalyst for urban regeneration.

Defining the process

Generally speaking, four core documents will provide a comprehensive picture of the financial and strategic scope of the project: the business plan, the financial viability study, the cost plan and, finally, the operational plan. In brief:

- The business plan defines the elements required to make the stadium commercially viable and how much they will cost.
- The financial viability study defines a financing framework to achieve the objectives set out in the business plan.
- The cost plan itemises and quantifies the total expenditure for the project.
- The operational plan establishes a time frame and milestones for the design, construction and running of the stadium, based on the financial realities defined in the business plan and viability study.

A:3

The business plan

The business plan establishes the financial viability of a stadium development project and sets out the anticipated sources of revenue. As with other core documents, its precise form and scope will vary, largely depending on the legal status of the stadium owner, who may be a public body such as a national association or local government authority, or a private concern such as a football club.

Before the business plan is compiled, a feasibility study should be carried out. This key exercise will provide the stadium developer with an initial evaluation of the project's technical and financial viability, and thus will help to clarify and influence the subsequent business strategy.

It may make economic sense for the stadium to be shared by two different clubs, like the San Siro in Milan (FC Internazionale Milano and AC Milan) for example, or even with a club from a different sport such as rugby, like in the case of the Madejski Stadium in England, which is shared by Reading FC and London Irish rugby club. Groundsharing – either through shared ownership or an owner/tenant arrangement – offers the advantage of sharing the burden of capital or running costs. In either case, it is preferable to define any plans for a groundshare from the outset, rather than to incorporate them at a later stage, as it could have a major impact on the viability of the stadium project.

Another important consideration is whether the stadium will be solely used for football, or if other sports or commercial events will be staged to increase revenues.

The development of the business plan, which will require input from legal and commercial specialists among others, should include a thorough analysis of the available commercial opportunities and alternative revenue streams. This analysis will be based on the stadium's location and the proposed budget, and should focus on those areas that offer transparent and sustainable revenue-generating initiatives. A strong commercial strategy will both strengthen the overall financial position of the stadium developer and increase the likelihood that the stadium can become self-financing.

A key decision at this stage is the choice of UEFA stadium category. UEFA currently classifies stadiums in four categories, according to the level and type of competition to be staged, each of which requires that a specific set of standards and regulations be respected and certain structural and design criteria satisfied.

It is important for the stadium developer and the management and design teams to be fully familiar with the latest UEFA regulations and to understand the different requirements and implications of the stadium classification system, so that a realistic objective can be set for the scope and level of UEFA competitions to be held at the stadium. The range, number and size of stadium facilities will depend on the competition category and the corresponding regulations.

Further provision will also need to be made for temporary arrangements required for a UEFA competition, referred to as "event overlay", covering specific competition requirements such as security zones, broadcast compounds, hospitality enclosures and additional parking within the stadium site and, if necessary, the immediate vicinity.

A:4

The financial viability plan

Sources of revenue

Serious consideration needs to be given to the concept of the stadium as a day-to-day revenue generator. In this context, it may make sense to structure the stadium as a stand-alone financial entity, separate from the actual football club or national association.

Complementary activities that will generate additional revenue should be identified, such as concerts, conferences and corporate events, but the cost implications of configuring the venue for this kind of multifunctional usage need to be clearly defined and evaluated. Moreover, market research should be undertaken to establish the feasibility of any commercial opportunities and to allow all options to be properly evaluated.

Sources of potential revenue include:

- Sale of match tickets and season tickets;
- Sale of VIP seats and hospitality packages;
- Sale of skyboxes;
- Revenue from TV and other media;
- Retail outlets and merchandising;
- Museum and stadium tour packages;
- Advertising and corporate event packages;
- Rental of concessions and retail units;
- Special events (concerts, conferences, etc.);
- Catering (restaurants, concessions, special occasions, etc.);
- Car parking.

Sources of financial support

Opportunities to bring on board external partners to participate in the development of the stadium need to be explored. Such partnerships may be forged through equity investment or fixed-term contractual agreements with media organisations, local authorities or sponsors.

Intelligent and creative marketing can produce very successful results in terms of identifying and securing innovative and lucrative commercial partnerships. The range of opportunities available to each stadium vary widely, depending on a number of different factors, not least location.

Funding for the stadium may be secured from the public sector, in the form of grants and subsidies, or from the private sector, as many companies and businesses view the chance to associate themselves with a football club or national association as an extremely attractive proposition.

EXAMPLES OF FUNDING OPPORTUNITIES

- Private and public investors
- Commercial loans/contractor financing
- Government aid, grants and subsidies
- Stadium naming rights and sponsorship packages
- Long-term commercial arrangements (sale of boxes, seats, car parking, etc.)
- Green energy revenue/subsidies

A:5

The cost plan

The cost plan is a fundamental component of any business plan. It provides an extensive and detailed analysis of all of the possible expenditure that will be required over the entire project, including construction, professional, legal, financing and licensing costs.

The cost plan also includes projected running costs for the stadium once it has been completed, quantifying outgoings such as salaries, maintenance and utilities. It should also incorporate any anticipated future income and revenue streams that will be used to offset these outlays.

It is important to ensure that the actual costs do not deviate from the estimates established in the business plan. Most clubs, particularly smaller ones, cannot afford to go over budget.

The main areas of expenditure to be included in a cost plan are:

- Site acquisition
- Professional and design fees
- Construction costs
- Licence costs
- Legal fees
- Advertising and marketing
- Running costs
- Sustainability costs
- Financing
- Insurance premiums
- Reports and ground surveys
- Internal expenses

A:6

The operational plan

The operational plan establishes the different works and activities that need to be undertaken. It also elaborates a time frame for the completion of the stadium. The operational plan could be implemented as a single phase or staggered over a number of stages, possibly spread over a period of years. Staggered phasing may be required for a number of reasons, including funding and land, which may not always be available immediately, or at least not in full.

The operational plan should answer the following key questions:

- Where are we now?
- Where do we want to go?
- How do we achieve our goals?
- How do we monitor our progress?

More specifically, a good operational plan should incorporate the following:

- Objectives
- Expectations
- Activities
- Quality standards
- Staffing and resource requirements
- Time frames and milestones
- Monitoring procedures

A:7

The stadium project

Once you know what you can afford, and how and when the project is to be implemented, you can then start to determine the characteristics of the stadium and how it will be built. These are defined in four further documents, generally known as the stadium brief (or schedule of areas), the design programme, the building budget and the construction programme. Collectively, these four documents will determine the operational guidelines for the stadium developer, consultants and contractors.

- The stadium brief sets out in detail every aspect of the stadium's functionality.
- The design programme establishes the time frame required to design the stadium and secure the necessary licences.
- The building budget quantifies the actual cost of the construction process.
- The construction programme establishes the time frame required to build the stadium.

The stadium brief

Once the business plan and initial cost plan have been formulated, a detailed stadium brief can be developed, which sets out all of the requirements, specifications and dimensions, including a detailed surface area plan for each section of the stadium.

The brief, which becomes the primary design document for the stadium, marries a concrete set of objectives as defined by the client with a realistic set of financial capabilities.

It determines the size and capacity of the stadium, the type and scale of sports facilities, spectator facilities and amenities, the size of the various commercial areas, etc. It also covers aspects such as stadium access and car parking facilities.

The brief should be flexible enough to respond to constant re-evaluation throughout the process. However, any proposed changes to the brief need to respect the budget established within the cost and business plans.

CONTENTS OF THE STADIUM BRIEF

- Stadium capacity
- Access and egress
- Specific access requirements and facilities for disabled people
- Media facilities
- VIP and hospitality areas
- Shops and other commercial facilities
- Support facilities (e.g. storage, operations and maintenance facilities, catering facilities, storage areas, loading areas, technical installations)
- Medical and first aid facilities
- Security and emergency service provisions
- Marketing and advertising
- Hiring out of the stadium for corporate use
- Food and beverage concessions
- Pitch and other sports facilities
- Parking (for VIPs, players, match officials and delegates)
- Player facilities (e.g. dressing rooms)
- Toilets
- External public parking areas

A:8

The master plan

Optimal stadium capacity

Capacity is, of course, one of the primary considerations for any stadium design project. The stadium needs to be big enough to accommodate all those fans who wish to attend matches, yet not so big that there are lots of empty seats, as this will detract from the visual impact and overall atmosphere.

Conversely, the atmosphere will be at its best when the stadium is full to capacity and buzzing. It is therefore very important that projected average attendances are correctly gauged when determining the capacity.

There is no set formula for determining the optimal capacity. This will depend on a variety of factors, including the status and popularity of the club/national team, the location, and any plans for alternative uses of the venue.

Establishing the correct mix of commercial and leisure facilities available to fans on matchdays is of paramount importance. A well-designed and well-equipped stadium is likely to encourage larger numbers of spectators.

UEFA and FIFA stipulate minimum capacities for their various events; these will need to be taken into consideration if there are any expectations that the new stadium may be chosen as a host venue for international tournaments or matches.

The master plan defines any new requirements that need to be fulfilled in the stadium and the surrounding area in order to fully comply with present and future needs. In an existing venue, this may include increasing the number of seats, building new stands, adding a roof or creating new facilities such as commercial areas, new VIP zones or skyboxes that will increase future revenues.

The master plan may also incorporate improvements to player facilities (e.g. dressing rooms), vehicle access, car parking and general accessibility to the stadium. Another common component of stadium modern stadium design is the incorporation of enhanced media and broadcasting facilities, which are now an integral part of modern sport.

The master plan facilitates a holistic and coordinated approach to stadium development that helps to eliminate the potential for conflicts during the different project phases. For example, when planning to install or upgrade floodlighting, it is important to ensure that such plans do not conflict with other work, and vice versa.

A professional cost controller can correctly assess the cost of every element within the proposed master plan. Once these costs have been confirmed, the club/association must then prioritise its needs and develop a phase by phase schedule for completion of the work.

The master plan therefore enables different aspects of the project to be implemented in a logical and structured manner, in the knowledge that everything is adequately coordinated and within the budget.

The sequencing and content of the phases within a master plan may be determined by the funding available or by other factors such as logistical or political considerations.

A:9

Project timescale

All those involved in a stadium project need to be aware of the significant timescales involved. Even when following a fast-track process, all of the relevant procedures need to be carefully organised. At the earliest stage possible, a project programme needs to be established, in which all key target dates and milestones are specified, from the first appointments of key personnel and board meetings up to and including the official opening of the stadium.

To ensure optimal results from consultants and contractors, it is important to have a clearly defined and comprehensive organisational structure, in which each individual/body has a specific role that has been approved and is understood by everyone else involved.

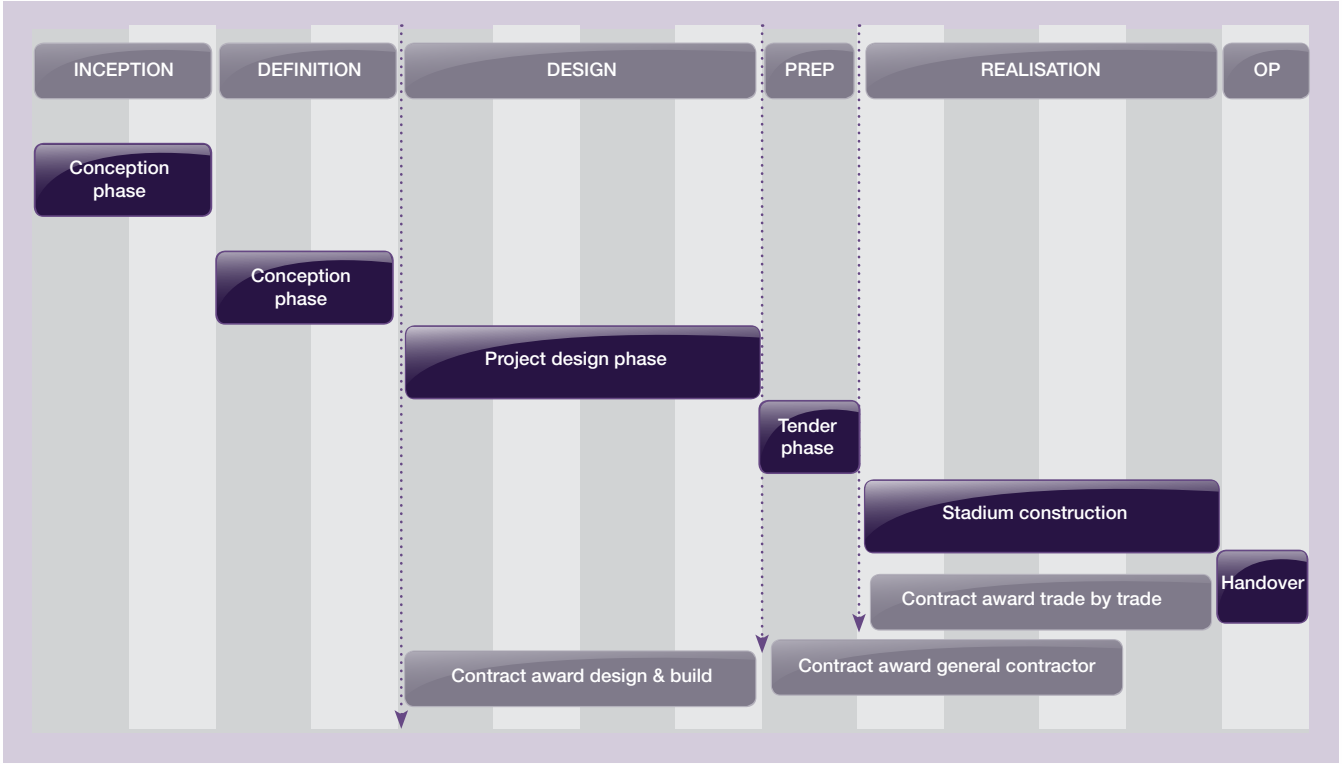
The project then needs to strictly adhere to a well-planned and rigorously monitored schedule. Failure to keep to this schedule can cause unforeseen or unwanted delays which, in turn, can lead to a rapid escalation of costs. All the timescales provided in this model project schedule are indicative and will vary depending on the scale, nature and location of the specific project.

Inception phase – six months

During this stage, the initial ideas and concepts for the proposed venue are developed. Possible locations are identified and the necessary feasibility studies are commissioned. The key personnel, advisers and specialists (technical, legal, financial, etc.) should be appointed to oversee different aspects of the process and a clear and

Project phasing

Scheduling procurement



concise financing strategy must be put in place. By this stage, all of the issues covered in sections A.2 to A.8 need to have been discussed and agreed – at least in outline – with a view to establishing as rigid and clear a direction as possible for the next phase.

Project concept phase – 6 months

During this stage, the stadium developer needs to prepare the core documents that define in detail the project brief and the cost plan/budget, and address other key areas such as the construction process and urban planning issues. The architect and other specialist consultants need to be commissioned to produce a design concept based on these core documents and parameters. By this stage, the stadium developer will have identified and acquired the site and should have established a positive and fluid dialogue with the local authorities and community to ensure smooth development of the site.

Project design phase – 12 months

Adequate time must be devoted to developing the building design in detail to ensure that it adheres to both the required standards and the established budget. During this phase, the project will also be reviewed by the local authorities. Licence applications need to be approved before construction work can start, and this can be a time-consuming process. If separate tender packages and/or construction phases are to be implemented, these need to be clearly defined and coordinated prior to the tender process and the subsequent construction phase.

Tender phase – 3 months

Prior to this phase, the stadium developer, together with their team of consultants and advisers, may undertake initial investigations and a possible pre-selection process in order to identify the most suitable contractors. This process may be conducted at a local, national or even international level. Once the full scope and details of the project have been established and approved by the client and the relevant construction licences have been secured, the invitations to tender can be issued. The submitted tender bids will then need to be analysed, and subsequent negotiations and/or conditions will need to be conducted/agreed with the preferred contractors with a view to finalising the construction costs and the completion date. At the end of this phase, a main contractor will be chosen so that construction can commence.

Stadium construction – 24 months

The time frame for the construction works (from the enabling works, general construction and commissioning to final completion) will depend in large measure on the size and complexity of the stadium. During this phase of the project, all of the necessary safety certificates and occupation licences, together with the relevant building permits, must be secured to ensure that the completed building is fit for purpose and can be fully occupied in accordance with the local building regulations and other legal requirements.

Stadium handover – 3 months

Prior to handover from the contractor to the stadium developer, the stadium architects and engineers will have carried out a large part of the building snagging, enabling the contractor to implement the necessary correctional work. Once the stadium has been handed over, the stadium management team will need time to adapt and fine-tune services and installations. Utilities (e.g. electricity, water, etc.) will need to be procured and connected and special permits and licences will need to be obtained for certain facilities and services (e.g. catering, retail and other public facilities), which will need to pass the relevant safety checks. The commissioning and testing of access and security controls will need to be carried out and all regulatory provisions complied with.

The test game(s)

Before the final handover and official inauguration of the stadium it is advisable to organise one or more friendly matches, in order to highlight and address any possible problems. The initial test game should be a low-key event with a limited number of spectators admitted.

Post-handover – 6 months

Following the formal handover by the contractor, there is an important period in which the venue management have to test out all of the stadium services and installations. This is an opportunity to see the stadium in full operation and to ascertain whether any further work needs to be undertaken to ensure the correct functioning of facilities.

A:10

Personnel and consultants

It is essential to hire a number of highly qualified specialists to help successfully navigate through what is a very complex process. The stadium developer will need to recruit experts from a broad range of specialist areas. These are described in more detail below. The selection process for these specialist personnel and consultants needs to be rigorous, as they will be responsible for major decisions that will help determine the success of the project and may prove difficult to reverse at a later date.

Key appointments

Stadium management team

The stadium management team should be put in place at the earliest opportunity, and no later than the start of the design phase. The stadium manager should have a very specific set of skills, including extensive experience and knowledge of safety and security issues, as well as a clear understanding of all the operations involved in event management. This role may be subcontracted to a specialist company with the necessary experience and resources to manage complex buildings.

Commercial management team

The commercial and marketing functions can either be allocated within the stadium developer's in-house team or outsourced to consultants or a specialist marketing company. Football clubs have traditionally had little or no experience in the commercial sphere, and they are not always best placed to fully exploit the value of their own assets. Even where the club has an in-house commercial department, it may need additional input from specialist consultants who can help devise packages that are tailored to the target market.

The commercial management team will have the task of defining measures to exploit and maximise the commercial potential of the venue. They will need to liaise with the architects, so that the design measures needed to achieve the desired commercial objectives can be incorporated.

Legal team

Any stadium project will involve complex legal issues, from site acquisition and land/building registration to the preparation of contracts for consultants and contractors. It is important to have a very strong legal team on board from the very outset, to ensure that the project strategy is conceived and implemented in accordance with current legislation and regulations.

Consultants

A stadium project involves a wide variety of different specialist design and consultancy disciplines. These can either be contracted out directly and individually by the stadium developer, or they can be grouped together and outsourced to a single company or consortium, which can then subcontract and coordinate the work allocated. Broadly speaking, the stadium consultants can be divided

into two categories: **lead consultants and secondary consultants.**

Lead consultants

Architects

The architects are arguably the most important of all of the consultants, and are commonly referred to as the lead consultants. As the de facto project leaders, they are responsible for coordinating the efforts of all the other design consultants throughout the different stages of the project. The architects have ultimate responsibility for implementing the client's project brief and cost plan, with a view to developing the best possible design project for the new stadium. They are also in charge of obtaining the main building licences from the local authorities.

Architectural designs for football stadiums have advanced enormously in recent years. In the past, stadiums were characterised primarily as feats of engineering with less emphasis on architectural finesse. Today, football stadium architects strive increasingly to produce structures that are not just functionally sophisticated but aesthetically striking.

The choice of architect and stadium design are decisions that will affect not just the club/association, but also the community and town or city in which the stadium is located. A football stadium will invariably dominate the local landscape, so it is extremely important that it should complement and help revitalise its surroundings, and not be regarded as an eyesore.

Urban planning consultants

Many projects will require the services of urban planning specialists to help ensure that all of the stadium planning requirements are correctly addressed and to satisfy the local authorities' criteria and legal requirements. These consultants will play a vital part in sensitive negotiations with the various local government bodies and departments (e.g. urban planning, highways, environmental, conservation, etc.) which will need to take place before planning approval is secured.

Project managers

The primary function of the project manager is to complement and support the in-house teams, working under the direction of the project director. The scope of the project manager's role can vary. Where a club has insufficient internal resources, the project manager may be placed in complete control of the project on behalf of the client. Alternatively, they may be given responsibility for specific aspects of the project, working in conjunction with specific club/national association departments. For example, they may be required to liaise with the external design consultants and/or oversee the contractors during the construction process.

Engineers: structural, civil, mechanical, electrical, plumbing

The different engineering specialists may be appointed directly and independently by the client. However, given the complex and technical nature of their specific roles within the design and construction process, it is generally recommended that they be selected by the project architect. The latter will interact closely with them to ensure that their roles and responsibilities are fully coordinated, and that their work is in harmony with the overall design objectives and solutions. The engineers will also have a key role to play in securing the infrastructure services and utilities required for the stadium.

Cost consultants

The need for a cost consultant will depend on the scale and complexity of the project, and also on the consultancy practices employed in the country in question. In many cases, the principle architects, engineers and/or project managers may have the necessary personnel within their ranks to monitor and advise on the all-important issue of cost control, in order to ensure adherence to the project cost plan and budget. For larger, more complex projects, a specialist cost consultant may be required to work closely with the other principle consultants throughout the design and construction process.

Secondary consultants

Geotechnical engineers

Geotechnical engineers are required to analyse the soil and ground-bearing conditions. A geotechnical survey should ideally be commissioned before the site is purchased, as poor soil conditions (due, for example, to contamination or landfill) will require remedial work that can have a considerable impact on the acquisition and development costs of a particular site, and this may threaten the financial viability of a project.

Land surveyors

Land surveyors are required to carry out a topographic survey of the site. This survey will provide a detailed analysis of the existing site conditions, including the site levels (contours) and boundaries, together with all of its salient features such as any walls, fences, trees and utilities within or crossing the site. The survey should also include areas adjacent to the site, which should in fact be taken into account throughout the design process. A topographic survey is one of the key documents at the inception stage of the project, as it defines all of the elements that have to be respected or, if necessary, rerouted (existing services, paths, etc.).

Landscape consultants

The open spaces around the stadium need to be developed to create attractive, welcoming and, above all, functional external areas for the large volumes of public who will be approaching and circulating around the stadium complex. These areas are often designed by specialist landscape architects, who are skilled in maximising the use of the space to create the desired effect by striking a balance between soft features (trees, plants, etc.) and hard features (paved areas, etc.), together with additional elements such as water features and sculptures.

Fire safety specialists

It is essential that the stadium complies with all national and international fire regulations. Specialist fire consultants are required to liaise with the other consultants in order to implement all of the active (e.g. fire hoses, sprinklers) and passive (e.g. fire retardant walls and doors) fire prevention and safety measures.

Security consultants

Security and safety are paramount requirements in any stadium design. Specialist consultants are required to advise on all of the different aspects and scenarios affecting the security of the different users such as access, differentiation of security zones, segregation of rival fans etc.

Access consultants

All public areas and amenities within the stadium should be fully accessible to spectators with disabilities. An access consultant will be able to give advice on all matters related to disability access to help facilitate inclusive stadium design and the UEFA-CAFE publication Access for All provides valuable good practice guidance.

Pitch consultants

The pitch is, of course, the heart of the stadium. The better the pitch, the better the quality of the football. As well as ensuring optimum conditions for the installation of the turf, pitch consultants can also advise on the best equipment

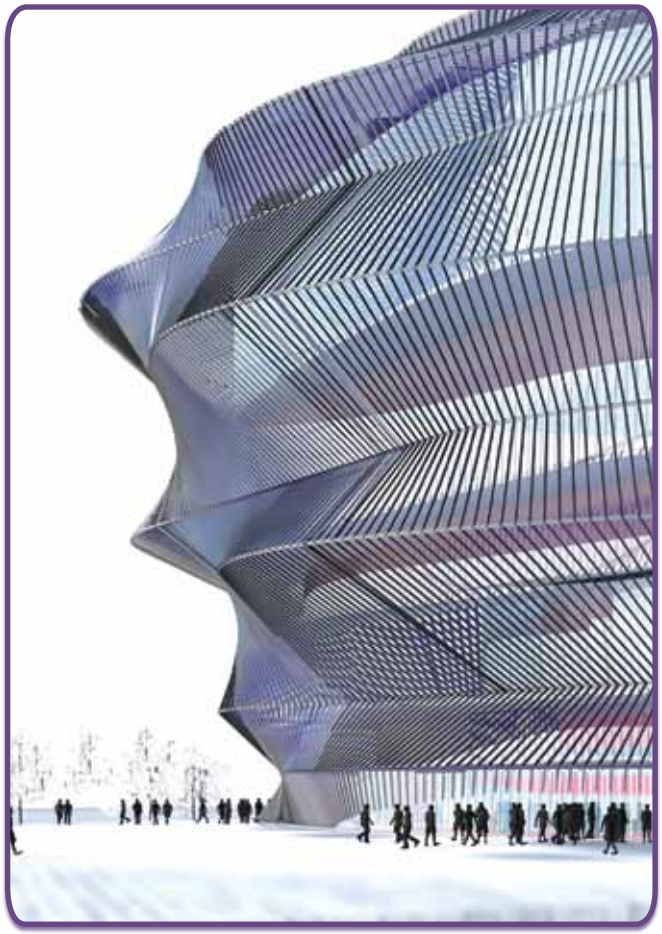
and installations for ongoing maintenance, such as artificial lights and mechanical ventilation.

Lighting consultants

Specialist lighting consultants are required to design and certify the floodlighting. This is a complex and sensitive process, as stadium lighting needs to be configured in such a way that the entire playing surface is evenly lit, with no sections in shadow, and it must also provide lighting levels that meet TV broadcasting requirements. Many modern stadiums may also incorporate special effects within the lighting system, which is another highly specialised area. Take, for example, the Fußball Arena München, whose facade changes colour depending on whether FC Bayern München or TSV 1860 München are at home, or the blue backlit glass facade of the new Estadi Cornellá El-Prat in Barcelona, which reflects the home colours of RCD Espanyol.

Acoustic consultants

A detailed acoustic assessment is essential to ensure that the stadium design is configured with optimal sound dynamics, for the sake of both the atmosphere within the venue and its impact on surrounding areas. The latter is a particularly important consideration for venues in urban settings.



Wind tunnel test engineers

Wind tunnel tests using scale models can help optimise the stadium's structural design and consequently reduce construction costs. These tests analyse the impact of any specific wind conditions on the design of the stadium and allow the engineers to adopt the structural solution best suited to the specific conditions, instead of relying on the more onerous theoretical parameters set out in standard building regulations. Wind tunnel tests are relatively inexpensive and can enable the stadium developer to make significant savings on structural costs.

CFD consultants

Computational fluid dynamics (CFD) consultants can be appointed to conduct a predictive analysis of air flow and temperature levels throughout the stadium. Air flow and temperature patterns can have an impact on overall comfort levels for the spectators and have a bearing on the design of the stadium roof.

Catering consultants

It is extremely important to define the catering needs for a new venue. Catering consultants can address key questions such as how food and beverages will be delivered, stored, distributed and sold within the different areas of the stadium. They can also help identify the specific requirements for the VIP areas, restaurants and concessions, and can make recommendations on

maximising revenue from catering, both on matchdays and during other events and activities.

Cleaning consultants

Stadium cleaning is a major and complex operation. From cleaning the stadium facade and floors to organising the post-match clear-up operation, well-defined strategies and procedures are essential. The correct choice of cleaning materials is also important, as these can play a crucial part in ensuring the longevity of the building.

Waste management consultants

Waste management consultants will seek to identify the correct management policies for the large volumes of waste created within a stadium, defining suitable storage and treatment procedures for both organic and non-organic waste, as well as proposing good practice and sustainable methods for recycling.

Key criteria for selecting consultants

When selecting consultants, whether by means of direct appointments or competitive tendering, it is important to ensure that they are fully in tune with the client's values and objectives, since a close interdependent working relationship will need to be forged over a period of three to five years.

Specific stadium experience

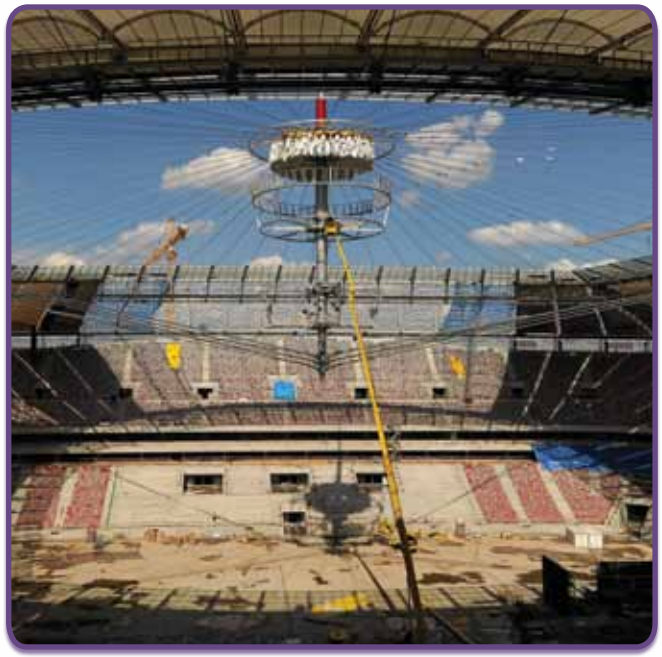
It is important that the consultants chosen have solid experience in stadium-related projects. While there are examples of great venues that have been designed by architects with no previous stadium experience, this is a highly specialised field, so it is generally advisable to opt for those with proven stadium-specific credentials. Where possible, it is a sensible idea to talk to other clubs/associations that have undertaken new stadium projects about their experiences, positive and negative, with various consultants.

Understanding stadium costs

Prospective consultants should also be able to demonstrate a good track record when it comes to cost control. It is advisable to review previous projects that they have been involved in, and to examine closely how the budgets for these projects were managed. There are frequent examples of European stadiums that have gone way over their initial budget and, in many instances, this has led to the financial demise of the club that commissioned the project.

Vetting the project team

It is important to interview key personnel in order to establish whether they will be able to forge a positive working relationship with other members of the project team. This is particularly important when contracting



any aspect of the project work to a large company. While the company may have proven credentials in the field of stadium design/construction, it is not necessarily the case that they will automatically use those staff members who offer the best or most relevant experience. It is essential to insist that they do. Stadium projects are complex, and it is of paramount importance that all the individuals involved have the right levels of experience.

Appointing the consultants

There are a number of different selection routes that can be adopted when appointing specialist consultants. In this section, we provide an outline of the three main options.

Design competition

A design competition can target different types of consultant, depending on the range of services the stadium developer is seeking. These categories can be broadly defined as follows:

- Individual consultants, e.g. architects;
- Team of consultants that embrace a broader range of disciplines;
- Fully integrated design-and-build packages in which the designers and construction contractor are appointed under a single "umbrella" operation.

The design competition is one of the most popular options as it not only allows the client to evaluate the consultant's abilities at first hand, but also provides them with a ready-made selection of design options from which to choose and develop the actual stadium project. The competition can be based on a clearly defined set of requirements and objectives stipulated by the client or, alternatively, on a more open-ended brief that allows the consultants to use their skill and judgement to come up with the best solution. A design competition may adopt one of two formats:

Open invitation

In this format, the stadium developer issues an open invitation to consultants to register their interest and submit their design proposals. The field is open to both local and foreign companies, with no restrictions on eligibility.

This route tends to generate a larger number of design proposals, as bidders with no prior stadium-specific experience are able to participate. The company submitting the winning proposal, as decided by the client, will then be awarded the contract and a fee can be agreed.

Restricted invitation

In this format, the stadium developer proactively selects a list of experienced consultants and agrees to pay each of them a fee to develop a design proposal. The winning design is chosen from this shortlist of proposals and the contract is awarded accordingly.

Curriculum and fee proposal

This route provides a selection of consultants with the opportunity to demonstrate their past experience in stadium design, and to present a fee proposal that embraces all the different consultancy disciplines required to fulfil the client's objectives.

In this scenario, the stadium developer will then collaborate closely with the chosen consultants to develop a detailed brief and, subsequently, the design for the new stadium. This enables them to benefit directly from the experience and knowledge of the consultants in order to achieve the best solutions.

Direct award

In certain cases, the stadium developer will choose to bypass a competitive selection process because they already know who they wish to appoint. They may have an established relationship with a particular consultant, or may have been sufficiently impressed by a consultant's previous work on other projects to feel confident that they are the best candidate for the job.

While there is nothing wrong with opting to award the contract directly, the client may not benefit from the same degree of competitive pricing that can be achieved via a tender process. Having said that, fee scales in the design/construction sector tend to be very transparent, so opting for a direct award is unlikely to produce any significant deviation from prevailing market rates. When it comes to appointing an architect, however, some clubs are prepared to pay extremely high fees in order to hire a "big name" who can not only deliver a distinctive and high-quality design, but also provide added cache to the new venue by virtue of their reputation.

A:11 Commercial opportunities

Stadium commercialisation

In the past, football stadiums were only used on matchdays. In the case of club venues, this generally meant one day every two weeks, and in the case of national venues far less. Those days are long gone. Modern stadiums need to identify other means of generating revenue on a daily basis.

In addition, the primary goal of any modern stadium is, of course, to provide a suitable environment for top-quality entertainment. However, commercial realities dictate that they also need to maximise the time and money that spectators and visitors spend during their visit. The design of the venue needs to facilitate this.

Maximising the "commercialisation" of a stadium requires an imaginative and energetic approach, specialist advice, solid market research and a clever marketing strategy. Stadium operators have become increasingly creative in their efforts to identify additional income streams by capitalising on the needs of the local community and the broader market.

Commercial initiatives may include:

- extending use of the stadium to non-matchdays, for example, by providing facilities and activities for the local community throughout the week;
- identifying other events that can be staged at the stadium, such as concerts, festivals and other sports;
- providing bars, restaurants and other amenities that encourage spectators to spend more money while at the venue;
- exploiting opportunities for exclusive VIP facilities, such as private boxes and luxury catering facilities;
- hiring out stadium facilities for use by local businesses, conference organisers, etc.;
- maximising retail and merchandising opportunities.

Maximising matchday revenue

The main areas that the stadium developer can exploit to maximise matchday revenue are:

VIP areas

VIP attendance and facilities have become a major source of income for stadiums. VIP areas may include open-plan

areas with superior catering and bathroom facilities, and it is important that VIPs have direct access to premium seating. The level and scale of VIP facilities should, of course, be tailored to reflect local demand and the specific nature of the venue and its target audience.

Skyboxes

These are small or large private boxes with premium seating at the front. It is preferable that the seating is not enclosed, so that guests can properly experience the atmosphere of the stadium. The number of boxes incorporated into the stadium design should accurately reflect the operator's commercial requirements and market potential.

Catering facilities/restaurants

There are many different catering possibilities, ranging from soft drinks and fast food concessions on the main concourses to various categories of restaurants. Restaurants may range from those offering buffets and set menus to à la carte, with prices adjusted to suit a variety of target groups.

Retail outlets/merchandising

On matchdays, it may be difficult for the main club shop to handle all the demand from spectators. It may therefore be sensible to position a number of smaller kiosks/outlets around the stadium, stocked with the most popular items from the main shop. This is also likely to increase revenue as a result of impulse purchases made by fans as they move to and from their seats.

Car parking

Stadium car parking facilities, whether for the general public or VIP spectators, can generate substantial revenue on matchdays, as it can be charged at a premium rate.

Ticket sales

It should be made as easy as possible for spectators to purchase tickets. In addition to the traditional over-the-counter method, tickets can be made available via the internet, telephone and even cash machines.

Maximising non-matchday revenue

It is important to look for alternative uses for the venue on non-matchdays. The stadium's marketing department should identify new business opportunities and maximise revenue from supplementary and complementary use of the stadium's facilities. An analysis of the needs of the wider local community will help identify viable uses of the stadium on non-matchdays.

Other sports events

Football stadiums can be used to host events for other sports such as rugby, American football and hockey. There may even be scope for staging motor rallies, go-kart races and other "extreme sports" events.

Concerts

Stadiums lend themselves well to the staging of concerts and other large events such as festivals, as they are already equipped with most of the facilities necessary to cater for large numbers of spectators, event staff and participants.

Corporate events

Stadiums offer both the facilities and the prestige to make them attractive venues for corporate events, which can be an extremely lucrative source of revenue. Media conference rooms can be used for seminars, corporate presentations or product launches. During the week, boxes can be hired out as meeting rooms.

Catering facilities

Stadiums need an extensive and diverse range of catering services and facilities to satisfy the requirements of a broad customer base. Catering facilities are expensive to install and maintain, therefore it makes sense to seek ways to harness their commercial value on non-matchdays. It is now very common for stadium restaurants to open their doors to the general public on a daily basis. Catering facilities may also be required on non-matchdays to service corporate boxes that have been hired for company events, meetings etc.

Weddings and other special occasions

Stadiums can be extremely attractive and atmospheric venues for special family celebrations such as weddings. In some cases, players are even asked to put in an appearance to make the occasion even more memorable.

Supporters lounges

Special areas should be provided for official supporter club members and other fans to congregate and socialise. These should be equipped with adequate leisure and catering facilities. It is important to remember that fans are very loyal customers and should be made to feel welcome at the stadium at all times.

Conference facilities

Media facilities, including an auditorium facility if there is one, can be used to host corporate or academic conferences and seminars.

Cinema

An acoustically treated auditorium can be used for live broadcasts of away matches for the benefit of fans who are not able to travel, as well screenings of films and documentaries. It can also be used for conferences or community programmes that have a multimedia dimension.

Museum

Most clubs have an interesting story to tell, so it makes sense that they should have a museum documenting their history. Football fans generally love to relive memories and past experiences associated with their club. A trophy room displaying all of the silverware and honours won by the club, along with memorabilia from past chapters in its history, will always generate great interest among supporters and visitors.

Stadium tours

Given their iconic architecture and symbolic power, stadiums hold a huge fascination for the general public. Stadium tours, offering the opportunity to go behind the scenes and visit the dressing rooms or other parts of the venue that are off-limits on matchdays, are invariably very popular. Tours can be offered as stand-alone activities scheduled on a daily basis or they can be integrated into other programmes such as corporate event days.

Club shop

Dedicated club shops are a good source of revenue, and the range of merchandise being sold in these outlets continues to grow all the time. The staple items in any club shop are team shirts, but other products that tend to be popular are posters, photographs, mugs, pens, clocks, watches, games and statuettes of the players.

Nursery facilities

Providing nursery facilities on matchdays will boost family attendance. Moreover, if the service is extended to a daily basis, it can become a valuable asset to the local community, offering younger supporters the opportunity to spend time at their favourite team's stadium every day.

Affiliated business outlets

Service sector businesses such as travel agencies and car hire services will not only provide additional revenue but can complement and enhance the overall "offering" of the stadium to the general public. These can be incorporated around the perimeter of the stadium, making them easily accessible at all times. The demand for such facilities will depend entirely on the location of the stadium, with venues situated in more urban environments likely to benefit from greater footfall.

Car parking

This is a necessity in any modern stadium. Stadium car parking can also be used to generate revenue on non-matchdays, with spaces made available for use by the general public or by local businesses. VIP parking spaces may be sold to local businesses or corporate clients.

Funeral parlours

Some stadiums now offer funeral parlours, memorial gardens or even cemeteries (e.g. the Hamburg Arena). There are fans whose love for their team is so great that, when they pass away, they want their last resting place to be somewhere that played a special part in their life.

The ideas listed above represent just some of the revenue-generating schemes being implemented in different stadiums around Europe. The choice of activities depends very much on the location and nature of the stadium, but also on the ability of the stadium developer to adopt an imaginative and original approach to commercialising their assets.

A:12

Harnessing technology to generate revenue

Technology has advanced enormously in recent years, and there are now many applications that can be used in stadiums to increase revenue generation.

In addition to online shops from which fans can buy team merchandise, the websites of some clubs and national associations now even allow you to make stadium restaurant reservations (in some cases you can even place your order in advance!). As the influence of websites and social networking sites such as Twitter and Facebook continues to grow, so does the scope for commercialising an online presence.

In Wi-Fi-enabled stadiums, spectators have access to a wide variety of online information on matchdays. They can access statistics and match reports and in some cases, where allowed, can even replay the match itself online, via computers, mobile telephones, PDAs and other portable devices.

Advertising revenue has become increasingly important for stadiums and new technology has revolutionised the ways in which this can be delivered. On matchdays, large video walls, TV screens, LED displays and digital hoardings can all be used help to deliver a striking visual message to fans in the stadium as well as TV viewers.

In order to exploit all of these technological opportunities, stadium infrastructure should be configured to incorporate data cabling and fibre-optic networks. It should also be "future-proofed" i.e. designed to adapt to future changes, so that the latest technological advances can always be embraced. The ability to offer state-of-the-art technological solutions will be an attractive facet of the commercial packages offered by a stadium.

A:13

Sustainable design initiatives

Increasingly, sustainable and environmentally friendly design and construction schemes enjoy political, public and financial support. Incorporating such initiatives into the stadium project may not only be beneficial in the long term, it can also help project an image of social and environmental responsibility.

Green Goal

UEFA embraces the FIFA Green Goal programme, which strives to encourage and support sustainable and environmentally responsible stadium design and construction.

The main specific objectives of the Green Goal programme are to reduce water consumption and waste generation, to create more efficient energy systems and to encourage increased use of public transport systems. In order to satisfy Green Goal benchmarks, “green” strategies and initiatives such as environmentally responsible water and waste disposal management systems should be adopted wherever possible.

Solar panels

Solar panels installed in the stadium roof provide a simple and environmentally friendly means of generating electricity (like at Cornellá El-Prat in Barcelona). The power produced can even be sold back into the main electricity grid. While solar panels are still an expensive option in the short term, and the economic benefits will only be felt over a period of time, many countries now have grants and subsidies that make them a viable and even attractive proposition over the longer term. And they will invariably help to reduce conventional energy costs.

B

THE SITE AND LOCATION

B:1

Choosing the new stadium site

General considerations

Before the site is selected, some important decisions need to be made to ensure that the new stadium can meet the demands of a rapidly changing market in the future. These decisions relate to issues such as the general location and context (urban, semi-urban, etc.), its accessibility, and the environmental impact on the surrounding area. They also need to be evaluated in conjunction with other considerations specific to the stadium building itself, such as capacity, present and future use and projected profitability. It is also particularly important to give due consideration to the logistical suitability of the site for emergency and evacuation planning.

All of these considerations and decisions need to be addressed during the formulation of the key project documents, from the business plan to the project brief, as they will have a cardinal impact on the future development of the stadium and surrounding area.

During this process alternative sites should be identified and comprehensively studied before a definitive decision is made on the final location.

Types of location

Potential locations can be divided into three broad categories: central urban, semi-urban and out-of-town/greenfield sites.

An urban site is one located in a central part of the townor city; semi-urban refers to a location on the outskirts but still within the city limits, while out-of-town/greenfield refers to a site outside the city.

Urban sites

Urban sites have the obvious advantage of easy access to public transport networks. However, car parking may be problematic due to a lack of available space and/or the high cost of land. On matchdays, or other event days, the streets around the stadium may require rigid access control. This will need to be clearly understood and closely coordinated with the local authorities and community.

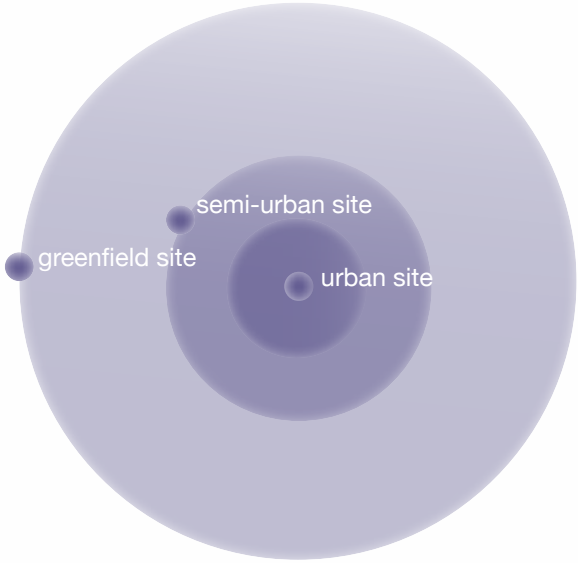
Semi-urban sites

A semi-urban site offers the advantage of lower land costs, but should still have good, or at least reasonable, access to the public transport network. Cheaper land costs may make it possible to acquire a larger site, which will provide greater scope for the inclusion of facilities such as on-site car parking.

The fact that the stadium is located in a less densely populated area will also reduce the obvious impact of a new-build on the surrounding area, which will limit the potential risk of disputes with the local community. Overall, there are many obvious arguments in favour of a semi-urban location; however, the optimal type of location for any given project should be carefully assessed on a case-by-case basis.

Out-of-town/greenfield site

The out-of-town option can often be attractive as the cost of land tends to be much lower than for urban sites. The most obvious drawback is likely to be reduced public transport links, which will have implications for the site's accessibility. When opting for an out-of-town location, it makes good sense to identify a site that is within easy reach of hotels, hospitals, railway stations and even a local airport.



It is also important to ensure that there are adequate road links, in order to avoid major bottlenecks during peak times before and after an event. Local authorities may require the stadium developer to pay for any essential major road infrastructure improvements, and this will obviously need to be factored into the business and cost plans. On the plus side, as with many semi-urban sites, the potential for purchasing a larger plot of land may make it more feasible to include additional facilities and amenities such as car parking.

The local community

Integration with the local community

It is vital that the project team clearly understands not only the specific needs of the fans attending the stadium on matchdays, but also the general needs of the local community.

From the start of the project, good relationships need to be developed with the local authorities, key service providers such as the police and fire brigade, and community representatives.

Great care must be taken to reassure the local community on sensitive issues such as noise pollution, the impact of large crowds during matchdays and public safety. Local residents need to know that policing will be handled in an efficient but low-key way.

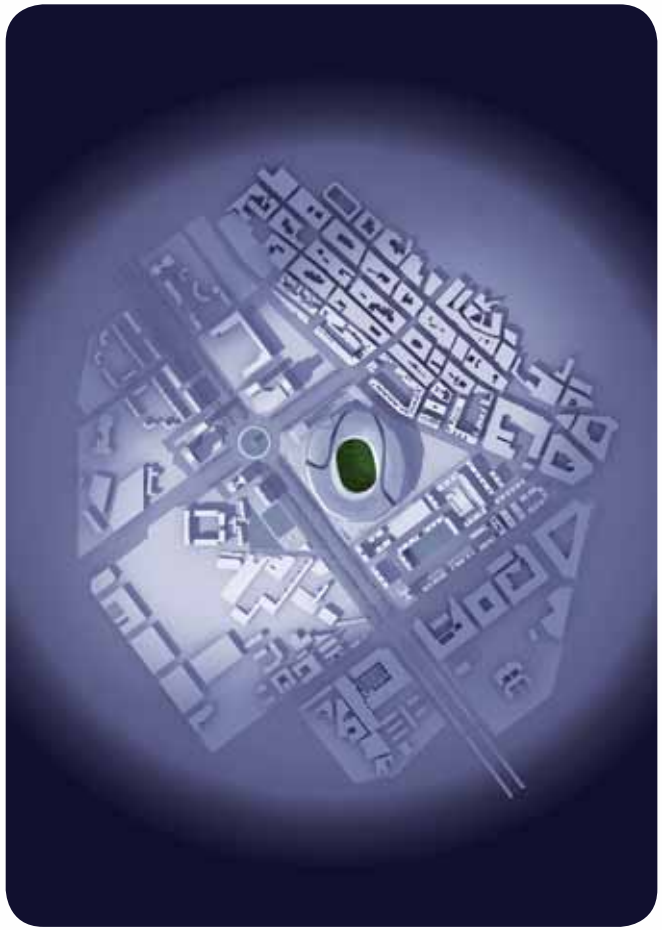
It is important to make sure that local residents and businesses are made fully aware of the benefits that the new stadium will bring to their community, and that their concerns regarding potential problems on matchdays are addressed. Sensitive and effective management of these issues can mitigate any negative aspects. Regular communication with community representatives is a key part of this process, and the ultimate goal should be making them understand that a well-designed stadium can be a source of local pride.

There may also be a strong case for carrying out additional landscaping work around the surrounding area, which would improve the visual impact of the stadium building and thereby have a positive effect on the general perception within the local community.

Contributing to the local community

A prime objective of any modern stadium is that it should be an integral part of its community and neighbourhood. Plans and proposals for a new or refurbished stadium should therefore seek to maximise the benefits and value for the local community, by improving amenities for residents or acting as a catalyst for local regeneration.

Comprehensive market research should be conducted from the very outset to identify the best means of achieving economic benefits for the local community, either directly or indirectly, through job creation, improved leisure facilities and other non-sporting amenities that will have a positive impact on the area.



A good stadium should become part of the daily fabric of the community; it should provide employment and should be a resource for local businesses. Nursery facilities and even medical and first aid stations can be made available to the public, thus making a vital contribution to core local services.

The venue's retail and catering outlets can be open on a daily basis, as can any public sports and recreational areas that have been incorporated into the stadium complex.

The stadium can be used to host other sports events, concerts, local festivals/events or smaller special family occasions such as weddings. The range of alternative uses will depend in part on the specific profile of the local community, but also on the creativity of the stadium management.

In summary, if well conceived and properly planned, alternative use of the venue will not only provide added value to the community, it will also generate valuable new revenue streams that can help underpin the viability of the stadium.

Key location factors

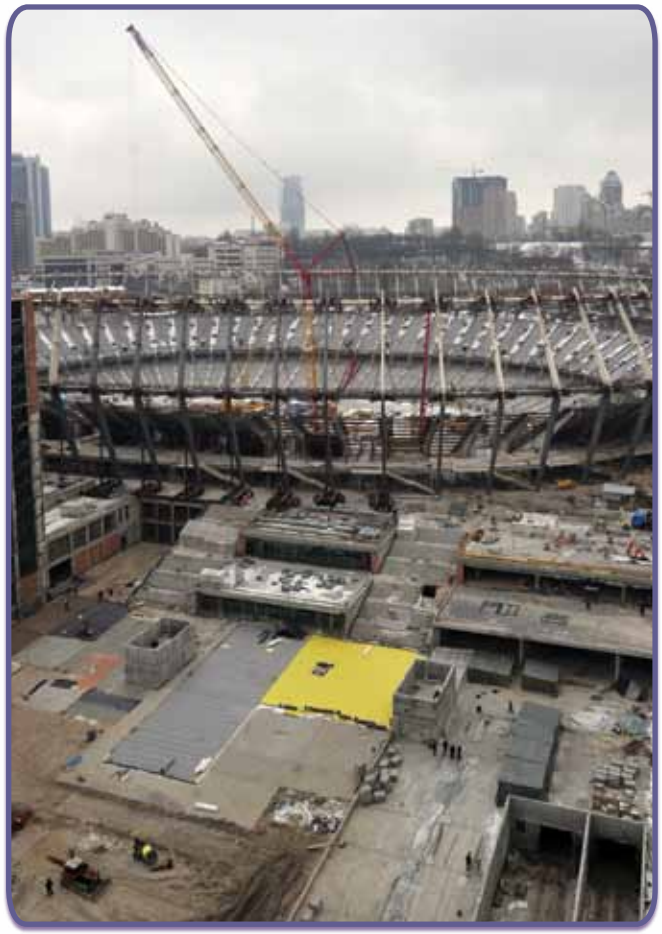
Choosing a location is not an easy task, as so many different factors need to be taken into account. Ultimately, all of the variables and criteria relating to the site location (see below) will have a direct impact on the stadium building design.

There are major debates as to whether new stadiums should be built in cities or on the outskirts. Each project needs to be treated on its own merits, and the final decision must be based on consultation with the local community and the local authorities who, ultimately, hold the key to unlocking the potential development of any given site location. As previously mentioned, if there is an existing stadium, a key decision is whether to retain the same site for the new stadium or to relocate. If relocation is the preferred option, then a new site needs to be identified and acquired.

In assessing a possible site location some of the key factors to be considered are:

Visual impact

It is important to appreciate from the outset that the stadium will have a huge impact on its surrounding area. It is likely to be one of the largest and most prominent buildings in the local area, if not the entire town or city. It will need to be integrated into the urban skyline and, more directly, within the "street-scape" of the immediate neighbourhood. The arrival of a new stadium will no doubt prompt a reaction (not necessarily negative) from the local community and local authorities, and consultation and dialogue with both will be essential.



Site ownership

It is critical to establish the legal ownership of the site beyond any doubt. A very large site will be required to accommodate a new stadium and in certain cases this will mean purchasing a number of different individual plots in order to secure the required total area. The project lawyers will be required to verify that the correct deeds of ownership have been secured and that there are no outstanding mortgages or other financial and/or legal obligations on the land/property being acquired.

Site area

The site should be large enough to comfortably accommodate the stadium and allow easy pedestrian circulation around the perimeter. It is also important for the site to have a flexible configuration, enabling the venue to be modified for other uses in the future, or expanded to increase capacity. Given the long lifespan of football stadiums, it is important to try to make provision for every possible future eventuality (e.g. hosting large events, expansion of the venue, or the addition of a roof). Hence the total area of the site, together with the potential for acquiring additional land, should be factored into the site selection process.

Site topography

The topography, or physical features, of the site is extremely important. The ideal location is a large flat site with no need for major earth works, which would be costly. If there is any kind of slope, it is essential to identify requirements for infill and retaining walls.

Geology and previous land use

It is also extremely important to understand the precise geological characteristics of the site, as there are potentially many hidden issues that will not be revealed by a topographic survey (e.g high water tables, ground-bearing capacity) and that could lead to a large increase in project costs if not identified and addressed at an early stage.

A thorough geological study should reveal whether there have been any previous site infills, waste dumping or other non-disclosed issues that could have altered the natural characteristics of the land. Any requirement for site clearing or disposal of waste to mitigate the above may increase the net cost of the site considerably. Contamination, which can occur in some industrial areas, is a very serious issue, and expensive remedial procedures may be needed to eliminate this.

Planning and zoning restrictions

When considering a site, the stadium developer should closely review the latest planning regulations and by-laws, including the relevant town planning documents and schemes. It is preferable that this be done with the assistance of specialist consultants (architects and urban planners) who are well versed in understanding and interpreting these documents. Some countries may have planning regulations that take into consideration all of the implications for the local infrastructure and community, and specify clearly whether a site is deemed suitable for sports-related buildings. This will save the developer the arduous task of having to assess various major aspects of a site's suitability.

Great care needs to be taken to ensure that a given site can be used not only for sports but also for any commercial activities that are envisaged within the project. Some European countries have very strict planning constraints regarding the use and exploitation of certain premises for commercial purposes.

Any planning and legal restrictions relating to a particular site need to be clearly understood prior to purchase. If required, the consent to modify any such restrictions will need to be negotiated and confirmed by means of the appropriate licences or planning agreements from the relevant authorities.

Site accessibility

The stadium will be the destination for large numbers of people over a short period of time on matchdays and when other major events are being staged. This will, undoubtedly, place a great strain on the local transport and traffic infrastructure, with increased numbers of people and vehicles needing to get to, around and from the site. It is therefore extremely important to conduct careful analysis and studies of the existing local infrastructure (from roads, rail, underground and even airports to basic pedestrian routes) and its ability to cope with increased traffic flows. The results of these studies will play a key part in convincing both the stadium developer and the local authorities of the site's suitability. It is often difficult to find a site with all of the necessary transport infrastructure already in place, so there may well be a need for new road works etc. The stadium developers may need to assume part, or all, of the cost of any major construction work needed to upgrade the public road network before licence applications for the stadium are approved.

Public transport network

Irrespective of the location, good public transport links are essential, especially for medium-sized and large stadiums.

These days, the majority of fans travel to football matches by public transport – a trend that is increasing – so proximity to railway and underground stations, bus routes and other transport services is a major advantage.

Connections to public utilities

The mains connections to electrical, gas, water and waste services that will serve the stadium should be identified before purchasing the site, so that the cost and other implications of connecting the venue up to all of the relevant utilities can be properly calculated.

The existing and future capacity of the local utility networks should also be clarified at an early stage. The electricity, water and drainage requirements of a stadium are significant, and if the local utility suppliers cannot satisfy the anticipated demands, the chosen site may not be feasible, since sourcing utilities from further afield can prove difficult and very costly.

Surrounding facilities and amenities

When selecting a location, the range and quality of available facilities and amenities is a key consideration. Ideally, the local area should be well provided for in terms of restaurants and bars, both for supporters on matchdays and more generally to make the venue an attractive option for other events. Adequate hotels and other services and amenities will be beneficial for visiting teams and

supporters, the media, delegates and officials. It is also advantageous if there are hospitals, police and fire stations close to the stadium.

Noise control

Noise from a stadium can be a major concern for local residents. Solutions for reducing the noise pollution of surrounding areas, particularly for venues located in the city centre or in residential areas, need to be identified at an early stage. Close liaison on noise control with the local authorities and the wider community is advisable, and the stadium design should aim to mitigate as far as possible the acoustic impact on the surrounding area.

Floodlights and illumination

Stadium lighting can also have an intrusive impact on the immediate neighbourhood. In addition to floodlights, many modern venues are equipped with illumination systems that light up the entire stadium structure on match nights. These lights have a major impact on the area around the venue. Contingencies need to be put in place to limit “visual contamination” and minimise disruption to the local community.

In many countries, the local authorities will require detailed reports identifying any areas that will be affected, and will insist that the stadium adopts acceptable lighting restrictions on match nights as well as for day-to-day use.

B:2

Site accessibility

Access to the stadium site needs careful study as the existing infrastructure may be inadequate. Rail, underground, tram, airport and road (from local roads to motorways) networks will all need to be able to cope with increased demand on event days. It is essential to have a comprehensive picture of the road and rail links in the surrounding area in order to evaluate accessibility both for the general public and for emergency services vehicles.

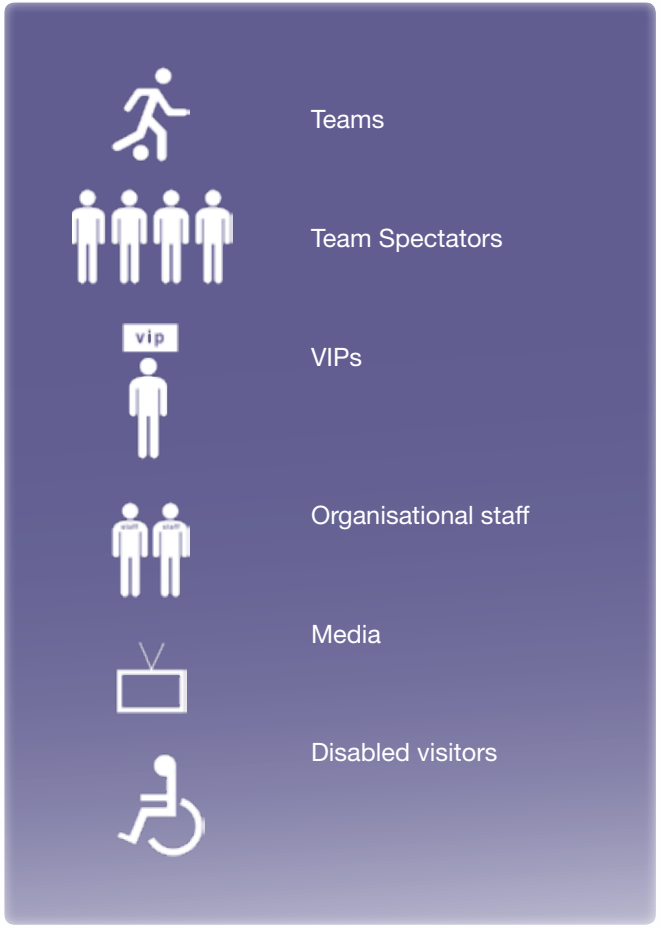
The stadium site itself should incorporate carefully designed and simple vehicle access routes that connect with the main road network.

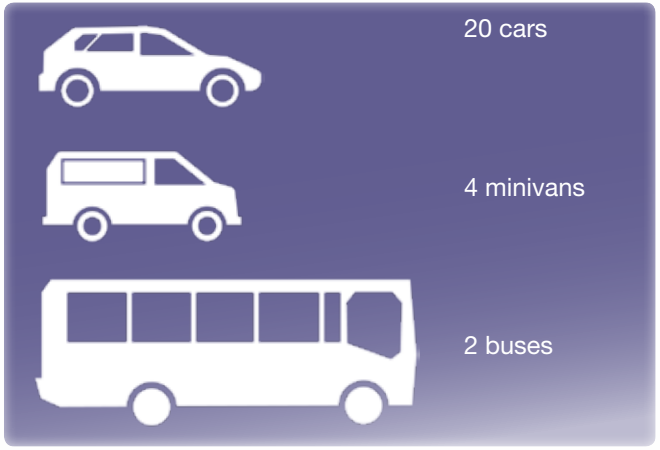
In terms of pedestrian access, safe and ample space (pavements, plazas, parks, etc.) should be available within the area surrounding the stadium in order to accommodate the large numbers of people who will be congregating on matchdays. Pedestrian routes should provide easy access to all private and public transport facilities, including car parks, railway and underground stations, tram and bus stops, taxi ranks, etc.

Public access

Spectators need to be able to get to and from the stadium easily, so a clear strategy for both public and private transport access should be devised, preferably before the site is purchased.

A new stadium will need to be well connected to public transport services, such as rail, underground, bus and





tram links. It must have good access to the main roads and motorways, including straightforward routes to the nearest airport and railway stations.

The configuration of the access and egress scheme will depend on the location of the stadium and the surrounding transport systems.

Stadiums in urban settings will obviously have much better access to public transport links. Semi-urban sites will have fewer public transport options, and out-of-town/greenfield sites fewer still, increasing the need for new or improved road and motorway links.

The anticipated balance of public and private transport will, in turn, help to define the car parking facilities required.

Car and coach parking facilities

Defining the correct car parking requirements is an essential aspect of any stadium design. This may either increase the size of the site required, or reveal the need for underground car parking. There needs to be enough parking space for both cars and coaches, either within the stadium complex itself or in the immediate vicinity. A parking strategy needs to be developed and coordinated with the local police in order to determine what will be feasible and minimise disruption to the local community.

Separate restricted-access parking areas inside the stadium complex need to be available for use by the following user groups: VIPs, local officials, players, media,

catering services, emergency services (ambulances, fire and police vehicles) and stadium staff. In addition, all of these groups should have specific or shared vehicle drop-off points with direct access to the stadium. For each group, it is also essential that adequate disabled car parking spaces and drop-off points are included, and that these are located close to the stadium accesses and circulation cores.

Increasingly, stadium designs include parking for the general public, but this is likely to be easier to accommodate in an out-of-town location than an urban one. However, when planning parking inside or underneath the stadium complex it is possible that only a few of these spaces will be available for public use. Factors such as the local security policy for screening cars, the number of entrances and the number and range of other user groups for which car parking is available can all limit public availability. Therefore, an adequate number of alternative parking areas adjacent to the stadium complex must be made available to compensate for the reduced public car parking capacity within the stadium.

While spectators should be encouraged, as far as possible, to make use of public transport, it remains standard practice for away supporters to arrive in large convoys of coaches, so adequate parking inside, or close to, the stadium needs to be made available for these.

PARKING REQUIREMENTS

- General public
- Disabled fans
- Sponsors
- Media and TV
- VIPs
- Authorities and VVIPs
- Staff
- Players
- Officials, referees and delegates
- Maintenance staff
- Ambulance staff
- Police and security staff
- Catering staff
- Retail staff
- Marketing staff
- VIP hosting staff
- Cleaning staff

Other access requirements

The list shows clearly that coordinating vehicle access to the venue is a complex operation. Different vehicle users will be categorised based on their security clearance rating, hence a comprehensive access strategy will be needed in order to coordinate and regulate how and when each vehicle category is allowed to enter the stadium.

The area surrounding the stadium needs to be planned coherently, with adequate road links to ensure fluid and unobstructed vehicle access at all times, especially on event days.

The stadium design should incorporate dedicated access and entry points for the various services, trades and professions who are part of matchday operations. For example, TV and media crews should not be expected to use the same access and entrance points as the catering vehicles, while police vehicles and ambulances will need to be assured of clear and easy access and exit routes at all times.

B:3

Security and safety issues

Largely as a response to several major stadium disasters in the 1980s, stadium design now places a huge emphasis on ensuring the safety of spectators at football matches.

A football stadium is an exceptionally complex structure in terms of the variety of different operations and activities that take place simultaneously. The location, configuration and urban context of the site will have a major bearing on how these operations are dealt with by the relevant local authorities and emergency services.

Police, fire services, medical teams, stewards and other security staff must all work closely together to ensure maximum coordination and efficiency in response to any emergency situation.

It is essential that the need for well-coordinated and integrated safety and security solutions is recognised from the outset. All of the aforementioned services should be involved in the general planning for a new venue, so that all of the relevant structural measures are identified and implemented well in advance.

Particular attention should be given to the security plan and segregation strategy for rival fan groups, which should be coordinated with the local authorities and police.

B:4

Future stadium use and adaptability

When selecting a site, it is essential to give full consideration to possible future use. The stadium developer may look to extend the capacity of the venue at some point, so the site needs to be flexible enough and large enough to accommodate such an eventuality.

Any plans to use the venue for non-football purposes also need to be given careful consideration, as these may have a major effect on planning requirements, although this is generally less relevant for small stadiums.

If there are plans to install an athletics track around the perimeter of the pitch, this may have a considerable bearing on the overall design parameters. Careful thought needs to be given to how this will impact on factors such as net capacity, sightlines, viewing distances, etc.

C

MAIN DESIGN ELEMENTS AND STADIUM GEOMETRY

C:1

Designing the football pitch

Orientation

When planning the orientation of the pitch, the primary consideration is its position in relation to the sun and prevailing wind. In Europe, a north-south orientation is generally considered best, as it means that, in the evening, the setting sun will not hinder the vision of one team more than the other.

Assuming a north-south orientation, the main TV camera positions should be in the west stand (main stand) to avoid problems caused by the glare of the sun.

It is particularly important that any deviation from a north-south direction is kept to a minimum if the stadium and pitch are not covered. In such cases, the general rule is that this deviation should be no more than 15° from the north-south axis.

In certain cases, site constraints may dictate an east-west orientation, although in general this is not recommended. In such cases, special efforts are required to minimise the contrast caused by some areas of the pitch being in sun and others shade, and thereby minimise the impact for the TV cameras.

The pitch area

UEFA standard pitch dimensions are 105m x 68m. There should also be a verge (grass or artificial turf) with a minimum width of 1.5m around the full perimeter. These dimensions are now accepted worldwide and should be regarded as mandatory.

Both UEFA and FIFA also require an outer perimeter area to be left between the edge of the pitch and the first row of seats. Further information on regulation distances is available elsewhere, but the general principle is that the crowd should be as close as possible to the touch line, yet far enough away to ensure the safety and free movement of players and match officials.

In practical terms, this means that there should be a gap of approximately 7.5m behind the goal line and 6m behind the sidelines. Hence the total minimum area required for the pitch and surrounding area, up to the first row of seats, is 120m x 80m. For major events or high profile matches, where a greater media presence can be expected, this should be extended to 125m x 85m.

On the side of the stadium where the dressing rooms are located, the outer perimeter should also contain two team benches, an area for match officials, a warm-up area for substitutes and TV camera positions. The other three sides should include space for advertising hoardings, TV cameras, photographers and security staff.

Artificial turf could be used for the outer perimeter area. This would help to avoid the problem of worn grass along the touchlines, caused by the assistant referees and also by substitutes using the area to warm up.

FIELD DIMENSIONS

Standard field dimensions
Pitch: 105m x 68m
Overall area: 120 x 80m

Key design factors

Pitch design should always take into account the local climate and the stadium environment. The aim is to produce a surface that can be easily maintained in a playable state throughout the season, and that is able to withstand all but the most extreme weather conditions.

Variables to be considered in the design include levels and gradients, drainage and the choice of grass seed, which will vary depending on the region and country. Allowing

for the correct amount of natural light and ventilation is also critical.

Despite appearances, football pitches are not completely flat. In fact, much like a pitched roof, they contain a very slight slope in order to allow correct drainage and prevent waterlogging, which was so often a major problem in the past.

A well-designed underground and surface drainage system should be installed. In addition, there should be a specialised irrigation (sprinkler) system covering the entire playing surface, but able to provide "zoned irrigation", since different areas of the pitch may require different amounts of watering at different times.

Pitch solutions vary from country to country. Locations with higher rainfall will require more stringent analysis of the gradients. In some Mediterranean countries, the impact of storms is a major issue, meaning that large volumes of water may need to be drained within a very short period of time.

Finally, where possible, any features or equipment that require extensive or costly maintenance should be avoided.

Pitch maintenance

Correct pitch maintenance can be problematic, particularly when it comes to achieving adequate grass growth. This is especially the case in countries that experience severe weather conditions. Failure to undertake adequate maintenance can lead to serious deterioration of the turf and create a need for remedial interventions such as artificial lighting and ventilation.

In countries that experience extreme cold weather, undersoil heating should be installed to prevent the pitch from freezing. Another possibility is a heated pitch cover, which consists of a layer of plastic sheeting that conceals a system of ventilators producing warm air. In addition to protection from frost, heated covers will also protect the pitch in the event of heavy rain or snow fall.

An increasing number of clubs/associations opt for fully covered stadiums. This leaves very little scope for the playing surface to be naturally lit and ventilated. In such cases, complex artificial solutions in the form of turf lighting apparatus and large mechanical ventilators can be used, but these are very expensive and are generally not a realistic option for smaller clubs.

Artificial pitches

In countries with extreme weather conditions, the maintenance of natural grass pitches is not only difficult, it might even be considered environmentally irresponsible, for example in places where there are significant water shortages.

An artificial pitch may not only be more cost effective; it may also be more sustainable and better suited to the local climate. However, if there are any plans for the stadium to be used for international matches, the stadium developer should consult the relevant UEFA or FIFA competition regulations, as natural turf may be mandatory.

C:2

Designing the stadium bowl

After the pitch, the stadium bowl is the most important element of any football venue. The characteristics of the bowl will go a long way to determining the quality of the spectator experience in terms of comfort, view, atmosphere and "connection" to the action on the pitch.

The bowl design requirements

A good bowl design should satisfy three principle requirements:

Safety

It is the responsibility of the stadium operator to make the safety of all those visiting the venue paramount. When it comes to contingency planning, there is no room for complacency. Access and exit to and from the seats, both in normal and emergency situations, needs to be carefully planned in consultation with the relevant specialist consultants and the local authorities. It is generally required that all seating complies with current safety regulations before stadium operating licences will be granted.

Visibility

All spectators should have an unobstructed and complete view of the field of play. Sightline quality, commonly referred to as the "C-value", is described in more detail in section C.2.5.

Comfort

Long gone are the days when the objective was to pack in as many people as possible into a stadium, most of them in standing areas. In recent decades, there has been a shift towards all-seater venues. This has been driven primarily by the introduction of stricter safety regulations, but also by a greater recognition of the fact that spectators should be able to enjoy watching football in comfort.

Fans expect to be able to get fed and watered with minimum fuss, so the stadium bowl should be designed to enable quick and simple passage from the seating area to the toilets and catering facilities.

Stadium capacity

UEFA and FIFA set out clear capacity requirements for each of their competitions. Therefore, if there are any future plans for a stadium to serve as a host venue for international matches, these competition-specific requirements should be factored into the planning process, as they may have a significant impact on the design of the bowl and its capacity.

Every stadium has both a net capacity and a gross capacity.

Net capacity

This is the number of seats that are available for sale or complimentary use for a given event.

Net capacity requirements stipulate that all seats must have an unimpeded view of the pitch, meaning that they must not be in any way obstructed by advertising hoardings or any other permanent or temporary structures that could interfere with a spectator's enjoyment when seated.

The net capacity of a stadium includes seating for:

- ordinary spectators;
- VIP and VVIPs;
- officials (from UEFA, FIFA, etc.);
- disabled spectators and their companions.

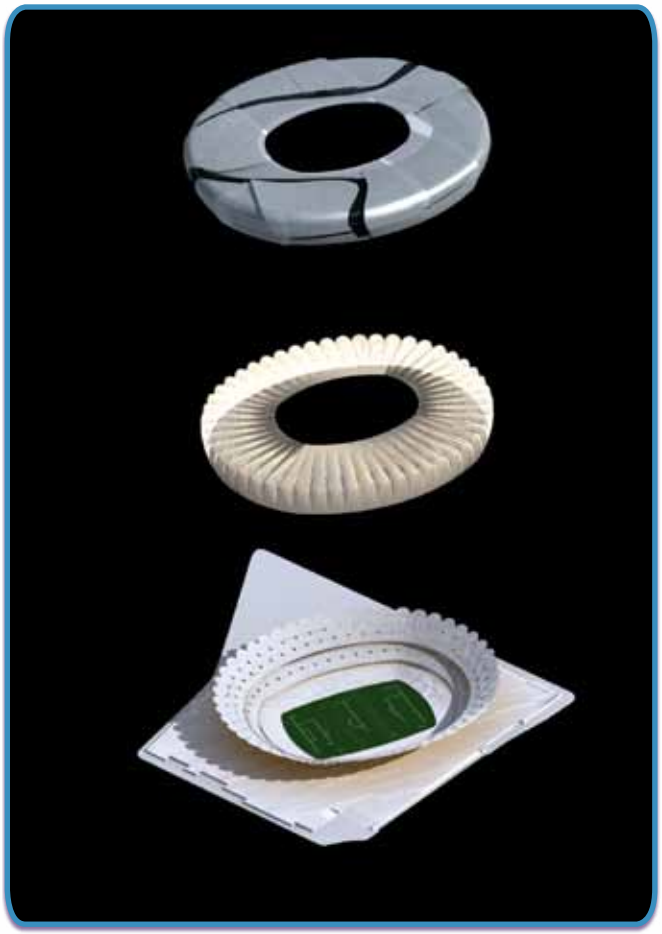
The number of seats allocated to each category, and hence the overall net capacity, will vary from competition to competition. The net capacity will also be affected by the special seating and facilities required for different types of tournament. For example, for UEFA or FIFA competitions increased media seat allocations, additional camera positions and larger advertising hoardings located closer to the pitch can all significantly reduce the total net capacity.

Gross capacity

The gross capacity of a venue refers to all of the seats within the stadium, including those for the general public, VIPs, media and officials.

Safe capacity

The safe capacity is a mandatory requirement which focuses, as the name suggests, on ensuring maximum safety for spectators. Safe capacity can broadly be defined as the maximum capacity that will allow for a full and safe evacuation of the stadium via dedicated access



and exit points within the time limits defined by local or national regulations. The main access and exit points are the turnstile entrances and emergency exits around the stadium perimeter, together with the concourses, vomitories and staircases within the stadium building. If the total capacity of the spectator area within the stadium bowl is lower than the capacity of the access and exit points, then this lower figure will be considered as the safe capacity of the stadium.

It is now widely accepted that all spectators should be able to exit the stadium bowl to a point of safety within a maximum of eight minutes. This is based on a maximum flow rate through the stadium exits of 660 people an hour. However, there may be some scope for variation based on the size and design of the venue and, in particular, its level of fire resistance.

The safe capacity also assumes an upper limit on the number of seats per row per aisle, which will be defined by local building standards (see section C.2.4). The safe capacity should exclude any seats located on rows where the number of seats served by a given aisle exceeds the maximum permitted in the regulations.

The safe capacity figure for the stadium should be recorded in the appropriate safety certificate, as required by the relevant local authorities.

Gangways and vomitories

Vomitories are the enclosed stairways and passageways leading from the internal concourses into the stadium bowl. Gangways are the stepped passages between the rows of seating via which spectators access their seats.

Vomitories and gangways should be designed to allow the optimum flow of people in normal operating conditions, but they must also be able to cope with increased flows in emergency situations, in the event that the stadium needs to be evacuated.

Determining the correct dimensions for these areas is vital in order to meet stadium safety requirements, so they should be carefully calculated in accordance with the relevant local regulations and standards.

Stadium seating

Optimal seating configurations

Stadium seating takes the form of individual seats arranged in a series of rows, which are tiered to ensure unobstructed views of the pitch from every single seat.

For matches at senior professional level, venues must be all-seater (although standing areas are permitted at youth and amateur levels).

Makeshift or temporary seating is not permitted. Most modern seating manufacturers produce comfortable seats that are unbreakable, UV-resistant and fire certified.

Each seat is allocated a row and place number, which should be easy to locate using the stadium's signage scheme. Seat numbering should be clearly visible to enable spectators to find their place as easily and quickly as possible.

For UEFA competitions, the UEFA Stadium Infrastructure Regulations (2010 edition) specify that "seats for spectators must be individual, fixed (e.g. to the floor), separated from one another, shaped, numbered, made of an unbreakable and non-flammable material, and have a backrest of a minimum height of 30cm when measured from the seat" (Article 15(1)).

Seating row depth and width

Optimal row depth and width are determined by three key factors: comfort, safety and stadium capacity. Striking a balance between capacity and comfort, which can be a difficult challenge, will determine the eventual size of the stadium.

In the past, the primary objective tended to be to cram in as many seats as possible. Increasingly, however, modern stadium design places the emphasis on comfort.

In a venue containing tens of thousands of seats, a difference of a few centimetres in the dimensions of each seat can mean major differences in the configuration of the bowl and, consequently, the size and cost of the stadium. Equally, those same few centimetres can mean substantial improvements to the quality of the seat design in terms of both comfort and safety. The greater the space between the rows, the easier it will be to carry out a swift evacuation in the event of an emergency.

Detailed guidelines for achieving the best seat configuration, both in terms of width and depth, are available elsewhere (see bibliography).

Number of seats in a row

The number of seats per row is a critical factor when establishing the safe capacity of a stadium and when trying to optimise the distance between the "centre lines" of the main structural grid.

The number of seats in a row has a direct impact on spectator comfort and safety. The obvious rule is that the fewer the seats in a row, the greater the comfort levels and the better the accessibility.

Typically, the number of seats in a row is between 25 and 28, but the latest local and international guidelines and regulations should be consulted before deciding on the exact figure for a specific venue.

The seats should be designed to flip up when not in use, as this increases the width of the gangway, thus improving access. This is particularly important in the event of evacuation, but also facilitates the cleaning of the stadium bowl after an event.

Stadium bowl

Geometrical configuration

It may seem logical that the configuration of the seating areas should be directly related to the geometry of the pitch and therefore form a simple rectangle.

Indeed, early stadium design adhered to this logic. However, this created viewing restrictions for those spectators situated at either end, particularly those closest to the goals. Because the seats faced directly ahead, spectators were constantly looking sideways in order to follow the action.

Theoretically, the ideal configuration for a football stadium is a curved bowl that is situated as close as possible to the playing surface, providing all spectators with a similar quality view, unobstructed along the entire length of the pitch.

The bowl shape occurs both in the aerial plan view and in the cross section, and even though the angle of the stadium seating seems straight in section, it does in fact follow a very slight curve.

This curve in section determines what is known as the “C-value”, which denotes the quality of the view from each seat. The need to achieve maximum proximity to the pitch in order to obtain the best possible C-value and the steepest angle in section means that different capacities will require different bowl designs both in plan and section.

As the planned capacity of the stadium increases, so does the precision required in the geometrical design of the bowl. The designers therefore need to strike a balance between the bowl plan view and cross section to produce the ideal shape and optimum lines of vision.

Good pitch visibility

A critical requirement of any stadium design is to ensure that all the seats provide an excellent view of the entire pitch. Therefore, great care must be taken to optimise the sightlines from every seat.

The primary objective is to minimise the distance between the spectators and the action on the pitch and ensure unobstructed views of the whole pitch.

For all major competitions, UEFA and FIFA exclude from capacity calculations those seats which are located at a distance of more than 190m from the pitch or which have impeded sightlines.

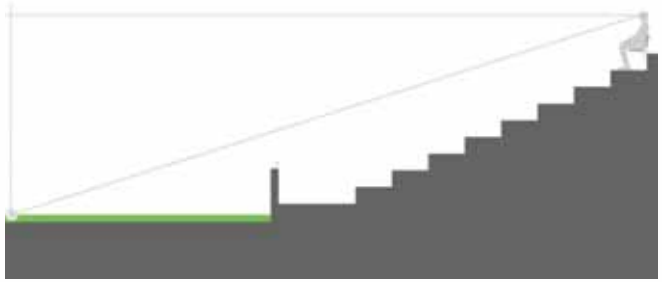
- Viewing distance

A good view clearly depends on how far the seat is from the action. A tight bowl configuration will aim to bring even the most distant seats as close as possible to the pitch, increasing viewing quality and helping to create a “cauldron” effect. The aim should always be to keep the seats within the maximum distances set out by UEFA and FIFA regulations.

- Sightline quality: the C-value

The C-value is a variable that defines the quality of the spectator’s line of vision over the head of the person in front, commonly known as “the sightline”.

In principle, the higher the C-value, the clearer the sightline, meaning the better the view of the pitch. A good stadium design will have a very high C-value throughout the entire bowl. However, increasing the C-value can also result in an increase in the overall height and width of the stadium.



The standard formula for calculating the sightline is as follows:

$$C = \frac{D\,(N + R)}{D + T} - R$$

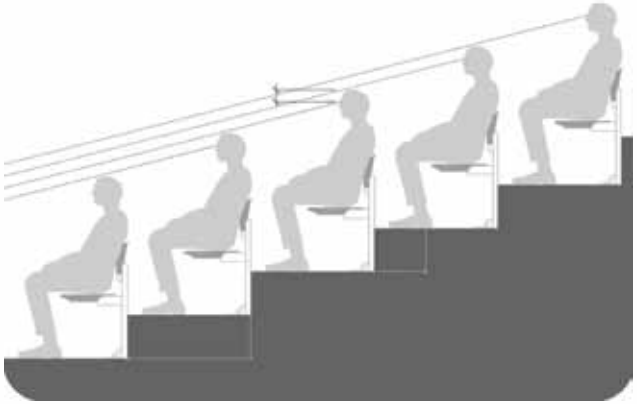
C = the C-value

D = the horizontal distance from each individual position to the point of focus (the edge of the pitch)

N= the riser height of each individual row of seats

R = the vertical height between the persons eye level and the point of focus (pitch level)

T = the depth of each individual row of seats



To produce a good C-value, the distance from the spectator's eye level to top of the head of the spectator immediately in front should be between 120mm (ideal) and 90mm (acceptable).

It is important that this work be undertaken by designers who are familiar with the C-value calculation and who understand how to optimise viewing quality.

- Unobstructed views

All spectators should have a clear and unobstructed view of the whole of the pitch area. However, complying with statutory requirements concerning handrails and other fixtures will mean that some barriers enter the field of vision, causing semi-obstructed views in some cases.

Structural features such as columns, roofing, pitchside advertising and scoreboards may interfere with the sightlines from some seats. As mentioned, these seats will not be included in the stadium capacity for any UEFA competition

In summary, a good view is achieved by ensuring that each seat has good line of vision, is as close as possible to the pitch and has no obstruction that could spoil the view.

Pitchside areas

Pitch access for players and officials

The players and match officials will need to access the pitch via a tunnel located between the two dressing rooms.

The tunnel should be wide enough to enable both teams to walk out side by side, comfortably and safely.

The tunnel should ideally have no steps; any changes in level should be resolved by use of ramps with gentle gradients. In many stadiums, however, the dressing rooms are located on a different level and the players will need to go up or down stairs to get to the tunnel leading them on to the pitch. This should be avoided wherever possible in new stadium designs.

The tunnel and players' areas beneath the stadium should be fitted with non-slip floor surfaces.

A telescopic tunnel extension should be in place to protect players and match officials from any objects thrown from the stands.

Toilet facilities should be provided adjacent to the tunnel access, in case players or match officials need to make use of them immediately before taking to the field.

Seating for players and coaching staff

The team benches are located on either side of the exit from the players' tunnel. It is recommended that the benches should be covered, in order to protect substitutes and coaching staff from the elements, and also from any projectiles thrown from the crowd.

In major competitions, such as the UEFA Champions League and the UEFA European Football Championship, the team benches should each have seating for up to 23 people (including coaching staff and substitutes). For smaller competitions, the bench areas should be able to accommodate a minimum of 13.

It is important to ensure that the view of spectators seated in the lowest rows directly behind the benches is not impeded.

Other pitchside positions: photographers, TV cameras, security staff

Consideration needs to be given to the designated positions for photographers and mobile/fixed camera positions, as well as the security staff and match stewards, who will need to be located along the full perimeter of the pitchside areas. The number of media and security positions, and the flexibility for movement within these areas, will vary according to the type of match or competition.

Pitchside advertising

Advertising makes an important contribution to stadium revenue and the correct location of hoardings within the main bowl area is particularly important in order to ensure maximum visibility, both for the spectators and the TV cameras.

Advertising hoardings are generally free-standing and are located around the perimeter of the pitch, if possible in a double ring. The exact positioning will vary, depending on the event and venue, and is primarily determined by the view from the main central TV camera and the designated areas for the team benches, the match officials, the warm-up area for the substitutes and other camera locations.

Additional access to the pitch

It is important to provide adequate access to the pitch for any equipment and vehicles that are required in case of an emergency (police vehicles, ambulances, fire engines, etc.).

Access also needs to be provided for any vehicles and equipment that are used in the day-to-day maintenance of the stadium, such as trucks and mowers, mechanical ventilation systems and artificial lighting apparatus.

It is recommended that at least one larger access point, preferably at one of the corners of the pitch, is made available for this purpose.

C:3

Stadium safety and security

Guiding principles

Safety and security are the most important aspects in the planning, design, construction, running and management of any stadium. Experience has demonstrated the need to have in place a stringent but people-friendly safety strategy. The personal safety of those inside the venue is paramount and no expense should be spared to ensure that all spectators are able to watch and enjoy the match in a safe environment. Safety aspects of the design and construction should always be prioritised, even where this may be detrimental to factors such as comfort.

Every section of the stadium, including access and exit points, turnstiles, the main concourse, fire doors, VIP areas, and all player and media areas, should comply fully with national and local safety regulations and standards, with regard to both fire protection and health and safety.

Clubs, national associations and, not least, UEFA itself have gone to great lengths to ensure that all modern venues achieve extremely high levels of public safety.

All stadiums used in UEFA competitions must comply with the UEFA Safety and Security Regulations. Another valuable reference publication is the Guide to Safety at Sports Grounds (commonly known as the “Green Guide”) produced by the Scottish Office of the UK Government. It is vitally important that stadium developers and their partners are fully familiar with these publications from an early point in the project cycle.

Key safety and security requirements

The main aspects relating to the correct handling of safety and security in a stadium are:

- fire safety and prevention
- structural safety
- architectural design
- operational safety
- segregation of rival supporters

Fire safety and prevention

Major lessons have been learned from the fire-related stadium disasters of the past. To avoid future tragedies, extensive active measures (e.g. extinguishers and sprinkler systems) and passive measures (e.g. fire sectorisation and fire doors) need to be correctly implemented, in close consultation with the local fire department.

Modern stadiums are built using non-flammable materials such as concrete and fire-protected steel, and there are now very few elements in a stadium that present a clear fire risk. However, despite all of the advances in construction materials, no corners should be cut when it comes to adhering to the current fire safety guidelines and regulations issued by the fire service and local authorities.

Stadium designers should always work closely with the local fire department on their fire strategy. It may be also advisable to employ specialists within the design team who can develop a comprehensive fire safety strategy for the venue so that, once the stadium is operational, the emergency services have a full understanding of its layout and systems. Approval must be given by the necessary authorities at the design stage, with all final certificates to be issued upon completion.

Structural safety

The entire stadium structure must comply with national and local standards and building codes. This is particularly important with respect to the public seating and circulation areas.

Building safety standards and requirements vary from country to country, but it is essential that, in each specific case, the most stringent safety standards are applied to the design of the stadium.

As previously mentioned, UEFA uses the Guide to Safety at Sports Grounds (the "Green Guide") as a reference document for good practice. However, where local or national standards are more stringent than the Green Guide, then these should be regarded as the cardinal reference.

Architectural design

Safety should be the primary consideration for every detail of the architectural design. For example, slippery surfaces should be avoided for floors, there should be adequate lighting, clear signage, wide concourses and easy access and exit points, and non-flammable materials should be used throughout.

Safety barriers and handrails

Barriers should be installed wherever there is a risk of falling, or where there is a need to guide spectators. Safety barriers should be designed to resist horizontal loads and forces. Vomitory and radial gangway barriers should be designed to minimise the obstruction of sightlines.

In accordance with building control standards, the internal and external walls around spectator circulation areas must be capable of withstanding similar horizontal forces to the safety barriers.

The handrails or safety barriers on the front row of the upper tiers are particularly important. These can be placed lower than regular handrails, as the space in front of a seat is not considered as a circulation route in most building regulations, and hence the standard specifications are not applicable. Care needs to be taken to ensure that these handrails do not impede the vision of the spectators, yet it should be robust enough to provide adequate safety.

At the end of the aisle gangways, the edge of the tiers on the upper levels will require a high handrail (110cm) in order to prevent falls in this circulation area. It is understood that these barriers will partially impede viewing from the seats closest to the gangway.

Operational safety

All stadiums need to have a fully integrated safety and security strategy that covers the entire structure and its surroundings. It is vital that security be centralised and that those responsible for implementing the strategy have a full view of all major sections of the venue.

For ease of operation, the stadium staff need to ensure that CCTV cameras (closed-circuit television) are correctly positioned. The audio quality of the public address (PA) system needs to be high in order to ensure that important or emergency announcements are clearly audible throughout the venue.

All turnstiles, safety barriers, evacuation doors and exits must be fully operational and free of any obstacles.

The stadium design must include control rooms and meeting rooms for security staff, as well as adequate facilities for the police and first aiders. Furthermore, provision must be made for easy, direct vehicle access for emergency services.

Stadium control room

The stadium should have a centralised control room located in a prominent position in the bowl. The control room should have an unrestricted view of as many spectator areas as possible, as well as of the pitch.

The control room is the hub from which the stadium security officer and their team, together with representatives of the local authorities and emergency services, monitor and control all aspects of crowd safety and stadium management.

The control room must be fitted out with a full range of communication equipment, including the PA system and access control and counting systems. Control room operators should be able to monitor non-visible areas by means of a network of CCTV cameras and screens. The surveillance cameras should be linked to colour monitors and should have pan, tilt, and zoom functions as well as the inbuilt facility to take still pictures.

CCTV surveillance

CCTV cameras should be installed in all internal and external public areas inside and outside the stadium, and should be used to monitor any areas where there is potential for security problems.

During the design stage, the security consultant should provide a concise layout of the CCTV camera positions and requirements inside and around the stadium.

Sound and public address systems

All stadiums need a high-quality PA system to broadcast messages to the bowl area, the concourses, the toilets and all other public areas. In addition to relaying general match-related information, the PA system is also an essential part of the security strategy in emergencies, providing the means to relay clear and concise instructions to the crowd in the event that evacuation is necessary. It should not be vulnerable to power failure.

Scoreboards and video walls

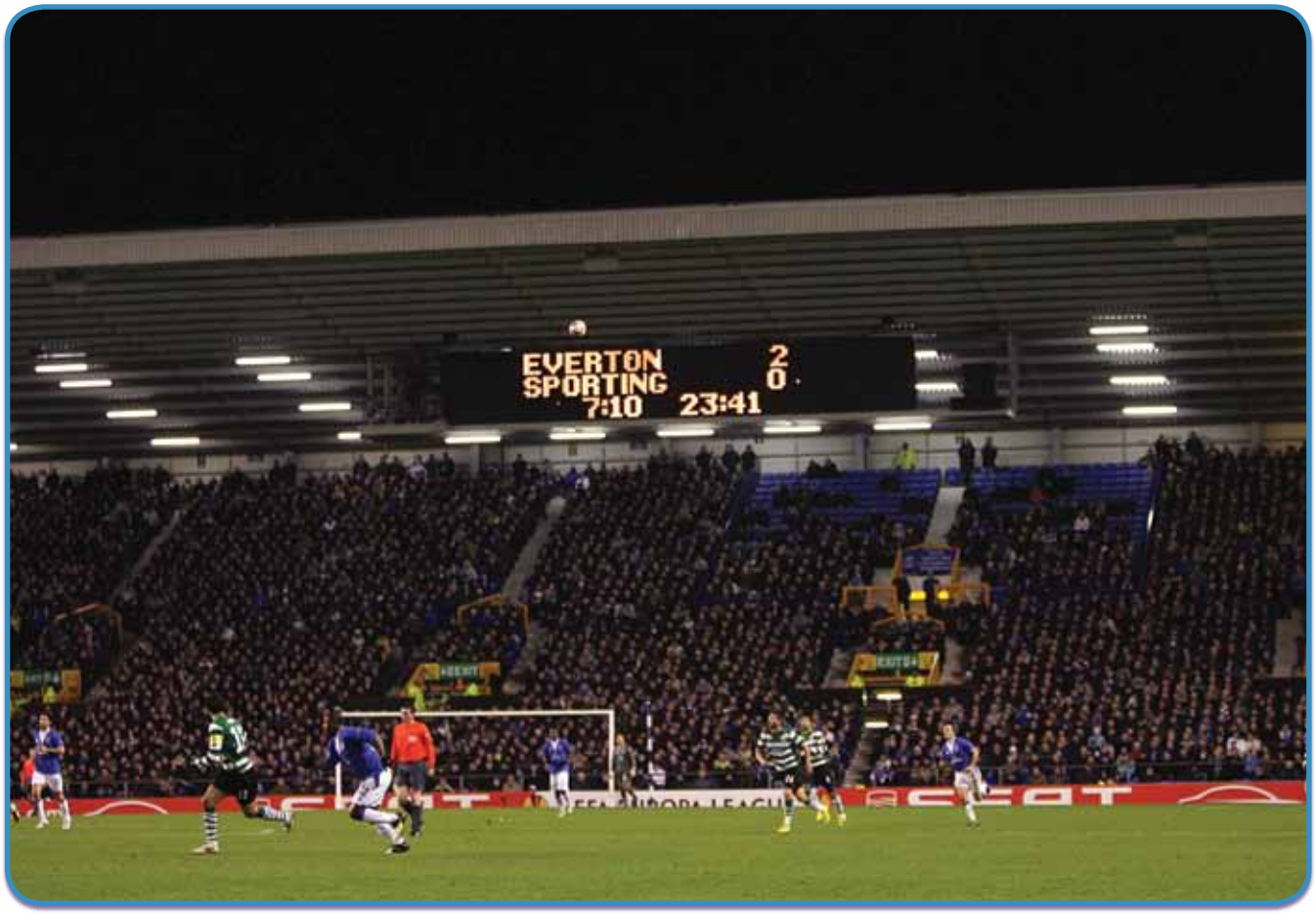
Most modern stadiums have large video walls or digital scoreboards that are used to broadcast match highlights and other announcements. They also serve a vital purpose in terms of safety, as they can be used to transmit video and text instructions to the stadium public in the event of an emergency.

Segregation of rival supporters

UEFA endorses the principle of fence-free stadiums for all competitions. The prevailing wisdom is that any form of fencing between the pitch and the spectators, or between groups of spectators, causes a sense of enclosure that is not in keeping with the modern-day football match experience.

Nonetheless, it is prudent to segregate opposing fan groups within different sectors of the stadium in order to prevent potential flashpoints.

A flexible, risk-based segregation strategy should be put in place. Each sector of the stadium must be self-contained in terms of welfare facilities, access, circulation and emergency evacuation provisions.



D

MAIN USERS AND FUNCTIONS

D:1

General user requirements

General standards of comfort

Long gone are the days when stadiums were basic concrete structures, configured to cram in as many spectators as possible, most of them standing.

The shift towards all-seater venues has ushered in a fundamentally new approach to the way spectators experience football matches. Not only has it ensured huge improvements in stadium safety; it also provides much greater levels of comfort.

Over recent decades, stadiums have improved significantly in terms of the level of comfort on offer, not just for VIPs but for all categories of spectator.

Particular attention is now paid to facilities for disabled supporters, with the recognition that they need special seating and access arrangements to ensure complete mobility within the stadium complex. Full details of what is required can be found in the UEFA-CAFE publication Access for All.

The trade-off between comfort and capacity is an issue that requires careful review. It follows that the more space allowed for each seat, the lower the stadium capacity, unless, of course, the overall size of the venue is increased, which will, in turn, increase construction and maintenance costs.

Very small changes in the seating configuration may have dramatic cost and revenue implications. Even so, today there is a growing tendency to slightly lower capacities for the sake of better viewing quality and spectator comfort. But any such decisions also need to take into account the spectator capacity required by UEFA or FIFA for international competitions.

A principal factor that can negatively affect the quality of a stadium is the poorly designed distribution of facilities, uses and spaces and/or ill-planned circulation systems which fail to take into account the movements of the different users within public and non-public areas of the building.

When planning circulation routes within a stadium, it is generally advisable to focus initially on the arrival and subsequent distribution routes of the general public. These will be determined by two main factors: seat location (i.e. the stand and level/tier) and the seating category (e.g. regular or VIP seats).

Identifying the user categories

Clear distinction must be made between the following users and their needs when designing circulation flows within the stadium:

- The general public
- VIPs and authorities
- Players, coaches and support staff
- Referees and officials
- Media
- Stewards and private security operators
- Maintenance staff
- Administrative staff
- Commercial concessions
- Emergency and public safety services

Organisational failures arise when the activities and circulation of any of these users have not been accurately anticipated in the initial design stages. It is therefore essential to produce a coordinated and integrated circulation plan that identifies the arrival point of each group, their internal distribution and circulation, and their final location before, during and after the match. It is important to note that proper accessibility should be provided for disabled people within all the above-mentioned groups.

D:2

Controlling circulation

Spectator access to the stadium

It is of great importance to carefully select the best method of entry to the stadium, and the procedure by which spectator access will be controlled.

Turnstiles are the most common entry control system, and there are a variety of different types available. A well-designed turnstile system will help to ensure ordered and controlled access and protect the safety of spectators. Turnstiles also enable a detailed head count to be completed, which means total attendance can be quickly calculated. In addition, they provide a check against the use of counterfeit tickets, given the tighter control at the point of access. All modern turnstile systems should have provisions for disabled access in place, unless alternative dedicated entry points are available.

Circulation design should focus on individual controlled access and rapid independent circulation from the exterior access points to the final internal destination of each category of stadium user before, during and after the match. This enables the stadium operators to provide adequate and efficient control measures throughout the duration of the event.

Concourses

The concourses are the passages inside the stadium through which spectators get from the main entrance to their seats. The concourse areas must be wide enough to

allow a smooth flow of people before, during and after the match and also, of course, allow for the safe evacuation of the stadium in the event of an emergency.

Even at times where crowd flow is at its peak (i.e. before and after the match and during the half-time interval), spectators should be able to circulate freely within the concourse areas, so that they can access the general exits, staircases, concessions and welfare facilities with minimum fuss.

Circulation within the stadium bowl

Spectators need to be able to move up or down the stadium bowl in order to get to and from their seats. Smaller, single-tiered stadiums may only require a system of gangways inside the bowl to facilitate this. However, stadiums with more than one tier will need a well-dimensioned “vertical circulation” scheme, which makes use of staircases, ramps, lifts and even escalators.

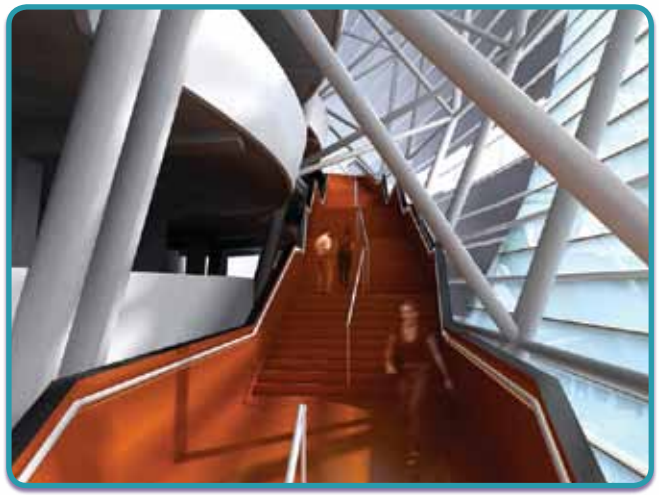
The staircases should be distributed in equal proportion around the stadium in order to adequately serve every section of the bowl, allowing easy access to the upper tiers and vomitories. They should be correctly dimensioned to fully and safely handle the volume and flow of spectators allocated to a given section of the stadium. The dimensioning of the treads and the handrails should fully comply with all national and international safety regulations.

If available, lifts are generally reserved for disabled supporters, VIPs and maintenance staff, and are located accordingly. Lifts are not usually designated for general use, as there would never be enough capacity to meet demand.

Signage

Clear and adequate signage is an essential requirement in any major building that will be used by large numbers of people and that has different points of access.

The signage should enable any person arriving at the stadium for the first time to understand precisely where they are, where they need to go and, just as importantly, where not to go. Good signage should be comprehensive, covering not just the main concourses and other public flow areas, but every single room in the building.



There are many ways to provide adequate signage in a stadium, both for the benefit of those accessing the stadium in normal circumstances and, vitally, to facilitate all evacuation and emergency measures to ensure a safe and speedy exit from the building by all users. Ideally, the stadium signage scheme should be indicated clearly on all tickets, so that spectators have in their a hand a "map" of how to reach their individual seat. It should also be available on the club or stadium website, enabling spectators to access it via their mobile phones or other internet-enabled devices.

Signage should always be in the language of the national football association. However, particularly where the venue is likely to be used for international matches, dual language signage is advisable, with English being the most logical secondary language. If a country has more than one official language, the stadium signage should reflect this.

All approaches to the stadium, including the entry/exit gates, doors and turnstiles, must also be adequately and clearly signposted using universally understood pictograms.

D:3

Public amenities and facilities

Food and beverage concessions

Food and beverage concessions are a vital part of the matchday experience for spectators and they are an equally vital source of revenue for the stadium operator.

These outlets are generally located at various points around the perimeter concourse, on each level. They should be distributed evenly to minimise queuing at individual points and to ensure that fans do not have far to go from their seats to purchase refreshments. Ideally, they should also be located near the vomitory entrances, so that they can be accessed quickly, especially before the match and during the half-time interval.

The stadium design should factor in the need for adequate congregation and queuing areas in the vicinity of the concessions.

Careful thought should be given to the range of hot and cold food on sale. Concession facilities need to be able to serve fans efficiently and quickly, but without compromising quality. Unlike stadium restaurants or bars located at street level, concessions are not usually open on a daily basis, but are reserved for matchday catering.

Special safety provisions will be required in any concessions where hot food is to be prepared, and these must be included in the stadium's fire strategy.

Merchandise outlets

Stadium operators are increasingly looking to maximise revenue from merchandising by expanding their on-site retail operations beyond the main shop to smaller merchandise kiosks located around the stadium concourse.

These additional units do not have to stock an extensive product range, but they should be able to offer the most popular items. Kiosks located in the concourse areas tend to benefit from impulse buying by spectators who might not go out of their way to visit the main club shop before or after the game, but who are tempted to make a snap purchase on the way to or from their seats.

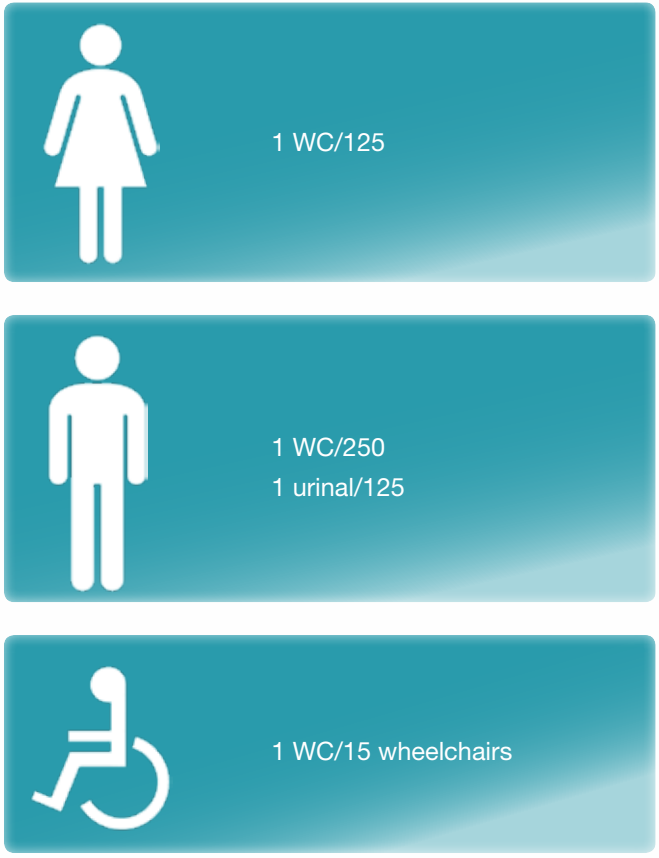
Toilets

One of the most important public facilities in a stadium are the toilets. These are normally located in the main concourses, and are positioned to make access from the seating areas as easy as possible.

When determining the number and ratio of toilet facilities, the latest UEFA and local standards should be consulted. Toilet facilities should be designed to cope with intensive use during short periods of time, as the majority of visits will occur before the start of the match, at half-time and after the final whistle. Hence, the design should facilitate the easy flow of people in and out of these areas during these peak times.

The ratio of men's toilets to women's needs to be established according to specific criteria defined by the club/association and in line with national guidelines. More and more women attend football matches and their needs must be just as well catered for as men's.

There must also be an adequate number of disabled toilets located at each level and equally distributed throughout the perimeter of the stadium. It is recommended that some disabled toilets also incorporate baby-changing facilities. Guidance regarding the minimum number/ratio of disabled toilets to be included will be available in local regulations and the UEFA-CAFE publication Access for All.



Minimum requirement for sanitary facilities is based on a ratio of 80:20 men to women for football

First aid facilities

A central first aid room must be provided and located in a position that allows easy access from inside and outside the stadium for all spectators, including wheelchair users, and also for emergency vehicles. It must be self-contained with its own toilet facilities, which should also be wheelchair-friendly.

In addition, every sector of the stadium must have its own clearly signposted first aid room, so that spectators do not have to cross between segregated sectors if they require attention or treatment.

First aid rooms must offer a comfortable environment. Doors and passageways should allow easy access for stretchers and wheelchairs, while walls and floors should be smooth and easy to clean. There should be sufficient storage space for all the required medical provisions.

The number, location and size of the first aid rooms, as well as the equipment provided, should be decided in consultation with the local health authorities.

D:4

Facilities for disabled fans

Modern buildings should offer unrestricted disabled access. In general, stadium designers should take care to include adequate access points, safe evacuation areas, suitable seating on all levels and dedicated toilets and refreshment areas for disabled fans, to ensure they have the same opportunity to enjoy the matchday experience as other spectators.

Disabled spectators may include people with limited mobility, hard of hearing and deaf people, partially sighted and blind people, and wheelchair users, as well as people with learning difficulties and other “hidden” disabilities.

Dedicated entrance gates for disabled fans must be provided. Everyone should be able to enter the stadium and access their seats without undue inconvenience, either to themselves or others.

Adherence to inclusive design standards will ensure that disabled spectators are able to move freely and safely within the main public and concourse areas while maintaining a sense of integration and inclusion. Ramps and specially configured lifts should be provided for wheelchair users to enable access to the upper tiers and other public areas.

It is advisable to create a series of refuges or “safe areas” which can be used in the event of an emergency. These should be located near the lifts and staircases, so that emergency services have adequate time to assist disabled fans out of the concourse area and to safety.

In the bowl seating area, designated positions for wheelchair users in particular should have an elevated view to provide them with a view that is comparable to, or even better than that available to general spectators. Each wheelchair position must be provided with an additional seat for a companion. This should preferably be adjacent to, but never in front of, the wheelchair space. More generally, seating for disabled fans should be located in a position where they do not present a hazard to themselves or others in the event of an emergency.

Extensive guidelines on facilities for disabled fans can be found in the UEFA-CAFE publication Access for All. This is essential reading and should be adhered to in addition to statutory local regulations relating to public buildings and event venues.

D:5

VIP and hospitality facilities

VIPs

The ability to provide high-quality hospitality for VIPs, including special guests, commercial partners and corporate clients, has become an important facet of modern stadiums and is an increasingly valuable source of revenue. Some clubs and national associations now go to exceptional levels to ensure their VIPs enjoy the best and most comfortable experience imaginable. VIP enclosures and hospitality facilities are therefore expected to be an integral component of the design brief.

VIP facilities

VIP facilities tend to contribute a disproportionately high percentage of overall revenue on matchdays. They can also generate additional income on non-matchdays, given that executive boxes can be hired out for business meetings, while restaurants and other high-end catering facilities can be used for corporate events.

The aim should be to provide VIP guests with an extremely high level of service, from the moment they arrive at the stadium until they leave. Every aspect of the VIP experience should be characterised by maximum quality and comfort.

The VIP enclosure should occupy a prime location in the centre of the main stand and be served by a private entrance, segregated from public and media entrance. VIP hospitality areas should also be completely separate from other public areas.

Dedicated parking should be available for those VIPs arriving by car. A separate entrance and reception area should be available for those VIPs arriving on foot. The VIP car park and entrance should have separate staircases or lifts that provide direct access to the VIP lounge area and enclosure.

Care must be taken to provide disabled access to, and use of, all VIP and hospitality areas. This should not be based on a minimum allocation in these areas but rather a general adaptation of these facilities for all disabled visitors.

VIP facilities can be subdivided into two categories: standard VIP areas and those restricted for VVIPs (Very Very Important Persons) such as dignitaries, celebrities and politicians. In both cases, VIP seating, either in the VIP enclosure or in private boxes, should be designed to offer greater comfort and space than the standard seats. VIP and VVIP guests expect to be able to enjoy an excellent standard of catering before, during and after the match and clubs will often employ top-class chefs to ensure that the food on offer is of the highest quality.

A variety of VIP packages can be developed, with a rising scale of prices to reflect the level of luxury provided. VIP packages may include services such as use of restricted access lounges, individual catering and hostess services, and possibly even hospitality fronted by ex-players or celebrities.

Skyboxes and open-plan VIP areas

Skyboxes are small enclosed rooms with a direct view of the pitch. Each box will generally have its own private allocation of seats, preferably located outside the box, but segregated from other seating, so that the guests can properly experience the stadium atmosphere but still enjoy a degree of privacy.

Skyboxes are very popular in modern stadiums as they can be hired out to local companies or individuals for the whole season, thus providing a guaranteed revenue stream which will be further enhanced by income generated from associated catering services.

The number, size and design of skyboxes varies from venue to venue, depending on the status of the club and the state of the local market. In some areas, demand for a regular corporate presence at the stadium makes the skybox the ideal option, while other companies will prefer to opt for seats within the main VIP enclosure.

In some stadiums, skyboxes include toilet facilities and even a small kitchenette, while in others they take the form of a simple furnished box space, with toilet and catering facilities available in a central VIP area.

The directors' box/president's enclosure

The directors' box or president's enclosure, is generally categorised as a VVIP area, especially in larger stadiums. There may be occasions when the club or association plays host to VVIPs or dignitaries (e.g. royalty or heads of state), and they will need to be accommodated in an exclusive area, segregated even from the other VIPs, benefitting from maximum safety and security levels.

The directors' box or president's enclosure may also have direct access to a room where club directors or chairmen can meet in private.

D:6

Media facilities

Members of the media should benefit from preferential access and movement within the stadium as they will need to interact with various other user groups (including players, coaching staff and perhaps even VIPs). Disabled access and facilities also need to be incorporated in all media areas.

The media areas are the press box/media sector, the stadium media centre (SMC) and/or media working area, the media conference room, the mixed zone (where the media have direct contact with the players for post-match interviews), the flash interview areas and the TV studios. These spaces should be designed and configured to ensure that both print and broadcast journalists have access to all the facilities and areas they need with minimum fuss, before, during and after the match.

The press box/media sector

While there is no fixed rule on the location of the press box/media sector, it should be in a central position, at least between the two 16m lines, with a vantage point that affords excellent views of the pitch and the rest of the stadium bowl. In practice, it is generally located in the same stand as the directors' box and the team dressing rooms, i.e. normally the west stand. The press box should include a variety of seating configurations tailored to suit the particular needs of the written press and radio or TV commentators. There should be a mixture of seats with and without desks. The former should be large enough to comfortably accommodate a laptop and notepad, while the latter should also include space for small TV monitors.

The press box should be fully segregated from other seating areas, as it is important that representatives of the media are protected from any possible interference from spectators in the adjacent sections.

The press box should be directly accessible from the media centre, either via a dedicated vomitory or, if the two facilities are located on different levels, via dedicated lifts or staircases.

The press box should also have access to all three areas of the stadium where journalists are provided with direct contact with the players and coaches: the media conference room, the flash interview areas and the mixed zone.

TV and radio commentary positions

TV and radio commentators need to be separated from other media (and of course from regular spectators) in enclosed areas that are totally protected from the elements. Commentary positions are generally small areas with a good view over the pitch and should be fully equipped to handle all the technical requirements for broadcasting, with TV monitors, adequate power supply and a large number of sockets, adequate lighting and soundproofing, etc. Commentary positions should benefit from reasonable (but not total) noise protection – TV and radio journalists aim to relay a sense of the atmosphere, but without interference with the broadcast quality.

TV studio facilities

The range of TV studio facilities available will depend on the size of the stadium. However, at the very least, venues should be equipped with several small studios capable of use for live broadcasts, together with the necessary editing facilities.

Studios must be acoustically treated and be easily accessible from the dressing room areas and the mixed zone. Ideally, studios should have a panoramic view of the pitch and be enclosed behind glass.

TV camera locations

Nowadays, most of the revenue of top clubs and national associations comes from TV rights, so ensuring the optimal location of cameras is a key priority. This may not be the case with smaller clubs, however they should still pay special attention to this aspect should the occasion arise in the future.

Comprehensive TV coverage requires a large number of camera positions, located at different points around the stadium. Detailed specifications for these are provided by the broadcasters themselves and can also be found in other technical publications.

TV cameras need to be placed on raised platforms as it is vital to ensure that the view of the cameras is never impeded by spectators at any time. This may mean that some seating capacity has to be sacrificed.

Pitchside photographers and reporters

Photographers working at pitch level should be allocated specific positions behind the pitchside advertising boards around the perimeter of the pitch, with a special area designated for pitchside presentations before or after the match. Pitchside reporters should also be designated specific areas on the same side as the team benches, close to the main tunnel. All these media personnel should have dedicated and controlled access to the pitch area.

Flash interview areas

Flash interview areas are small areas located immediately adjacent to the route taken by the players and coaches from the pitch to the dressing rooms, to enable reaction interviews to be conducted immediately after the game.

These areas should have an open configuration with sufficient space for advertising/sponsor screens to be placed behind the interviewees. As they are located in a busy part of the stadium, care should be taken to ensure that they are situated out of the sight and way of passers-by.

Further interview spaces, known as super-flash positions, should be located between the pitch and the tunnel entrance. As a rule, these measure 3m long by 3m wide, and again should be configured to avoid any obstructions or interference by passers-by.

Media conference room

All stadiums need a well-appointed and fully functional media conference room or auditorium, designed to host media conferences with players and coaches both before and after the match.

In addition to its primary purpose, the conference room or auditorium should also be suitable for accommodating non-football events, which are a valuable source of additional revenue. Possible alternative uses include company presentations, seminars and training courses, and even screenings of films and live match broadcasts.

The auditorium should benefit from the best possible acoustic and lighting conditions. In larger stadiums, which are likely to be hosting international matches, interpreting booths should be installed to cater for the needs of foreign journalists and broadcasters. These booths should be enclosed and soundproofed, with an uninterrupted view of the raised platform/stage.

Mixed zone

The mixed zone is the area where the media can conduct informal interviews with the players and coaches as they leave the dressing rooms after the match. It is always located between the dressing rooms and the car park or coach pick-up point. A low physical barrier should be erected to separate players/coaches and journalists. The circulation space for the players and coaches should not be too narrow as it becomes the main exit for other officials (kit men, etc.).

From a logistical point of view, the mixed zone is one of the most complex circulation points in the stadium, as journalists will need to access it from the various media areas (press box, media centre, media conference room).

Media centre

The media centre is a centralised, back-of-house working area for the written press, photographers and other members of the media that should be equipped with all the necessary technological support needed for smooth and comprehensive media coverage.

For major events where international media presence is particularly high, such as the UEFA European Football Championship, additional media areas will probably be needed, possibly outside the main stadium building.

The media centre should be easily accessible from the dedicated media parking areas, as well as from the press box and other commentary areas.

Like the VIP facilities, the media centre should be self-contained, with its own lounge areas, catering facilities and toilets. Most importantly, it should have a full range of communications and other equipment needed by journalists and photographers, including a variety of internet connectivity options (Wi-Fi, ISDN lines, etc.) and telephone lines, as well as general office equipment such as photocopiers and printers, and a large number of power points. Ideally, the media centre should also include a secure storage area where cameras and other equipment can be kept safe.

Commentary control room

The commentary control room houses all of the editing and communications equipment. It is the communications hub connecting the commentary positions to their respective telecommunications networks. It should be located as close as possible to the actual commentary positions, as all commentary feeds need to be channelled back to this area in order to be connected to the telecommunications network.

Broadcast compound

This is an area allocated for television outside broadcast (OB) vans, where media organisations have their production and technical facilities. This can vary from a simple lay-by or parking area immediately adjacent to the stadium, in the case of smaller venues or events with limited broadcasting requirements, to a large open area (sometimes the size of a football pitch) able to accommodate a large number of vehicles, together with temporary power supplies (e.g. mobile generators), which will be needed at large venues or high-profile events with extensive broadcasting requirements.

D:7

Player facilities

Arrival and departure

It is essential to ensure that the teams are able to arrive at and depart from the stadium in complete safety. Dedicated access routes and parking for the team coaches and officials' vehicles need to be planned in a way that allows for water-tight security control. Exclusive parking zones should have direct access to the dressing rooms and other restricted access areas such as the players' lounge.

Dressing rooms

Dressing rooms need to be functional and well laid out. For official UEFA competitions, home and away team dressing rooms must be equipped with identical facilities.

The actual changing facilities should be configured to enable the coach to deliver team talks to all of the players from a central point in the room. Shower and bath facilities should be located adjacent to the main changing area.

In addition, there should be separate toilets and washroom facilities. If the budget allows, additional facilities such as saunas, Turkish baths, Jacuzzis and pools may also be included within the dressing room complex.

Dressing rooms need to have direct and easy access to the pitch via the tunnel.

In larger or medium-sized stadiums, it may be advisable to provide additional dressing room areas for other uses, such as community sports events or concerts. These can be smaller and less fully equipped than the main dressing rooms.

Warm-up area

This is a large open indoor space, directly accessible from the dressing rooms, where the players can warm up ahead of the game. Some stadiums include an artificial grass surface in the warm-up area.

Family room/players' lounge

This is an area designated for use by players and their families before, during and after the game. It should be comfortable and secure and have its own catering facilities. It may also include TV screens and a games area. It should be located close to the players' car park, with direct, or at least simple, access to the stadium seating area allocated for use by players and their families.

D:8

Facilities for match officials

Similar to the players and coaching staff, referees and their assistants require maximum safety and security on arrival and departure, and within the stadium complex. They need specially designated car or bus parking spaces and must have direct access to their own dressing rooms.

Changing facilities for match officials

At least two dressing rooms with dedicated shower and toilet facilities should be available for use by match officials. A separate room should also be available in case the referee team contains both male and female match officials.

A bell system should be installed and linked to the two team dressing rooms, so that the referee can advise the players when it is time to make their way to the tunnel ahead of the match and at the end of the half-time interval.

Other facilities for officials

A range of administrative and support areas which can be used by match delegates, and UEFA or FIFA officials at international matches, should be included in the vicinity of the dressing rooms.

Match delegate's room

All stadiums should have a dedicated room for match delegates. Current regulations stipulate that this room should measure at least 10m² and should be equipped with telephone, fax and internet connections.

Medical examination room

The medical examination room should be within easy reach of the pitch and designed to be accessible for stretchers. It should be equipped with a good hot and cold water supply, as well as a power supply that is sufficient to service all the necessary medical equipment.

Doping control facilities

The doping control area, which is mandatory at any venue staging competitive matches, should include a waiting area as well as at least two observation rooms and toilet facilities.

Administrative and meeting rooms

The number of rooms earmarked for administrative use, either by staff or external officials, will be proportional to the size of the venue and level of matches it is likely to be staging. It is advisable to have a medium-sized meeting room that can be used by the event management team.

Rooms for UEFA officials

Any venues that are likely to host international fixtures should include a number of multifunctional rooms that can be used as office areas before and on matchdays by UEFA or FIFA officials, e.g. UEFA venue directors and their teams. These rooms should be equipped with all the necessary communication resources (Wi-Fi, telephone, fax, etc.). A storage room should also be available nearby. Smooth access to the pitch is essential.

D:9

General administration, maintenance and servicing facilities

Administrative, maintenance and servicing requirements will vary widely depending on the size of the stadium. This section provides an illustration of the sort of facilities that may be needed.

All stadiums will need separate office and storage facilities to service the various commercial concessions and catering services housed within the venue.

Administration facilities

The stadium manager and support staff will require adequate office space and facilities, located in an area that has easy access to the main sectors of the stadium. As a rule, these spaces do not need to be particularly large or complex, but they should be properly equipped to provide the stadium management team with everything they need for the day-to-day administration of the venue. A separate office and meeting room for the stadium manager are a standard requirement, while further open-plan facilities, toilets and kitchenette areas should also be incorporated into the design according to the number of administration personnel employed at the stadium.

Maintenance facilities

Stadium maintenance is a complex operation, involving a variety of different teams and departments, each of which is likely to need its own office, workshop and storage facilities. In some cases these will require a lot of space.

In the case of pitch maintenance, there will need to be sufficient storage space to accommodate the grass-cutting equipment and, where required, artificial lighting and ventilation machines.

Extensive storage space may also be needed for cleaning equipment, such as the large ladders and movement systems that are used to reach the higher roof areas. Moreover, dressing rooms with showers and toilets should be made available for use by any personnel who are engaged in physical or dirty work.

Servicing and loading bays

A steady inflow of goods, materials and equipment, normally delivered by lorry or container, means that the stadium will need a dedicated loading bay located close to the main storage or service areas. It should also be located close to the waste management facilities to expedite disposal of large volumes of waste.

D:10

Cleaning and waste management

The stadium design must ensure that cleaning and maintenance will be as efficient and simple as possible. This is important both from an environmental and financial point of view.

Simple details such as flipped seats in the spectator areas and the incorporation of large open spaces into the design will promote ease of access for the cleaning personnel and the equipment they need to use, thereby reducing the time and cost required to clean and maintain the main areas of the stadium.

Stadiums generate a large and varied amount of waste, especially on and after matchdays. It is therefore important to develop a detailed and coherent cleaning and waste management strategy to ensure efficient storage and disposal.

An environmentally responsible waste management strategy will make provision for the sorting and segregation of the different waste types. At larger venues, compactors may be required.

Special consideration needs to be given to organic waste from the catering facilities. This will need to be handled specially, in cooled areas, to avoid the spread of unpleasant smells throughout the venue.

E

THE STADIUM STRUCTURE

E:1

The bowl structure

Stadiums need to be developed using the best resources and materials available in any given country, as well as in accordance with the international and local technical and legal regulations in force at the time.

In some countries, steel is the preferred option for the main structural beams of the bowl, while in others stringent fire regulations or cost/availability preclude its use.

Given that stadiums are formed of large spaces with substantial structural spans, concrete tends to be the simplest and most cost effective structural material. In those countries where concrete is locally produced and steel has to be imported, it is certainly the most cost-effective option.

If concrete is to be used, a decision must then be taken on whether to opt for in situ concrete or whether a prefabricated concrete structure will be more cost effective.

The most appropriate structural system will not only depend on the country in question and the regulations in force with regard to structural solutions; it could also be influenced by the preferences of the main contractor, whose decision is likely to be affected by factors such as time and availability.

The use of prefabricated beams and stepped seating for the stadium bowl offer the advantage that fabrication will be completed prior to delivery on site, which can substantially reduce the overall time frame of the construction process.

However, it may still be better to use steel or in situ concrete, as there may not be enough beam elements in the structure to justify prefabrication. This tends to be the case for smaller stadiums.

E:2

The roof and facade

Stadium envelope strategy

Covered seating is not mandatory, so each stadium developer needs to weigh the various benefits – notably added comfort and protection against the elements – against the considerable additional costs involved.

In northern countries, roof coverings provide protection from the rain and wind, while in southern countries they offer shade from the sun and heat. In certain conditions, a retractable roof may be the best solution. This will enable the stadium to be used in extreme weather conditions and will also make it a more viable as a venue for other events such as concerts.

A good roof design needs to take into account factors such as shading of the pitch and adequate exposure to sunlight. Lack of light will mean less than optimal conditions for the turf, reducing the lifespan of the pitch and possibly necessitating expensive artificial lighting systems to supplement natural light sources. It is also important that the roof and facade allow for adequate natural ventilation of the pitch. If this is impeded by the design, artificial ventilation systems may be required, and these are also expensive.

The effect of contrasting sun and shaded areas on the pitch can affect the players, which, in turn, is likely to have a negative impact on the quality of the game; it could also prevent good TV coverage. These risks should be studied in advance and pre-empted in the design of the stadium envelope.

Options for covering the bowl

Covering a stadium inevitably requires complex structural solutions because of the need to eliminate all visual impediments from the seating. Very large structural spans will be necessary, and these are both costly and technically very difficult to engineer.

The architects and engineers will have to determine the best structural design for the stadium roof. There are many options available. Their decision will depend on whether the stadium is to be fully or partially covered, on the specifics of the architect's design concept and, of course, on the available budget.

If the stadium is only to be partially covered, priority is generally given to the main stand, which is normally located to the west of the pitch, and then to the opposite (east) stand.

F

MECHANICAL AND ELECTRICAL INSTALLATIONS


JVC
SUM LCD
KIA MOTORS
Canon
Carlsberg

F:1 Floodlighting strategy

General requirements

The cost of equipping a stadium with adequate floodlighting is significant, and it will be difficult to incorporate this within many low-budget projects. However, the general consensus is that all but the smallest local stadiums should have floodlights if possible.

Even if floodlighting is not to be included, it is advisable to include the necessary provisions within the design and infrastructure to allow them to be incorporated at some point in the future.

Floodlighting is mandatory at any stadium used for major tournaments and competitions, given that so many matches now tend to be played in the evenings or even at night. This is a tendency that has accelerated due to increased TV coverage; TV rights are generally much harder to sell if a match is played outside prime-time viewing slots.

In some parts of Europe, artificial lighting will be essential due to the limited hours of daylight, particularly during the winter months.

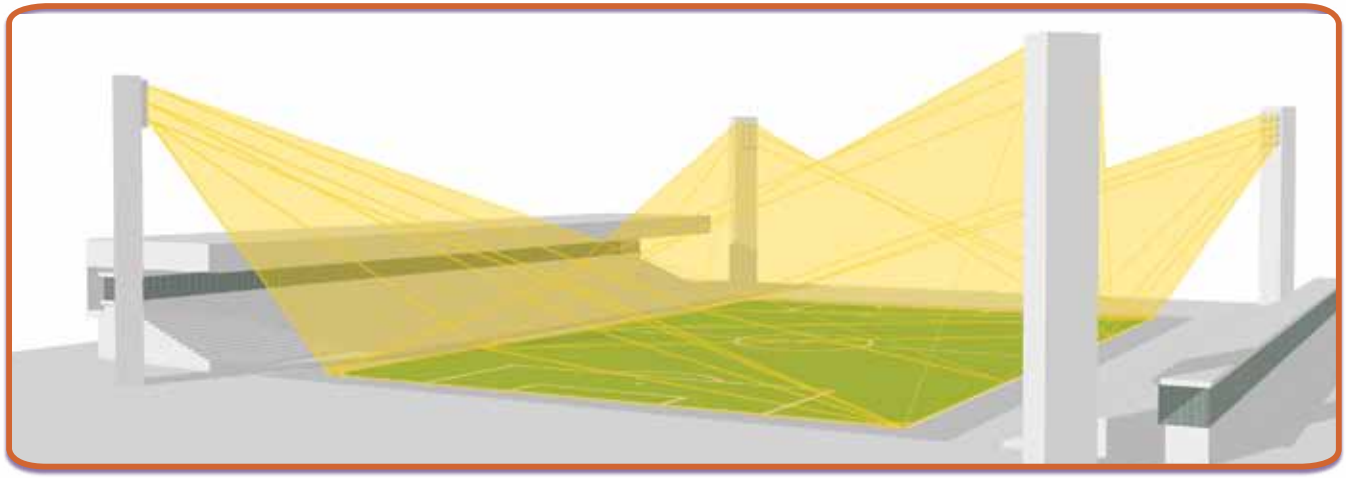
Floodlight configuration

There are different options for the location and style of floodlighting. Stadium lighting manufacturers can provide detailed advice on this matter.

The options for the positioning of floodlights within a stadium are, however, limited. The lights need to be elevated to a certain height in order to avoid horizontal glare, although in fully covered stadiums the limited space available below the roof canopy means that this will rarely be an option.

Stadiums that are fully covered will therefore need to have a ring of lights fixed to a perimeter gantry positioned around the pitch at roof level, while stadiums without a roof will tend to opt for a tower configuration. It is also possible to use a combination of roof and tower lighting.

The floodlight design should not lead to any light contamination of the surrounding neighbourhood. The floodlights should be correctly focused on the pitch, and the height and appearance of the lights should not give rise to objections from the local community.



Lighting levels

Modern stadium lighting should ideally be compatible with the latest TV requirements. The introduction of high-definition (HD) TV, and more recently 3D TV, has significantly altered specification requirements.

It is advisable that the floodlighting design allow for varying intensities of light, to suit the requirements of a particular event or purpose. For example, for training sessions, or during post-match cleaning operations, full competition lighting levels will not be required. Correctly designed adjustable lighting levels will not only facilitate a flexible and coherent lighting strategy; it will rationalise energy usage and therefore cut costs.

Good floodlight design should permit uniform lighting levels over the entire area of the pitch and reduce the shadow effect caused by the players to an absolute minimum. This is achieved by ensuring the correct positioning, height and angle of the lights.

Emergency power supply

An electrical supply failure is not regarded as a valid reason for cancellation of a match. A stadium therefore needs to have an alternative electrical supply to cover the required electrical loads in the event of a power failure or an emergency. This is particularly relevant to those stadiums which are dependent on floodlighting.

In the past, a common problem with floodlights was the long time-lag experienced before full lighting levels were restored following an electrical fault. Modern floodlight design has overcome this issue. Nowadays, any delay before play resumes after an incident with the main power supply should be minimal, as should be the need to rely on emergency generators.

The emergency supply must also be able to cover the power requirements of all CCTV cameras and equipment, emergency lighting, the PA system and any safety-related installations within the stadium complex.

F:2 Additional lighting requirements

In addition to the pitch floodlighting, it is extremely important to provide adequate lighting in all other parts of the stadium, especially in public areas where there will be high levels of spectator circulation.

The choice of lighting solutions can have a tangible impact on the architectural design. Selecting suitable lighting levels, colour and light fixtures will all help to enhance the overall aesthetic quality of the venue.

Lighting solutions need to be tailored according to specific user requirements. For example, the light specification for VIP restaurants and boxes will be very different from those for the players' changing facilities.

It is now common practice to include a specialist lighting consultant within the project design team, as imaginative lighting solutions can heighten dramatic effect and add to the spectacle.

F:3

Cooling and heating systems

Cooling and heating in public areas

This is an issue which should be analysed in the context of a variety of factors, such as the location of the stadium (i.e. whether it is in a hot or cold climate), the available budget, the expected comfort levels and the range of activities to be staged.

It is generally recommended that heating or cooling systems should not be included in the concourses and other general public areas, as the cost of installation and day-to-day operation is likely to be prohibitive.

Conversely, it is recommended that cooling and heating systems be installed in all internal VIP and VVIP areas, as well as the skyboxes.

It may also be advisable to install them in administration areas and certain areas used by the public on a daily basis (e.g. restaurant or leisure facilities), as these may also be may be needed for commercial use, where user comfort is essential.

All other enclosed areas, such as dressing rooms, media areas, delegate rooms and kitchens will require heating, but not necessarily cooling. In each case the specific requirements should be assessed in more detail when developing the stadium brief, based on the client's objectives and expectations.

Cooling and heating the stadium bowl

Increased recognition of the need to counteract the effect of extreme hot or cold weather has prompted stadium developers and designers to look at ways of creating more comfortable conditions for spectators in the bowl area itself. There have been a lot of recent advances in this area, however stadium developers should examine the benefits carefully before embracing such systems, especially in the context of any sustainable and responsible design objectives.

Cooling

In extremely hot countries, where, even in the evening, the heat can make for an uncomfortable spectator experience, stadium cooling systems are increasingly common.

There are various systems available, and a distinction needs to be made between air cooling and air conditioning systems, but the objectives and end results are similar. In each case, enormous volumes of air need to be treated in order to bring the ambient temperature down to acceptable levels for the spectators and, indeed, the players.

Cold air is generally heavier than hot air, so the tendency is for cold air to stay on the ground, providing a positive benefit for the players in particular. However, the cost of achieving this, and the energy consumption involved, do not always tally with responsible "green" or sustainable design criteria.

Stadium developers in some countries have now attempted to address this challenge by drafting in consultants to look for ways to produce clean energy specifically for use in stadium cooling systems. The solutions being adopted include solar panels, photovoltaic panels and wind generators. Stadiums using these installations can supply clean energy back into the main grid on a day-to-day basis, and draw out energy on matchdays as needed.

Heating

Heating stadiums in northern countries can be challenging. In cold climates, stadiums should ideally be covered to leverage the benefits of a heating system, given that hot air rises. Ultimately, the energy requirements, cost and efficiency of the proposed system will be dictated by the amount of protection provided by the stadium roof. In the case of extreme cold, it may be necessary to waive any requirements for matches to be played outdoors and have the stadium fully covered.

Clearly, spectators in these extreme environments should be able to watch a match in as much comfort as possible and technological advances are helping to facilitate this. The technology to provide the large volume of heat required to cover the needs of an entire stadium is certainly now available. However, the amount of energy and the cost involved can be huge, and it certainly cannot be regarded as a “green” option.

It may be possible to harness more sustainable energy sources for heating, such as wind and geothermal power. In both cases, the technology and available energy sources are still expensive and not entirely efficient, but there may be grants or other subsidies available that would make them viable options.

F:4

New technologies

Commercial viability

Modern stadium designs seek to maximise the benefits of technology, with new innovations becoming available all the time. If cleverly used, multimedia and interactive technologies can be harnessed to enhance the spectators' experience and enjoyment of the match.

Smaller stadiums are likely to be more restricted in their budgets but should still be in a position to take advantage of some, if not all, technological advances. Stadium designs should always make provision for cabling channels and signal repetition that will allow any new technology to be incorporated in the future. Advance provision costs much less than subsequent adaptation.

Implementing new technologies

Devices such as mobile telephones, PDAs and GPS systems play an increasingly prominent role in our daily lives. Stadium developers can exploit these technologies to enhance their own operations, media services and, perhaps most importantly, interaction with the spectators.

There are more and more specialist companies that provide bespoke technology-based solutions specially designed for use in stadiums. Multimedia installations such as video walls, TV screens and automated information systems will continue to become more and more sophisticated and versatile. 3D TV, for example, is already a reality. Higher quality video screens, information panels and internal

stadium information networks will all help to enhance the spectator experience in the future.

Wi-Fi-enabled stadiums provide enhanced connections for mobile phones and other internet-linked devices, permitting spectators to access a wide range of information and statistics relating to the event they are attending, which can enhance their overall experience. Complex systems can be developed to interact with personal handheld appliances such as telephones and games consoles that can provide fans with multimedia content relevant to the event and, indeed, to other events taking place elsewhere.

The scope for expanding online commerce within the context of football events is huge. Many fans already purchase their match tickets online. However, there will come a time when spectators will even be able to order refreshments and have them delivered without even leaving their seats, thus avoiding the often rushed and stressful process of trying to purchase food and drink during the half-time interval.

In conclusion, technology is set to play an increasingly prominent part in stadium design and construction in the future. While smaller stadiums may not have the financial resources to take full advantage of every advance and innovation, experience shows that new technology which is initially expensive eventually comes down in cost, making it affordable to more and more stadium developers.

G

SUSTAINABLE STADIUM CONCEPTS


BLUES

G:1

Sustainability in stadium design

Green architecture

The term “green architecture” is used to describe environmentally conscious and sustainable design and construction principles and techniques.

The architecture of a green stadium should embrace environmentally acceptable design options and solutions before and during construction and throughout the venue’s usable life. Both FIFA and UEFA support the need for sustainable design in football stadiums. FIFA’s Green Goal initiative sets out a comprehensive set of objectives for sustainability in modern stadiums.

The key objectives of any green programme are to achieve a reduction in the consumption of water, a more efficient use of energy – both in terms of production and use – good waste management, and also a reduction of the carbon footprint relating to transport of materials during the stadium construction process and travel to and from the stadium.

Many might argue that the cost of designing and building an environmentally friendly building outweighs the benefits. However, all stadium developers should be encouraged to take a positive and responsible stance by incorporating as many sustainable principles into the whole project process as possible. Contrary to common perception, such initiatives are not always more costly; many simply require a more careful and conscientious design and thought process. Those initiatives that are more expensive can always be considered for implementation at a later stage, as and when finances permit.

The design team’s objective should be to incorporate initiatives and proposals that:

- reduce general energy consumption;
- reduce waste and carbon emissions;
- introduce the means to generate energy locally;
- promote the rational use and recycling of natural resources, primarily water.

The implementation of such measures will help reduce running costs and overheads, providing direct and long-term financial benefits to the stadium operator.

Regulating sustainable design

There are a number of bodies that issue certifications for buildings designed and constructed in line with strict sustainability guidelines. The most prominent of these bodies are BREEAM (in Europe) and LEED (in the USA). Both of these bodies provide an extensive list of parameters and checklists which need to be followed and implemented, after which the designated certification body assesses the level of compliance and issues the appropriate certification for the building accordingly.

Both FIFA and UEFA recommend that all modern stadiums adhere to the standards stipulated by one of

these two certification bodies. However, it is ultimately down to the stadium developers themselves to be fully aware and supportive of the need for an environmentally responsible approach, to proactively include sustainable initiatives within the project brief and to direct the design consultants accordingly.

Passive and active sustainability measures

Reduced energy consumption and sustainable design can be achieved through what are known as passive and active measures.

Passive measures

Passive sustainable measures are those that can be achieved entirely by means of good urban planning and architectural design, without recourse to any mechanical or technological solutions or other active measures.

Historically, most vernacular (or local) architecture has tackled the problem of extreme weather conditions by using passive techniques such as shading from the sun using screens or narrow streets, cooling and ventilation towers, thick walls and grass roofs.

Active measures

Active measures are those which use technological systems and installations to produce energy in order to heat or cool a building in a more efficient manner. Such systems may have higher up-front capital costs, but these can often be offset in the long term by the savings accrued in running costs.

Key concepts for sustainable buildings

From the earliest stage in the stadium project, environmentally friendly and sustainable principles can be integrated into the process. The main areas where sustainable initiatives can be implemented, through both passive and active measures, fall into three broad categories: **energy, water** and **materials**.

Energy

There is a whole range of measures that the stadium developer can take in order to reduce energy consumption, from the selection of the location to the methods and materials used in the design and construction process, and, of course, for the actual day-to-day running of the stadium once it is operational.

Transport

All initiatives designed to promote and maximise use of public transport will be beneficial, as reducing private vehicle use will significantly reduce the stadium's overall carbon footprint.

Building services systems

The energy-efficient design of heating, ventilation and air conditioning systems is vital to reduce energy

consumption and running costs. It is equally important to establish and implement the optimal management strategies for these systems throughout the life of the building.

Facades

Building facades that provide thermal as well as acoustic insulation will enable big savings in heating and cooling costs.

Evapotranspiration

This is the cooling effect created by wind or ventilation through trees and other flora. The landscape design around the stadium can harness the benefits of evapotranspiration, as air mass that circulates through trees located close to the stadium will create a cooling effect during the summer. In winter, these same trees will provide protection against prevailing winds.

Energy-efficient lighting

Use of energy-efficient lighting throughout the general building areas can drastically reduce energy consumption and costs. Low-consumption sodium lamps are the recommended option.

Natural light

Making use of natural daylight wherever possible within the design will drastically reduce the need for artificial lighting and, therefore, energy consumption.

Natural cooling

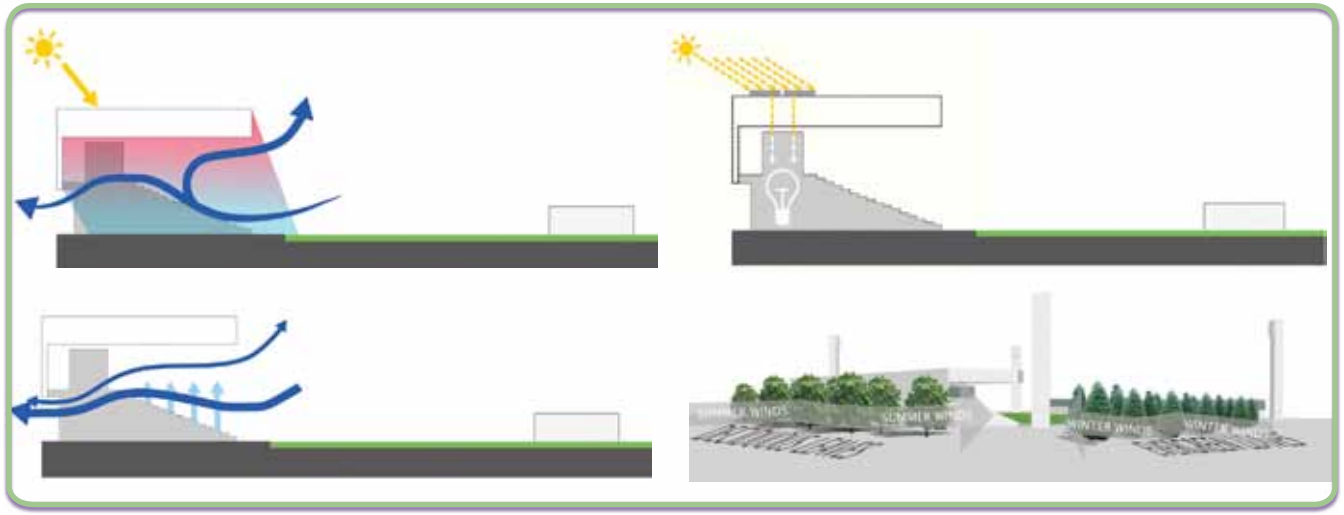
Sun-shade protection can be provided by the roof structure and covering. Using sun protection elements (e.g. louvers, overhangs or false facades that are free of highly heat-absorbent materials) will help prevent surfaces from overheating and will naturally cool external areas that are hidden from the sun, thus omitting the need to install artificial cooling systems that consume large amounts of energy.

Natural ventilation

Natural ventilation can contribute to temperature control and improve stadium air quality, reducing the risk of heat-related discomfort, which is likely to occur when large crowds congregate, and preventing damp and surface condensation. Designs that include good natural ventilation will also reduce the need for energy-intensive mechanical ventilation and cooling systems.

Solar panels

Natural heat generation from solar panels can be used to reduce a stadium's dependence on conventional sources and also reduce overall energy consumption. For example, hot water for sinks and showers can be provided by the collection, storage and use of low-temperature solar energy produced by solar panels.



Photovoltaic panels

Photovoltaic panels produce electricity whenever sunlight shines on them. They require little maintenance, create zero pollution and require no mechanical operation. The installation of photovoltaic panels on stadium roofs has proved to be very effective.

Wind energy

Wind is now a major source of energy in many parts of Europe, and wind turbine technology is advancing rapidly. It may be viable to install a series of small wind turbines in the vicinity of the stadium to produce electricity for internal use, or to feed into the local grid if there is a surplus.

Co-generation

Co-generation refers to the harnessing of the heat produced during electricity generation. Traditionally, this heat was simply dissipated into the atmosphere. However, co-generation schemes enable it to be used for stadium heating systems and/or the production of hot water.

Water

Stadium developers should encourage and promote the more responsible use of water, through reduced consumption and recycling.

Availability

The ready availability of water will vary depending on the country and specific location. Safe drinking water is scarce in many countries. The methods for treating the water available and the way it is then used are crucial factors in any stadium design.

Rainwater harvesting

The benefits of collecting rainwater include lower fresh water use, reduced energy and chemical consumption and increased water conservation. Rainwater can be channelled from the roof and pitch into temporary storage facilities for treatment and later used for pitch irrigation.

Recycling

Water from showers and other “clean” areas (known as grey water) can be recycled for reuse in the toilets to achieve substantial water savings. In some cases, agreements may even be reached with local sewage plants to draw from their recycled water to service the toilets, and also irrigate the pitch.

Waterless urinals

Waterless urinals that use a “trap insert” filled with a sealant liquid instead of water are another means of reducing water consumption.

Materials

The responsible selection of construction materials can have major environmental benefits. Materials that have been recycled or have environmentally friendly certification should always be given preference where possible.

Material sourcing and manufacture

It is not only the materials themselves, but the means by which they have been produced and sourced that is important. Construction materials sourced close to the stadium will reduce transport costs and, hence, lower the carbon footprint.

Material recycling

The choice of materials, their fabrication, construction, maintenance, demolition and disposal has repercussions on both the environment and on the health of users, hence the recycling of materials should be actively encouraged.

Waste management

Waste from construction sites is a major environmental issue, as is the day-to-day waste of energy through poor management. Waste-conscious site management and maximum use of recycled materials should be promoted to counter unnecessary waste.

Once operational, the stadium needs to have strategies and systems for managing the waste produced by the users. This needs to be carefully addressed both by the stadium operator, who should employ a system for segregating organic and recyclable waste, and also by the end recipient of the waste being generated.

It is equally important for stadiums to have a comprehensive waste management and treatment plan. Waste has a big impact on the environment, therefore careful thought should be given to which materials are used and the impact of their disposal should be properly anticipated.

G:2

Sustainable architecture for people

Blue architecture: localisation not globalisation

The promotion of sustainable building design, based on the need to save energy, reduce emissions, and respect the planet, has greatly influenced the way we think about architecture and construction. However, there is often less clarity as to how this approach affects the comfort and well-being of the end-user.

The concept of “blue architecture” places the emphasis on the need for human well-being and comfort, both psychological and physical, which should be an integral feature of any sustainable building design. It can be broadly defined as sustainable architecture for the planet and for people. Blue architecture deals with simple but important issues such as human scale, psychology, culture and ergonomics. Furthermore, it encourages a design sensibility and interpretation that seeks to go beyond the client’s basic requirements and thus aims to give the project added value.

Blue architecture also focuses on the importance of creating a sense of place and encouraging social interaction, which is especially significant in buildings such as stadiums, where the idea of fostering community is very relevant. This can be promoted through a variety of additional facilities and activities within a stadium complex that can provide the community with much needed leisure facilities, without forgetting the commercial benefits that these will bring to the stadium developer.

This design philosophy can be encapsulated by the slogan “localisation not globalisation”, in that it seeks to understand the localised and individual essence of any given project rather than treating a building as a generic production line commodity.

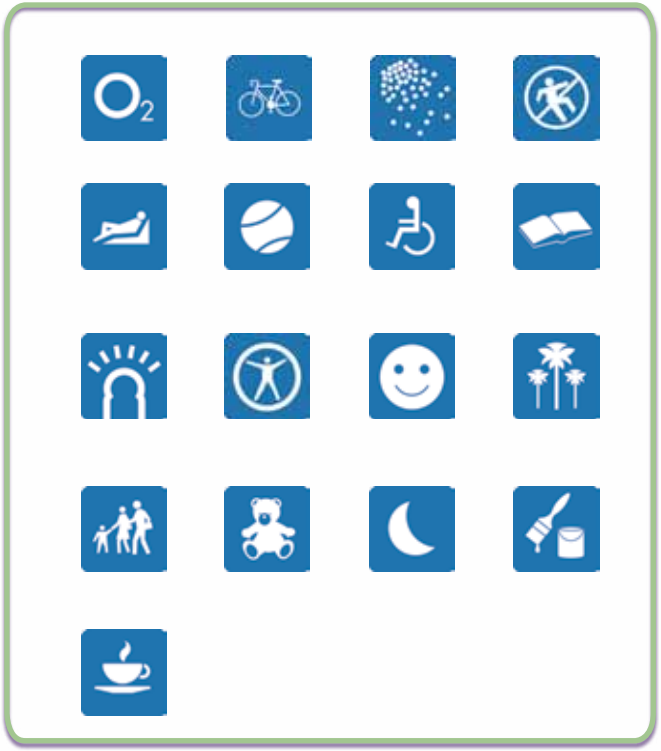
The core objectives of stadium designers and developers who embrace the blue architecture philosophy are:

- to foster the well-being, health and comfort of the users through a human-centric design;
- to design with a human scale, for example, by creating pleasant environments and sequential architectural routes;
- to create a sense of place by incorporating user-friendly and adequate access to the stadium, meeting areas for social events, plazas, courtyards, amenities, gardens and promenades;
- to advocate a flexible approach to the stadium design by creating diverse and multifunctional spaces, thus expanding its public appeal and exploiting its marketability;
- to encourage the use and enjoyment of common spaces to enhance social interaction.

The following guidelines outline some of the ways in which stadiums can be made more people-friendly.

Club/team identity

Regardless of the size or status of a stadium, it should be possible for the club/team’s identity to form an integral part of the structure, for example, by incorporating the team colours and emblems into the design.



Local/regional identity

The local/regional context can also be emphasised within the design concept. A stadium should become a local icon that symbolises the pride and unity of the community.

The facade could incorporate motifs that reflect the local geography, traditions, designs, colours, etc. Measures such as this can help intensify the emotional bond between the users, the local community and the stadium.

Traditional and cultural values

It is important to find ways to incorporate local traditions and culture within the stadium design and use. The traditional can often be interwoven with the contemporary to great effect.

Surroundings and context

A proper understanding of the surrounding environment and urban context will help ensure that the stadium is fully integrated into its neighbourhood. Design work should always be undertaken with a sensitive and holistic approach to produce a building that merges into, and enhances, the surrounding urban fabric and does not clash with it.

Transport systems

Eco-friendly or low-impact transport can be encouraged by ensuring that, in addition to good access to the public transport infrastructure, there are adequate pedestrian routes and cycle paths within the stadium complex and in the surrounding area, to encourage pedestrians and cyclists.

Views and perspectives

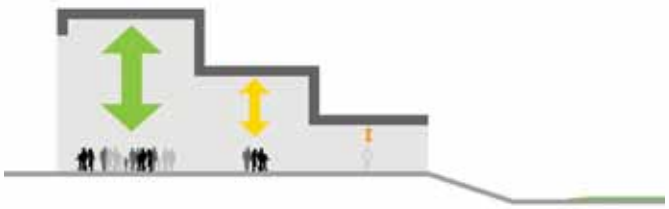
It is desirable to create clear sightlines and perspective views of the stadium, both from afar and close up, as this will help promote a positive perception of the new building. Making use of existing visual axes, such as a major boulevard approach to the stadium, or taking advantage of highly exposed frontage views from busy roads or motorways, can help the stadium to make a positive, and dramatic, mark on the urban landscape.

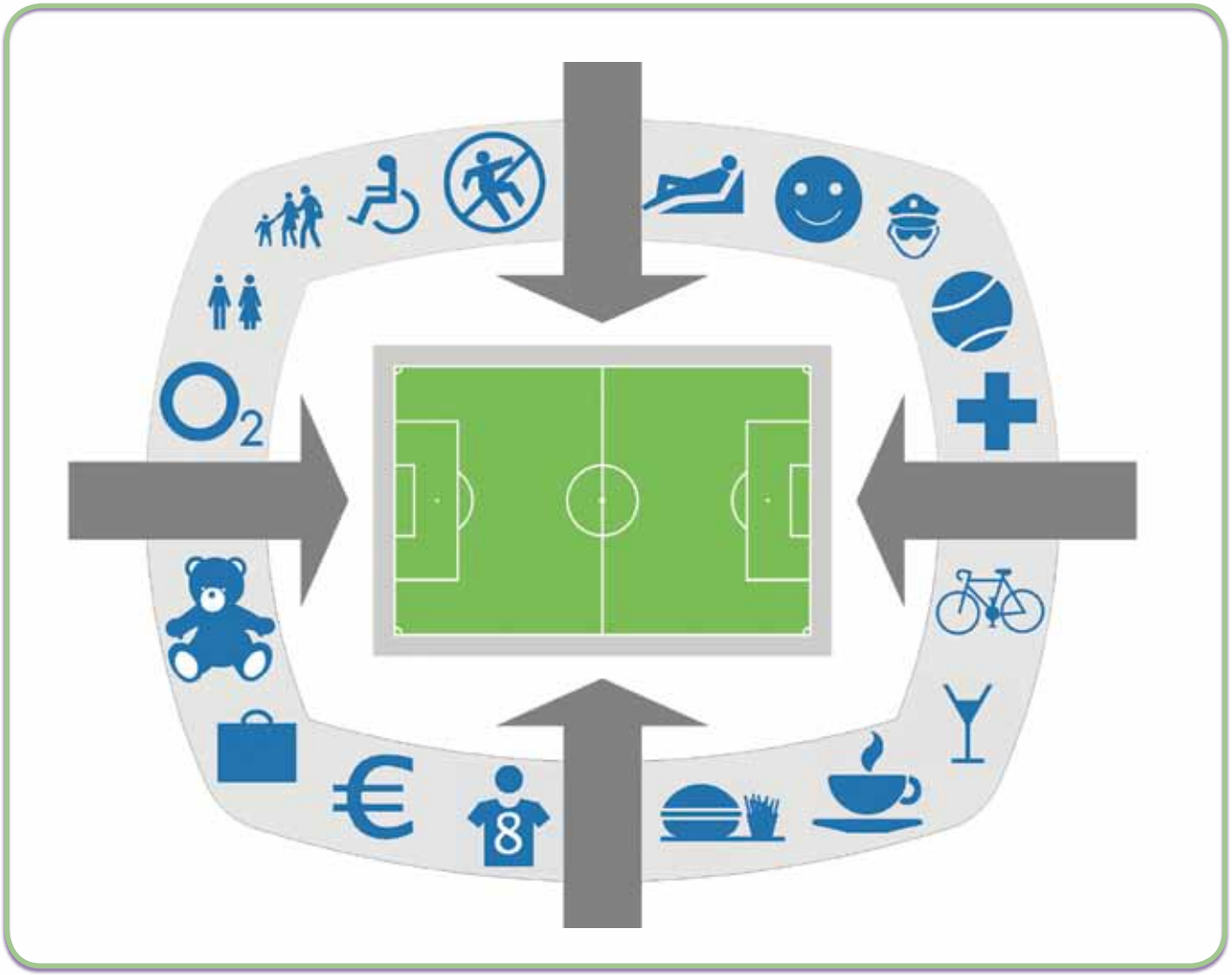
Leisure and recreational facilities

Recreation/play areas, gyms and sports facilities, rest areas, etc. will add value to the stadium, by promoting health and well-being and by increasing opportunities for social interaction.

Social facilities and amenities

The integration of activities and facilities that promote social interaction and encourage family participation will add real value to the overall stadium offering. These





might include facilities such as a club museum or visitor's centre, a children's play area, a nursery, family-friendly restaurants, etc.

Commercial facilities

The inclusion of cafeterias, restaurants and high-street services such as banks and travel agents not only provides additional revenue streams; it can reinforce the stadium's position as a focal point for the local community.

Cultural and educational use

Stadiums have huge potential to be used as cultural and educational spaces. Library or reading areas, multimedia spaces, and exhibition and gallery spaces are just a few of the possibilities that can be explored in this sphere.

Landscaped spaces

Spaces such as plazas and courtyards, landscaped transition areas and water features will visually enhance the stadium complex and they will also help to produce a more people-friendly environment.

Psychology and health

A stadium is more than just the sum of its physical parts. In order for it to become more than just a functional building, but one that is attractive and comfortable, it needs to satisfy certain psychological needs. Entrance areas for large volumes of people should be spacious with

high ceilings. Conversely, it is often desirable for spaces such as rest areas and bars to be more intimate in terms of their dimensions and design. The objective is to stimulate all of the human senses in order to create an overall feeling of well-being and to avoid creating spaces that alienate the user.

Accessibility and ergonomics

Easy access, circulation and orientation (e.g. clear visual lines and signage) are crucial components of any user-friendly building. From the macro scale right down to the details, all features of the building design should be conceived with human ergonomics and comfort firmly to the fore.

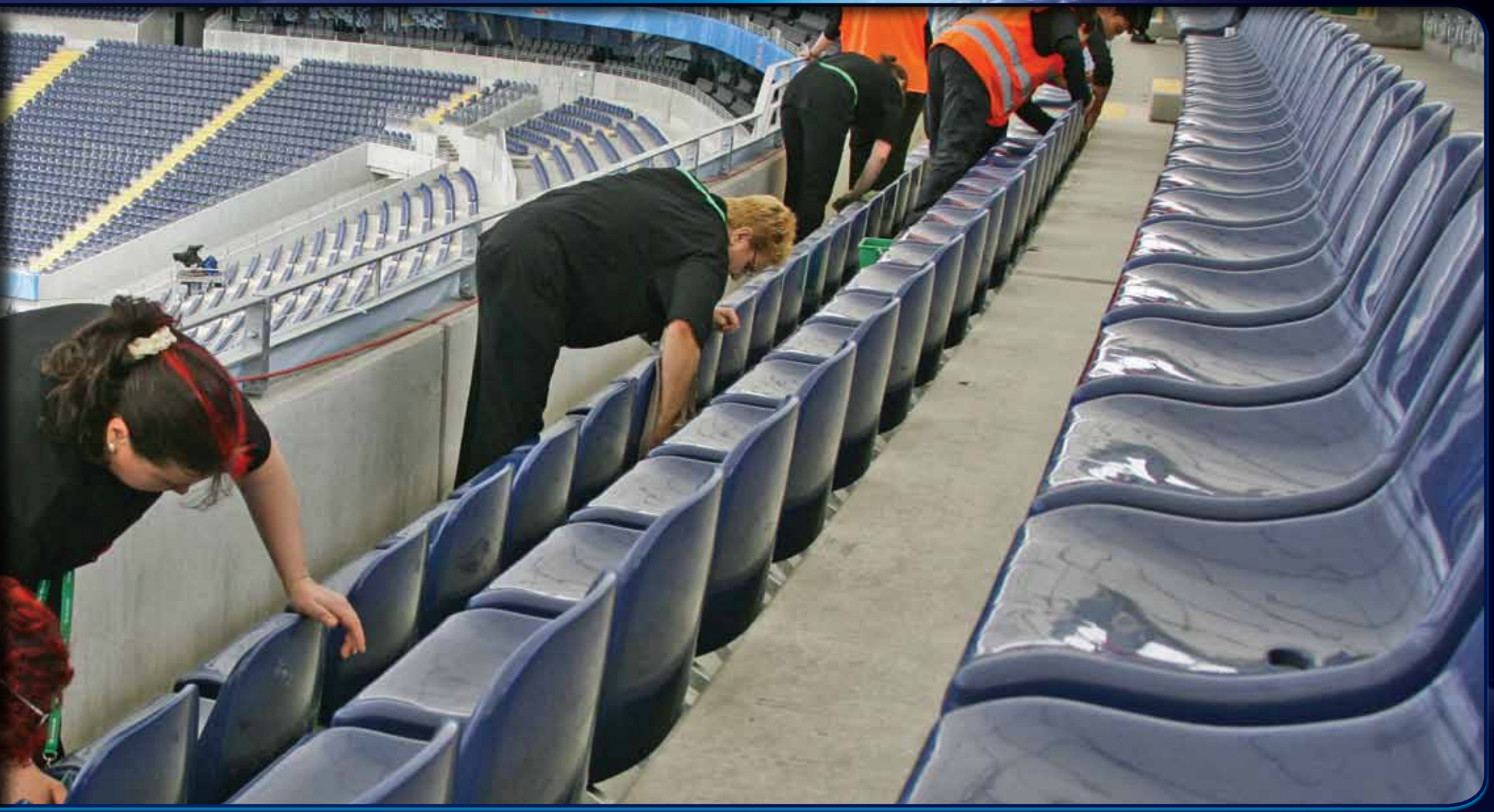
Sensory stimulation

A variety of design techniques – thermal, acoustic, visual, tactile and olfactory – can be used to enhance the human senses and feeling of comfort, either consciously or subconsciously. For example, differing intensities of light – whether natural or artificial – can be used to stimulate the senses, as can the use of flora, colours and textures.

These are just a few of the many possibilities that can be incorporated into the design in order to produce a stadium that places the user at the heart of the concept.

H

GENERAL STADIUM MAINTENANCE



H:1

Stadium facilities manager

Maintenance and cleaning are vital in ensuring the proper functioning and longevity of the stadium, and the well-being of those who use it. The basic structure, the stadium envelope, the mechanical and electrical installations and the finishes, fixtures and fittings must all be properly cleaned and maintained. The overriding objective is to ensure that the building is safe and fit for purpose. Maintenance and cleaning go hand in hand with health and safety; if the former are neglected, the latter will be jeopardised.

Maintenance and cleaning are key issues not just once the stadium is operational, but also during the design and construction phases. In the long run, the stadium developer, will reap the benefits of implementing proper cleaning and maintenance procedures. The primary advantages are:

- reduced running and operational costs;
- prolonged durability and fitness for use;
- integrity of the original architecture and maintenance of high visual standards;
- health and safety;
- enhanced public image.

Failure to implement a proper cleaning and maintenance programme can result in soaring costs, unexpected and undesirable remedial works and the need for premature refurbishment (ranging from superficial finishes to major structural works). More importantly, as mentioned, it can also jeopardise the health and safety of the public, with potentially tragic consequences.

While all the various design consultants will have a direct input into different aspects of the maintenance and cleaning requirements, the key person within the management team responsible for overseeing the correct operation and maintenance of the building is the facilities manager.

The facilities manager oversees the maintenance of the building structure and the various architectural components and installations, but also has direct dealings with the stadium staff, caterers, commercial operators, etc., all of whom have an impact on the maintenance and cleaning management of the building.

Ideally, the facilities manager should have considerable experience of stadium buildings and should be introduced as early as possible during the process. It is useful if, during the design phase, the facilities manager can learn about the stadium's design intentions and functionality directly from the design consultants. Their presence can also be invaluable during construction, so that they grasp a clear understanding of the stadium directly from the builders, installers and suppliers. Conversely, an experienced facilities manager can advise on specific issues such as choice of materials, mechanical and electrical installations and general design issues.

H:2

Design stage

Of the many factors that will have a major bearing on the maintenance and cleaning of the stadium building, the most significant are:

- the need to cope with intensive pedestrian traffic;
- the potential for vandalism;
- heavy vehicle traffic on matchdays and for other events;
- the exposed nature of the stadium building, making it vulnerable to extreme weather and dust;
- the need to clean and maintain large areas;
- the difficulty of access due to the height of the building and free-standing/cantilevered roof structures.

The designers will need to consider all the variables that can facilitate and reduce cleaning and maintenance requirements. With this in mind, they should ensure:

- adequate resistance to and/or protection of all building elements from heavy traffic (both pedestrian and vehicular);
- special measures for dealing with exposure to the elements and the contrast in extreme conditions from winter to summer;
- special anti-vandalism measures;

- suitable materials that are fit for purpose and avoid the need for intensive maintenance and cleaning, and which are also readily available and easy to replace at little cost;
- simple construction details and fixings that allow for easy repair or replacement;
- combinations of materials that are compatible in terms of their reaction to wear and tear and exposure to the elements, as well as their maintenance and cleaning requirements;
- direct consultation with all the different manufacturers, suppliers and installers as to the suitability of the materials and their specific maintenance and cleaning requirements.

One of the fundamental aspects of the building design is to provide safe and easy access for maintenance and cleaning operations. All areas and elements should be accounted for. For public areas, the architects should seek to design large open and geometrically simple spaces to allow for large industrial cleaning and maintenance equipment. For areas such as the roof and facade, general floodlighting and other remote installations, the architects will need to specify special equipment and requirements for cleaning and maintenance (e.g. cherry pickers and special access gantries).

All of the above measures and provisions should be well documented throughout the design phase and should ultimately be incorporated into the building maintenance and cleaning strategy, which aims to ensure the continual integrity of the building as well as to provide the stadium developer with a clear overview of costs, both at the initial construction phase and during the subsequent life cycle of the stadium.

An equally important document that needs to be formulated in conjunction with the maintenance and cleaning strategy is the health and safety plan, which is a comprehensive manual describing in detail all of the necessary measures and safeguards associated with maintenance and cleaning, with particular focus on safe access for personnel.

The health and safety plan should also include assessments of any potential risks to workers, staff and the general public, together with proposed remedial measures. The plan should form part of the package of statutory project documents that are required to obtain the necessary planning and building licences.

The building's maintenance and cleaning requirements, and particularly the associated health and safety aspects, will need to be discussed and coordinated during the design phase with a number of third-party bodies, namely the official health and safety authorities (including fire brigade), as well as the public utility providers (electricity, water, etc.), which will need to gain access for maintenance and inspection purposes.

At the end of project design phase, it is crucial to include in the construction tender documents instructions for the main contractor to supply "as-built" drawings for all components of the building (layout plans, services installations and special components), as well as all the relevant maintenance manuals and instructions. In many cases, the stadium developer may request prices for further post-completion maintenance contracts within the main tender. Alternatively, these contracts may be concluded separately with individual sub-contractors, suppliers and installers after completion of the works.

H:3

Construction stage

Adequate maintenance and functioning of a building are directly dependent on its proper and robust construction. Materials, services and workmanship must all comply with the designer's and manufacturer's specifications. Therefore, close and diligent supervision is required on site, as well as rigorous snagging at the end of the construction process. It is essential to close out and remedy all latent defects that could otherwise become a major maintenance problem at a later stage.

At the end of the construction process a fully comprehensive building in use manual should be prepared and submitted to the stadium developer. This should generally comprise:

- 'as-built drawings of all components of the structure, architecture and mechanical and electrical installations;
- maintenance and cleaning manuals, together with details of the expected life cycles of the components;
- recommended testing and inspection periods for all key structural components and services installations – from special testing to routine/annual inspections;
- all relevant health and safety measures, detailing access and procedures for all aspects of stadium operations.

In many parts of Europe, the building in use manual may be a statutory prerequisite for obtaining the necessary building occupation or operational licence .

H:4

Building in operation

It is important that the stadium developer understands that they have a legal duty of care to properly maintain a structure that will be open to the public and used by large numbers of people. This applies equally to new stadiums and refurbished ones.

It is vital that the maintenance, repair and cleaning requirements and systems are properly understood, adequately planned and documented, and adopted and implemented by a team of proficient and well-trained operatives, working under the supervision of the facilities manager.

All cleaning and maintenance procedures should follow the necessary health and safety instructions set out in the relevant maintenance manuals and directives. These should be regarded as "live" documents, to be updated and adapted throughout the stadium life cycle with details of any new repair, refurbishment and improvement work, along with any recommendations for further action to be taken. This work should be carried out by a vigilant, proactive and safety-conscious management team and staff who can identify, or even better, anticipate problems and react accordingly.

It is vital that regular and detailed testing and inspections are carried out before, during and after matches, with a view to minimising potential risks to the spectators and staff alike. Inspections should cover all aspects of the stadium operations and structure, including:

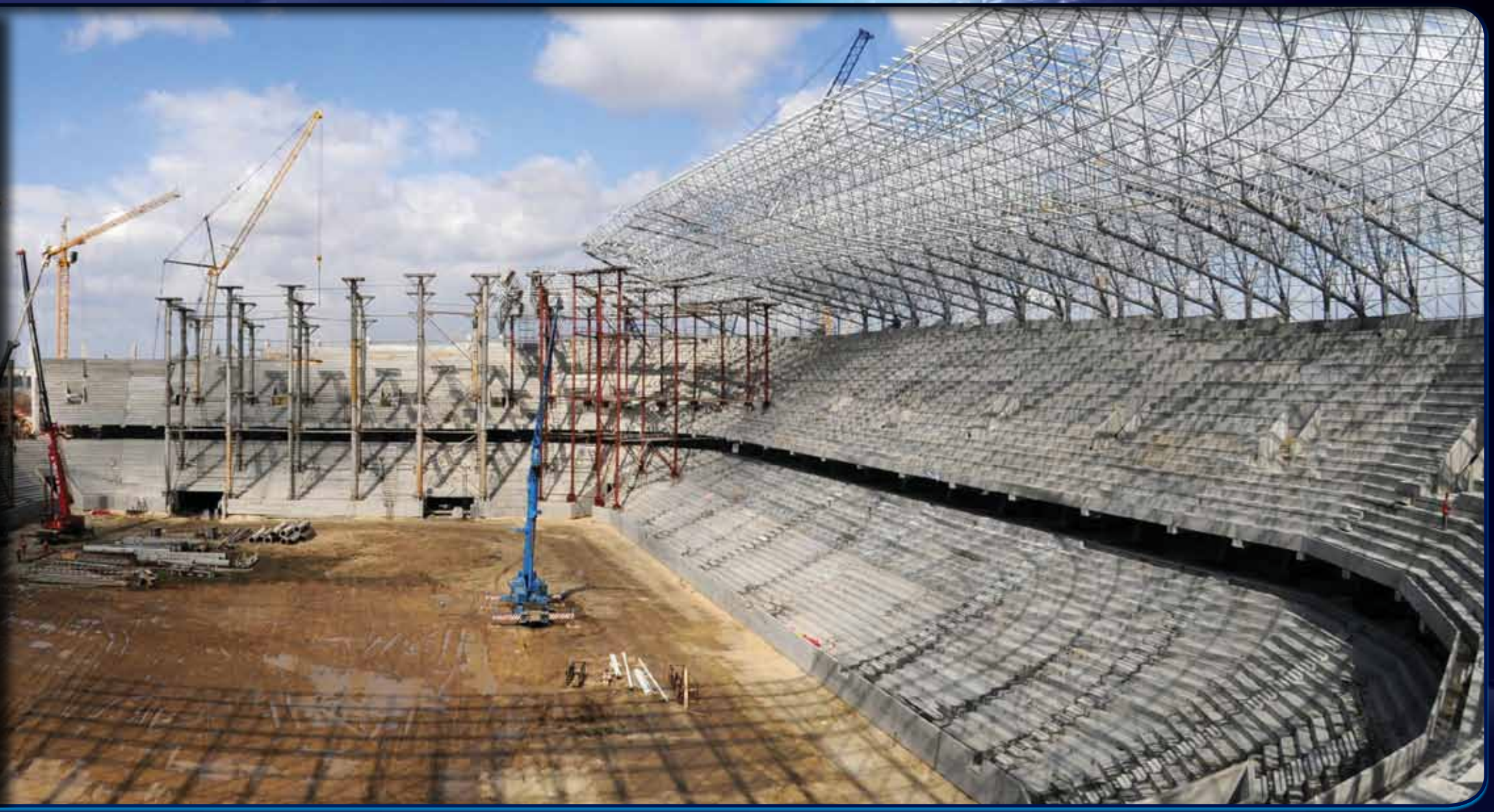
- fire safety systems;
- stadium operation and communication systems;
- emergency power systems;
- structural soundness – checks for damage or corrosion;
- all access routes and concourse areas;
- all welfare facilities.

The inspections should also ensure that all components and areas remain fit for purpose, as well as maintaining a high standard of appearance.

Ultimately, good maintenance and cleaning depends on being able to provide the necessary resources both within the building itself (special equipment and storage facilities), as well as a realistic budget to cover in-house running costs and the hiring of specialist contractors as and when required.

I

THE CONSTRUCTION PROCESS



1:1

The tender process

The tender process is one of the most important stages in the construction of the stadium. It is essential to select the correct tender route, as this will have a significant bearing on the overall project costs and the success of the construction process.

Invitation to tender

There are numerous factors that need be evaluated in order to decide who should participate in the tender for the stadium contract, and via which route.

In principle – and this applies to any of the routes chosen – all the potential contractors need to demonstrate solid finances, technical competence and suitably qualified personnel. The calibre of the on-site team is of paramount importance and it is therefore essential to interview prospective key team members.

Stadium projects require extensive technical capability and experience, and the process for selecting the main contractor or construction manager needs to be rigorous and tailored specifically to the requirements of the project.

The primary part of the construction work will relate to the concrete or steel structure, hence it is advisable that contractors specialising in such structures should be given preference over those with a background in buildings with a predominantly interior design component.

Selecting the best procurement route

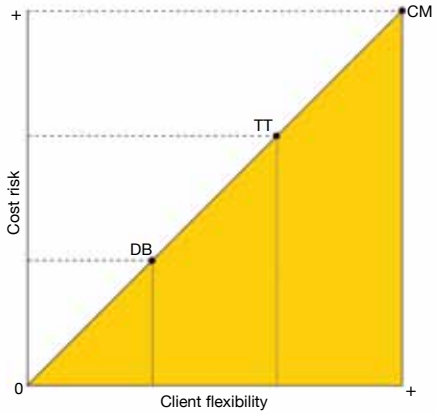
Procurement is a complex process. The route chosen will depend entirely on the characteristics and objectives of the stadium developer.

In the case of smaller stadiums, it is better to opt for a simple tendering route and to avoid complex procedures that require extensive professional and construction management teams.

In broad terms, the various tender and construction processes can be categorised as one of three alternative management strategies: traditional tender; construction management and design and build.

These three options can be analysed and compared using two key criteria: cost and client decision-making. More specifically, the choice of route taken will depend on the specific requirements of the client, on their desired level of control and on whether or not they need the final cost to be fixed and non-negotiable.

As clearly shown in the diagram comparing the three tender options, the greater the flexibility the client wants regarding site decisions, the higher the cost risk will be; conversely, limiting the client's ability to make site decisions will generally result in a lower cost risk.



DB - Design build
TT - Traditional tender
CM - Construction management

Traditional tender

The traditional tender remains the most popular option for developing stadium projects. Taking this route, the client approaches design professionals, architects, engineers and other specialist consultants, in order to put together a complete project document in which each and every aspect of the stadium is defined in detail.

In this scenario, the client is able to oversee all aspects of the project, from its inception to the production of the final tender document. They need to have a strong in-house project management team that is able to communicate its specific requirements to the architect and engineers.

The objective of both the client and the design team is to produce a clear, concise and complete tender document, comprising architectural and engineering plans that set out

a comprehensive and detailed design for the stadium. These plans are backed up by extensive written specifications which establish the quality and characteristics of the materials to be used in the construction.

The traditional route requires the final tender document to be carefully coordinated and checked before it is signed off, as in the resulting contract any items or requirements that are not included in the original tender will come at an extra cost to the client, most probably at a premium rate.

When the tender document has been completed it is sent to a number of prospective main contractors, who will then submit a tender for the project and give the client a fixed price based on the project plans, specifications and bills of quantities.

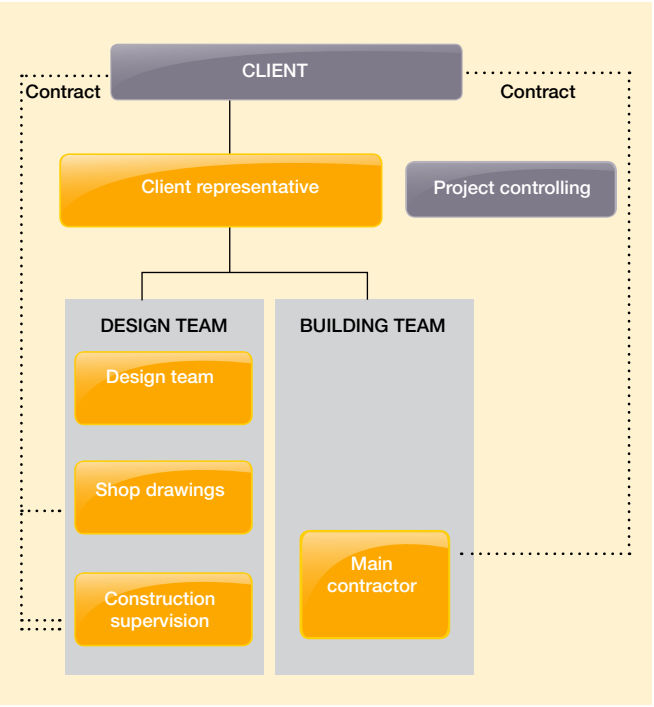
The client has maximum control over the stadium design, but less control over the final cost submitted by the contractor. However, the latter is contractually bound to provide the specified quality and finishes.

Positive factors

Cost

As there is only one contract between the client and the main contractor, the final building cost is defined in the agreed contract. The client will therefore only need a relatively small coordination and management team to ensure full compliance by the contractor with all the contract conditions.

Traditional tender



Responsibility

The client has limited responsibility for on-site operations. They are only responsible for issues concerning the site boundaries, public highways and adjoining sites and buildings, while the main contractor is responsible for all activities carried out on site, including all health and safety issues.

The main contractor bears sole responsibility for all elements of the project developed or constructed by the various subcontractors. This is particularly important for the client and the site architect in the event of any disputes or claims relating to any aspect of the execution of the works.

Larger contractors tend to have their own technical departments who check and validate all aspects of the construction on site. This can provide the client with added assurance that the work has been executed properly, given that the main contractor accepts full responsibility for adhering to the methods and assuring the quality defined in the project.

Time

Time frames for completion are clearly stipulated and guaranteed in the contract, allowing for penalties to be applied if these are not fulfilled.

Negative factors

Variations

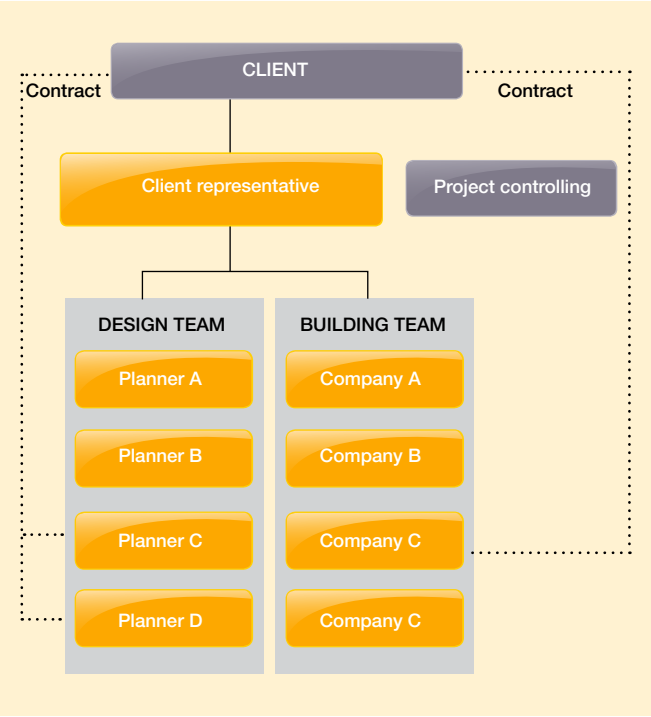
Any changes initiated by the client or design team at any stage during the construction process will incur additional costs, as the contractor will have agreed a fixed price based on the project submitted at the tender stage. New or additional elements introduced during the execution of the works will mean expensive contract variation orders and increase the overall cost. To avoid this happening, the client, with the architects and engineers, must ensure disciplined management of the contract for the duration of the construction process.

Ideally, changes or variation orders should be avoided after the contract has been awarded. In practice, they always occur, and it is therefore always sensible to set aside a contingency budget to cover such eventualities. This is generally set at 5–10% of the total contract value, but the rationale is that, once budgeted for, it will not cause any major distortion of the estimated building costs.

Control of subcontractors

The client has no control over subcontractor costs and the main contractor's arrangements with individual subcontractors may not be fully transparent. This can be remedied by including specific nominated subcontractors in the original contract, although this may result in less competitive tender prices being secured.

Construction management



Construction management tender

In the construction management tender scenario, the client effectively becomes the main contractor, acting via a project manager and/or construction manager team.

Instead of the architects and the engineers producing a single integrated tender document, the construction manager develops a series of tender packages geared towards the different trades and specialist subcontractors involved in the construction process.

These different packages are then coordinated by the construction manager on site. This allows the client to seek competitive prices from preferred individual subcontractors and eliminates the intermediary role and additional cost incurred by appointing a main contractor.

Positive factors

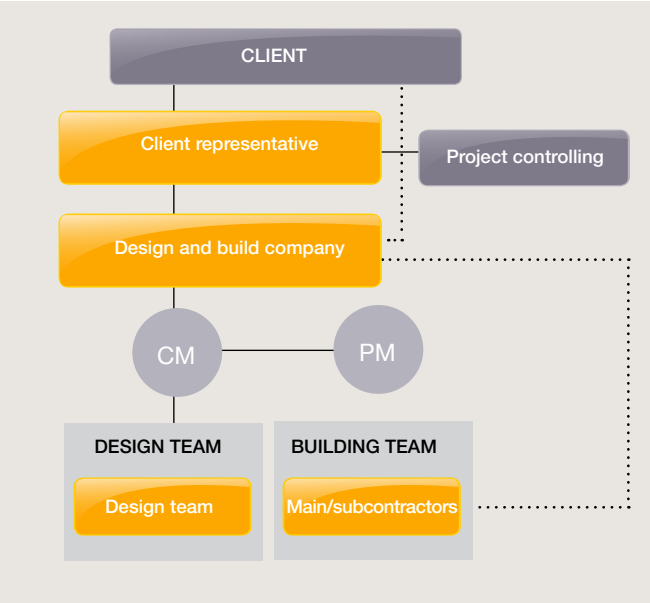
Flexibility

The specialist subcontractor packages can be developed at different stages of the project cycle, which means there is no pressure to finalise and coordinate every aspect of the project at the outset.

Changes

Changes can be managed individually with the relevant subcontractors, which allows the construction manager to launch a competitive tender for any changes well into

Design build



the construction process. This is one of the main potential advantages of the construction management tender option, as it means that the client can modify the brief without jeopardy throughout the course of the project.

Cost

The contractor can manage the different tender packages independently. In theory, this should mean a reduced cost for each package, as there are no intermediary or main contractor costs added to the prices agreed with the subcontractors. However, in practice, much will depend on the negotiating power of the client and their construction manager. Even once their mark-up is factored in, larger contractors tend to be able to negotiate better prices due to the scale of purchases they make within the market.

Negative factors

Technical resources

The construction manager is unable to call on the expertise of an in-house technical department to undertake the design checking and supervision on site.

One-point responsibility

By eliminating a single main contractor, the client takes over control of the site and the construction process. While each subcontractor bears responsibility for their work, in the event of a more complex claim involving many trades, the client may need to assume ultimate liability as the de facto main contractor. The client will also need an extensive contract management team to organise and coordinate a large number of separate contracts, which will entail considerable expenditure and effort.

Cost

Although there is a cost plan in place, in reality there is no fixed price for the scheme and the actual cost will not be confirmed until the end of the works. Monitoring of costs during the construction process needs to be particularly rigorous in order to keep a clear and accurate view of all the estimated and actual costs involved at every stage.

Time frame

As there is no main contractor involved and the client assumes total control over the subcontractors, the risk that the planned time frame will slip is very high, and therefore the implementation of subcontractors' work needs to be constantly monitored.

Design build tender

The design build route is possibly the lowest-risk option in terms of changes to the design and costs. As long as the contract has been well-defined at the tender stage, the price of the stadium will be fixed from the start and the main contractor takes on the burden of the overall construction risk.

In this scenario, the architect and the engineers develop a schematic design that is sufficiently detailed to enable a contractor to produce a full cost estimate and final price for the construction of the stadium. All issues relating to quality, finishes and certain structural and M&E (mechanical and electrical) systems are clearly defined, although not necessarily in full and final detail.

The main contractor then assumes responsibility for developing the full design and construction project. This allows them to take decisions themselves on key issues such as the construction method – for example, whether or not to use prefabrication – and the best materials to deliver the quality and functionality defined in the schematic project.

The design build option gives the client less control over how the project is detailed and developed, but if it is well conceived and structured, it also provides them with the comfort of knowing the final cost of the building from the outset.

Positive factors

Cost

The design build option offers the advantage of a single-point contract with a fixed price that cannot subsequently be altered, as well as low coordination costs.

Responsibility

All responsibility for design and construction lies with the main contractor and the quality of the work is defined at an early stage in the project cycle.

Time

As the contract is negotiated at the early stages of the design and awarded on the basis of little more than a concept design, this means that the main contractor can organise any subsequent design and site work based on the most effective and time-efficient construction methods. This normally results in substantial time savings compared with the traditional tender process.

Negative factors

Control

The main contractor is in total control, which means that no changes can be made by the client without incurring major additional costs or time penalties.

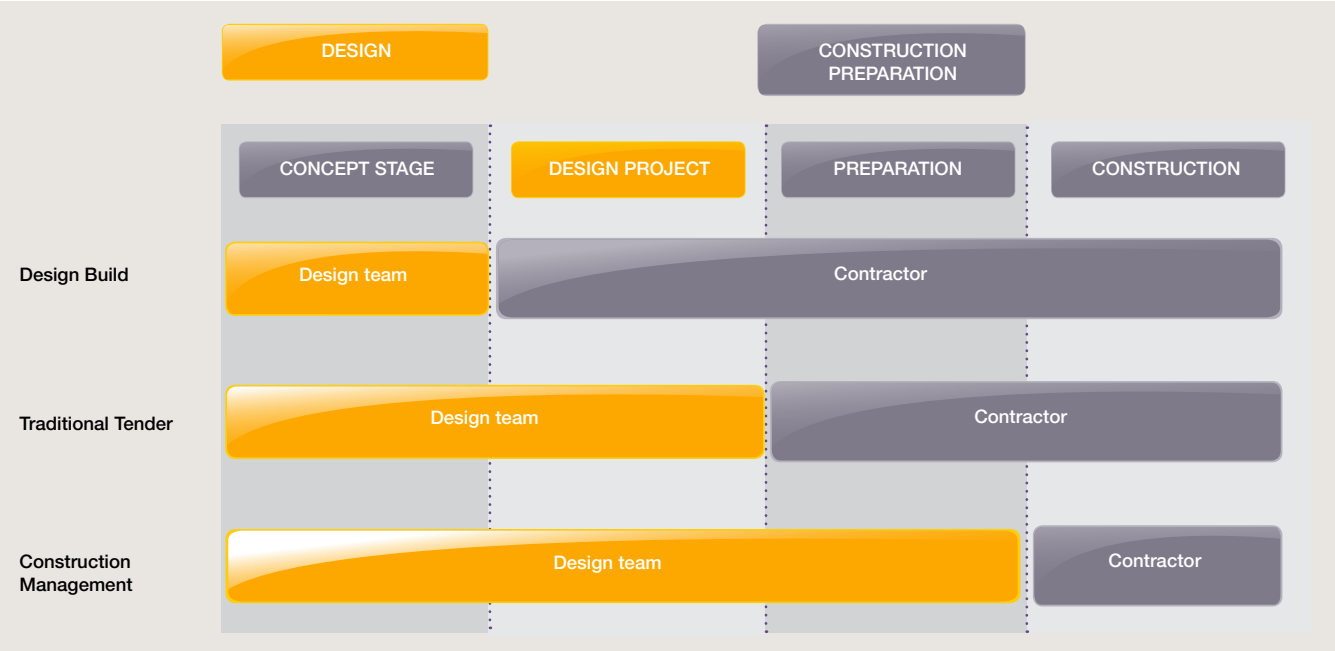
Change

The main contractor is at liberty to make changes to the project in order to stay within the contractually agreed price, as long as these do not affect the quality, purpose or function agreed at the initial tendering stage.

Contracting outside the main contract

Certain elements can and should be directly procured outside the main contractor packages. This is particularly relevant in the traditional tender route, which allows for certain elements to be handled in-house or outsourced separately to specialist contractors. This will produce tangible cost savings as it avoids high contractor overheads.

Kitchen and waste management is one area that can easily be contracted separately through specialist contractors. Meanwhile, procurement of floodlighting, pitch installation and irrigation, stadium maintenance machinery, seating, general furniture and signage could all conceivably be kept in-house.



I:2

Awarding the contract

Tender bid evaluation and final contract award

Once all the tender bids have been received, the client, or their representatives, need to define a set of analysis parameters to evaluate the different proposals on a like-for-like basis and ensure that each one covers the scope of works as per the invitation to tender and the project specifications.

The contract award needs to be made based on the best tender proposal. This does not necessarily equate to the lowest tender price. Indeed, due care should be taken to avoid the scenario where a prospective contractor offers a very low tender price in order to win the contract, but then subsequently claims for extra costs throughout the site works.

The final contract award should be based on the criteria set out below.

The contractor's fee

Obviously, the price terms offered by the contractor are extremely important, but these should not be the decisive reason for contracting a particular construction company. Price proposals need to be reviewed in detail to ensure that they fulfil all the project requirements and do not include any shortcomings or omissions that could give rise to a future claim or notice of variation.

Payment conditions and guarantees

Care needs to be taken to ensure that the main contractor is solvent. In many cases, and especially in public tenders, the contractors will be required to present a bank guarantee for a percentage of the contract value. It is also common to agree that a percentage of the monthly payments to the contractor be retained by the client and paid on final completion and acceptance of the works.

Contractor personnel and technical support

The quality of the personnel allocated to the job is of fundamental importance, as they may be working on the project for a number of years. It is advisable that the stadium developer scrutinise the individual CVs of each member of the contractor's team in order to fully satisfy themselves that their qualifications and competencies are suitable.

It is equally important that the quality and capacity of the contractor's technical department are evaluated. In large buildings such as stadiums it is strongly recommended that the contractors carry out their own checks to ensure the quality and suitability of the different structural and M&E projects; it is important that they have the technical resources to do carry out such checks to a high standard.

In the construction management route, where there is no external main contractor, the client will instead need to rely on major suppliers or subcontractors to provide this service.

Contractor track record and references

It is always advisable to ask prospective contractors to provide full details of their involvement in similar previous projects, as there is no substitute for sector-specific experience. In addition to the corporate CV of the contractor, it is also vital to apply due diligence to the individual CVs of the key personnel who will be representing them, to ensure that they have been directly involved in the relevant projects in the contractor's portfolio.

I:3

The site works

At this stage the building starts to visibly take shape day by day. This is also a period of exceptionally intensive work, with the potential for various crisis situations.

The stadium developer needs to establish an experienced and technically skilled site supervision team to defend their position during the site works. The structure of this team will depend entirely on the tender route selected.

Traditional tender

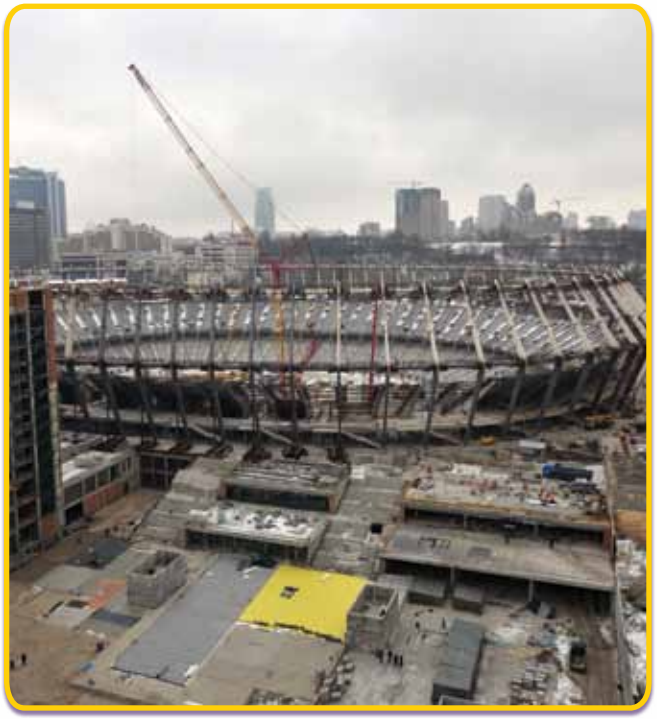
In the traditional tender the stadium developer will have in place a solid team, in the form of their architects and engineers, who will manage the different technical aspects of the site works. As they have designed the building they will have a detailed understanding of the project and will look to defend it accordingly.

It is also advisable to appoint a consultant to evaluate and control the costs established in the contract. Furthermore, for larger stadiums a project manager may be required to assist the stadium developer's in-house team and provide additional personnel.

Construction management

In this scenario, the stadium developer needs to understand that they are effectively fulfilling the role of main contractor themselves, and that they therefore bear full responsibility and liability for the project in accordance with local laws and regulations.

The construction manager will need to organise and oversee the work carried out by each and every subcontractor to ensure that everything is properly coordinated on site. This will require the presence of a solid and experienced team to manage the construction packages.



The architects and engineers will also be present on site. Given that they will have been contracted directly by the stadium developer, they can be expected to defend the best level of quality and finishes for the stadium building.

Design build

In this scenario, both the design and construction aspects of the project are managed directly by a single main contractor, at a fixed price.

As the entire process has been outsourced to a "one-stop shop", the stadium developer has little direct involvement in how the work is then managed or subcontracted, and the contractor assumes all the risks involved in the construction.

In this case, the stadium developer will need a much smaller in-house project team, who will then be required to oversee and monitor the activities of the contractor to ensure that the work is completed to the required standards.

I:4 Completion and commissioning

Pre-completion of the works

Once the contractor has established that the stadium has been completed, the stadium developer, via their specialised consultants, needs to confirm that it is completely ready for handover before taking official receipt of the building.

The consultants need to carry out snagging to identify defects relating to any aspect of the construction itself, as well as the installations and utilities. A full set of commissioning tests needs to be carried out on the services and utilities to ensure that these are functioning fully and correctly.

The contractors should provide the consultants with all the maintenance schedules, guarantees, legal certificates, etc.

Final reception of the stadium

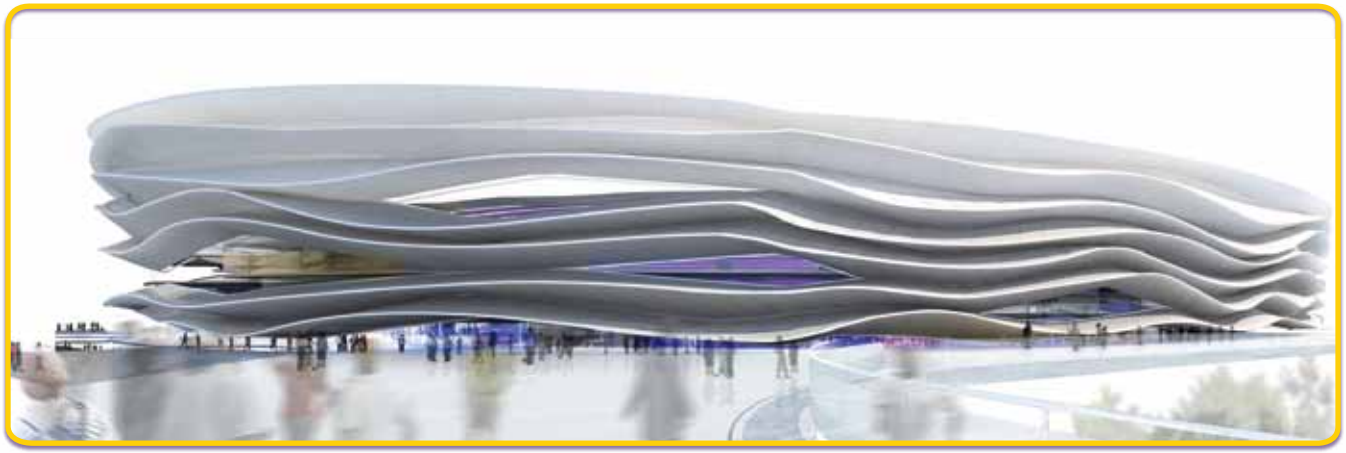
Once all of the commissioning tests have been completed and the stadium developer's consultants are duly satisfied that the contractor's work has met all of the required quality standards, the stadium developer can then proceed to complete the handover by means of a formal reception of the works.

At this point, the contractor should receive the balance of payment due, with the exception of a contractually agreed retained amount, likely to be in the region of 5–10%, to cover any latent defects that may not be apparent in the final inspections. This amount, which is normally withheld for a period of one to three years, provides the stadium developer with a guarantee that the contractor will not seek to exempt themselves from any further responsibilities.

As with any building, it is very important that the owner is in possession of a complete and correct set of documentation and information relating to the design and correct functioning of the stadium. The most important of these is the "as-built" documentation, in which the contractor and the architect provide an updated set of project specifications reflecting the final and actual state of the building. The as-built documentation includes the main plans, sections and elevations, the main construction elements and details, and updated information on the building services, installations and utilities. This documentation is needed to facilitate the future maintenance and correct operation of the stadium building. It will also be required in the event of any future modifications to the stadium.

The main contractor should also provide the stadium developer with a complete set of up-to-date maintenance and servicing manuals, along with all guarantees and legal certificates confirming that every aspect of the construction work has been correctly implemented and granted all of the necessary official approvals.

Only once all this has happened should the stadium developer take formal receipt of the new building.



I:5

The public launch

The culmination of the stadium project provides an opportunity to share the fruits of several years' work with the supporters and the local community.

The public launch of a new stadium is one of the most important days in the history of a club or national association, and is likely to generate huge levels of expectation.

The stadium developer should do everything possible to ensure the success of the official launch. This should include a well-coordinated PR and advertising campaign across various media platforms to generate maximum coverage, interest and attendance.

While a new stadium will undoubtedly be the cause of great pride among fans and the local community, emotions may be mixed. In cases where the new venue is replacing an old one, there will be nostalgia for the old structure and this should be respected and treated sensitively.

The opening ceremony should always focus on bringing together the whole community. Efforts should be made to encourage family attendance, as this will add to the festive nature of the occasion.

Special thought should be given to the choice of opposition for the inaugural match; this might be a local rival, a big-name team or perhaps even a foreign side.

In summary, the stadium launch should be a momentous and memorable occasion, and one that sets the tone for what will, hopefully, be a successful future.

J

CASE STUDIES AND EXAMPLES

In this section we profile five recent stadium projects in various parts of Europe, all of which have been developed to very high standards, and which range from a capacity of 5,000 to 40,000.

Each case study includes plans, sections and elevations, as well as photographs of the finished building. A detailed cost analysis for each project is also provided, to enable a clear and precise understanding as to how the expenditure breaks down.

The five case studies have been chosen in order to provide users of this guide with a representative sample of high-quality European stadium designs, spanning different eras, sizes and geographical locations. It is not our intention to single out these venues as benchmarks or rigid design templates, but rather to demonstrate the broad range of options available to the modern stadium developer.

J:1

Stadion Hrvatskih vitezova

In 2003, Arhipolis architects were selected in an open architectural competition to design the new football stadium in Dugopolje as project phase 1 of the entire Hrvatskih vitezova sports centre.

Project phase 2 involved building a 50m Olympic swimming pool (along with a small 9m pool) and a tennis centre with a 1,200-seater indoor court and 8 outdoor courts. This second phase was due for completion in summer 2011.

Considering the stadium's location, in the centre of the Podi-Dugopolje business district, the basic structural concept was to distinguish it from the 80 other buildings nearby.

Within the seating area of 5,200 covered seats, the stadium has a large 25m² scoreboard display and around 10,500m² of interior spaces: official club premises, conference room, restaurant, cafe and management facilities belonging to the company managing the whole complex. To emphasise the control over the financial side of the entire project, the overall "per seat" cost is in range and very comparable with the average "per square metre" apartment price.

Location: Dugopolje, Croatia

Client: Dugopolje City

Architect: Arhipolis Architects (Prof. Neno Kezić), Split (Croatia)

Consultants:

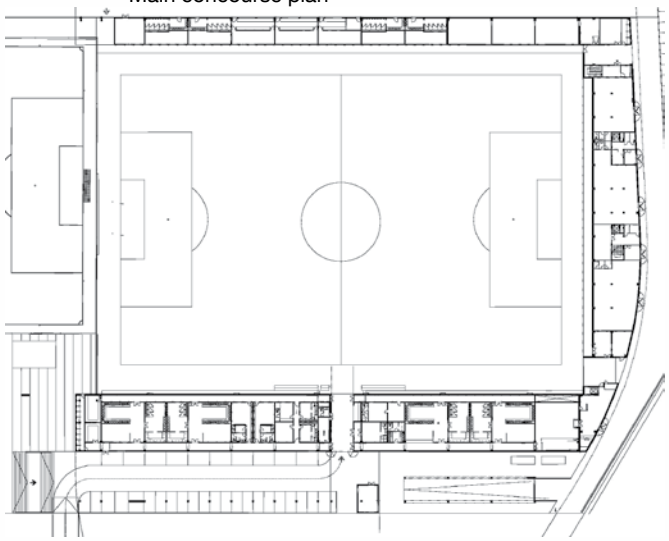
Structural engineer: Zorana Zaratin Vušković

Mechanical engineer: TUB Ltd, Split (Croatia)

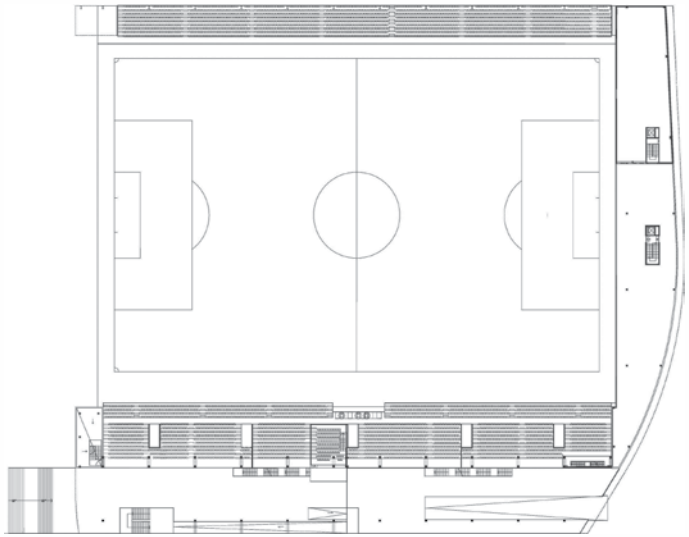
Electrical engineer: ELEKTRO KLIMA Ltd, Split (Croatia)

Landscape design: Arhipolis Architects Ltd, Split (Croatia)

Main concourse plan



VIP tier plan



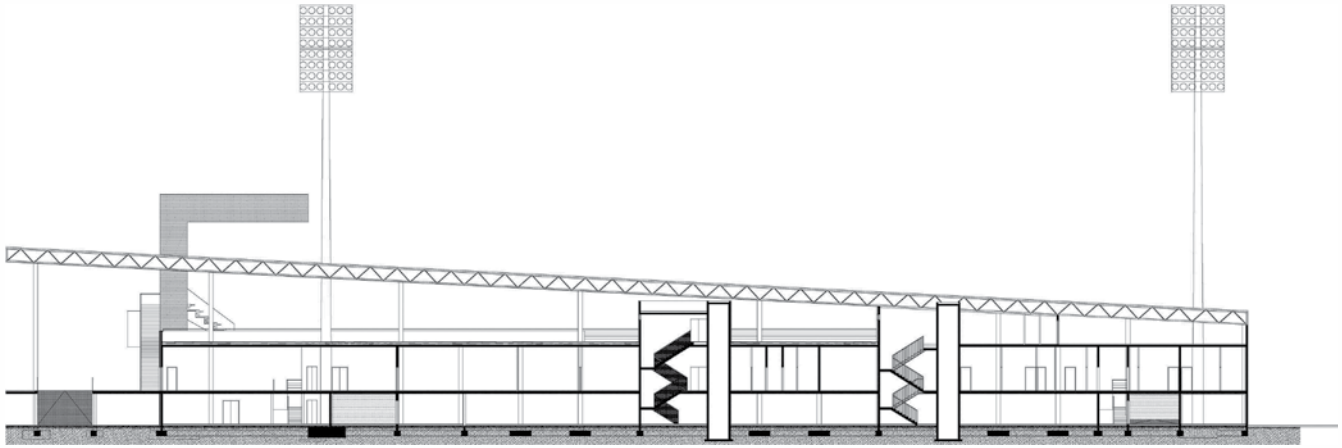
Stadion Hrvatskih vitezova

Total capacity: 5,200

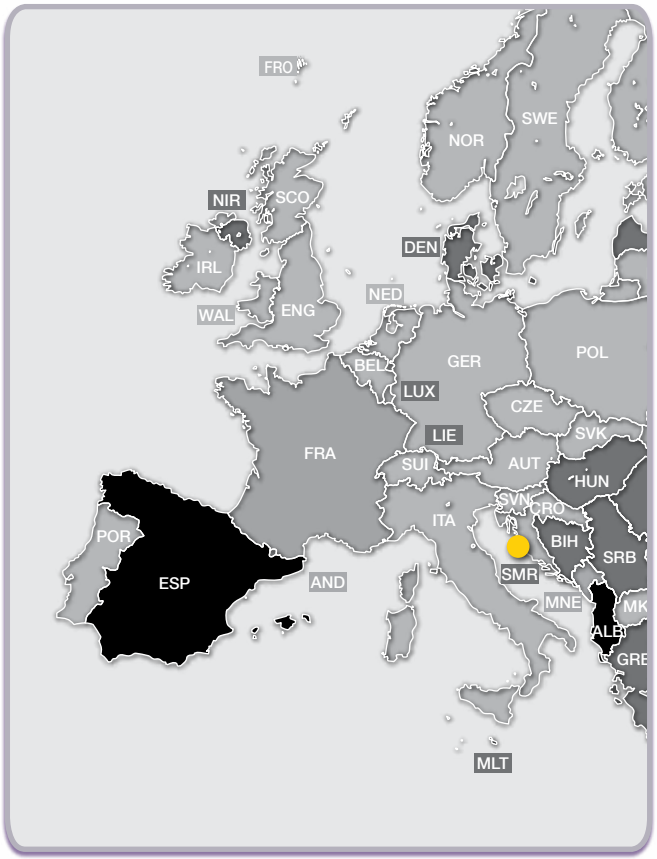
Total construction area: 12,000m²

Total construction budget: €11,605,000

Project construction: 2009



Main section of the stadium



CONSTRUCTION BUDGET

Preliminary budget chapter		
	Cost	Percentage
Excavation/earthworks	€200,000	1.72%
Demolition	€150,000	1.29%
Reinforced concrete	€2,245,000	19.35%
Pile foundations	€230,000	1.98%
Roof	€355,000	3.06%
Roof/underground structure	€1,545,000	13.31%
North stand	included in listed costs	
South stand		
West (main) stand		
East stand		
Seats	€150,000	1.29%
Pitch	€480,000	4.14%
Electrical/telecommunications	€1,005,000	8.66%
Mechanical	€725,000	6.25%
Floodlights	€830,000	7.15%
Scoreboard	€270,000	2.33%
PAD	€75,000	0.65%
CCTV	€135,000	1.16%
Technical installations	€120,000	1.03%
Emergency signal	included in listed costs	
Lifts	€105,000	0.90%
Exterior	€210,000	1.81%
Finishing	€1,500,000	12.93%
Project	€175,000	1.51%
Parking/access/ surroundings	€300,000	2.59%
Other	€515,000	4.44%
TOTAL	€11,605,000	100%

J:2
ŠRC Stožice

The Stožice sports park is a hybrid project. Its implementation is the result of a public-private partnership between the city of Ljubljana and the Grep development company. The Stožice sports park integrates a football stadium and a multipurpose sports hall with a big shopping centre, covered by the artificial landscape of a recreational park. As a result, the 182,000m² Stožice sports park is one of the focal points of Ljubljana's urban life, attracting people of different interests and ages both during the daytime and in the evenings.

The 16,000-capacity football stadium is laid out under the plateau of the park. As a structure, it is therefore "sunk" into the park. Only the roof over the stands rises above the plane of the park as a monolithic crater. The 12,500-capacity sports hall is located in the northwestern part of the park. The four levels of concourses and the lower, VIP, and upper stands are covered by a shell-shaped dome that opens towards the perimeter with large crescent openings overlooking the park. Along the entire perimeter, there is a canopy encircling the hall, acting as a derivative to the scalloped shell. Like the stadium, the entire shell of the hall is also finished in exterior cladding that changes colour depending on the exterior conditions and viewing distance.

Location: Ljubljana, Slovenia

Client: Grep d.o.o., Ljubljana City

Architect: Sadar + Vuga d.o.o.

Consultants

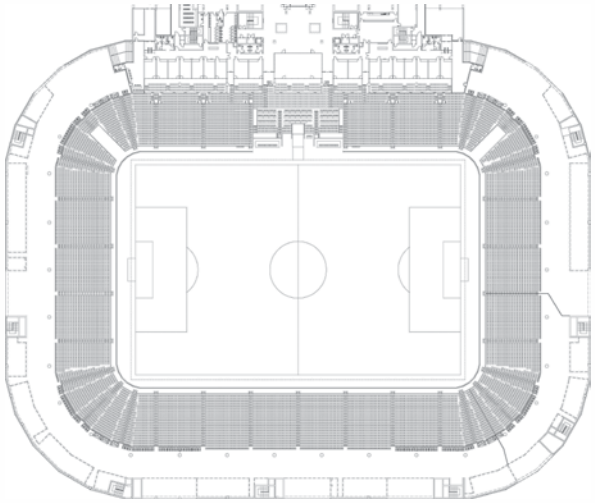
Structural engineer: Gradis biro za projektiranje Maribor d.o.o., SPIT d.o.o.

Mechanical engineer: Lenassi d.o.o.

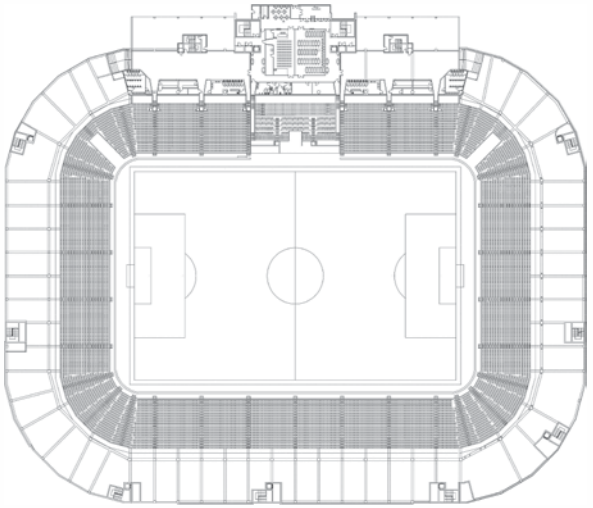
Electrical engineer: EL Projekt d.o.o.

Landscape design: Studio AKKA d.o.o.

Main concourse plan



Media plan



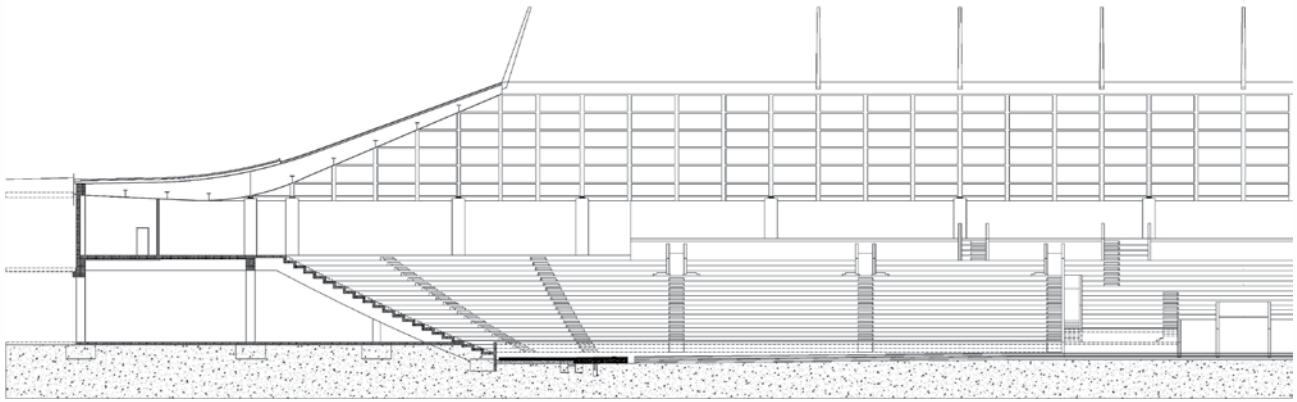
ŠRC Stožice

Total capacity: 16,000 gross

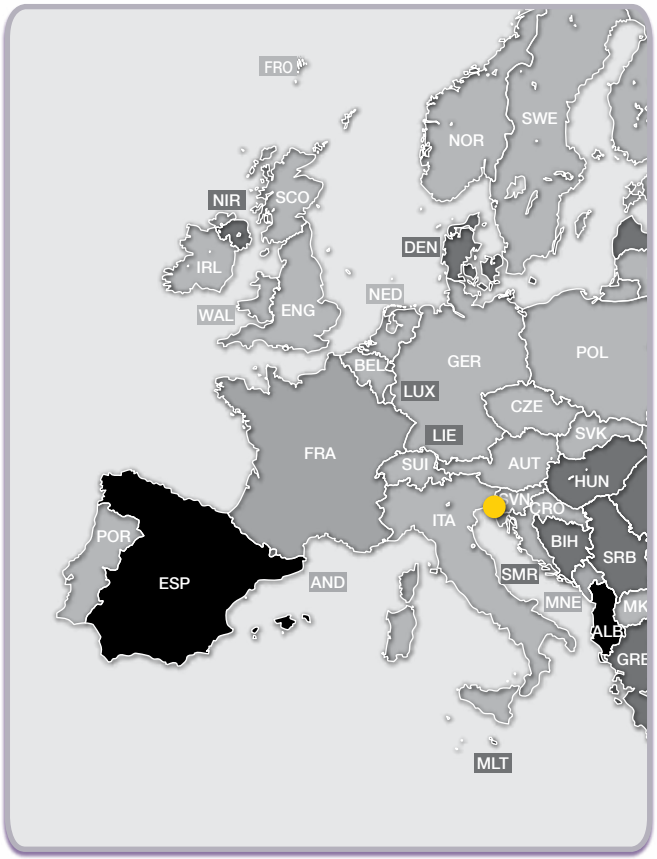
Total construction area: 33.738m²

Total construction budget: €46,470,000

Project construction: 2008–10



Main section of the stadium



CONSTRUCTION BUDGET

Preliminary budget chapter		
	Cost	Percentage
Excavation/earthworks	€6,500,000	18.34%
Reinforced concrete	€8,900,000	25.11%
Roof/underground structure	€5,100,000	14.39%
North/south stand	included in reinforced concrete	
West (main)/east stand		
Seats	€780,000	2.20%
Pitch	€1,100,000	3.10%
Electrical/telecommunications	€2,600,000	7.33%
Mechanical	€1,800,000	5.08%
Floodlights	€350,000	0.99%
Scoreboard	€1,000,000	2.82%
PAD/CCTV	included in electrical installations	
Technical installations		
Emergency signal	included in reinforced concrete, craftwork, finishing, mechanical installations	
Lifts	€290,000	0.82%
Exterior arrangements		0.00%
Finishing	€4,200,000	11.85%
Project		0.00%
Other		
Equipment	€2,830,000	7.98%
Engineering		0.00%
Communal fee		0.00%
Craftwork		0.00%
Parking/access/surroundings		0.00%
TOTAL	€35,450,000	100%

J:3

Viking Stadion

In 2002, Signatur Arkitekter and NBBJ were invited to design the new football stadium and club headquarters for Viking FK, a Norwegian premier league club based in Stavanger. Signatur Arkitekter/NBBJ proceeded to develop the design for a 15,000-spectator stadium which also included the new headquarters of Viking FK, VIP facilities which could be used as conference facilities on non-matchdays, and other commercial facilities.

Construction works started in 2003 and the opening match was played in May 2004.

The stadium is an all-seater football stadium. It has also the flexibility and capacity to host big concerts. Its capacity has since been increased to 16,600.

Viking FK have their training facilities in the vicinity of the stadium.

The construction of the stadium played a central role in the development of Jåttåvågen, a new part of Stavanger. The stadium houses shops and restaurants and provides good access to the rest of the city and the region through integrated railway and bus stations.

Location: Stavanger, Norway

Client: Viking Fotball ASA

Construction management: Kruse Smith Entreprenør AS

Architect: Signatur AS

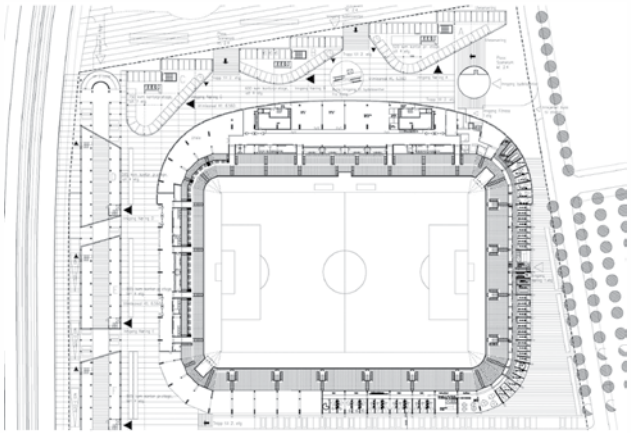
Consultants

Structural design/engineering: Raugstad AS

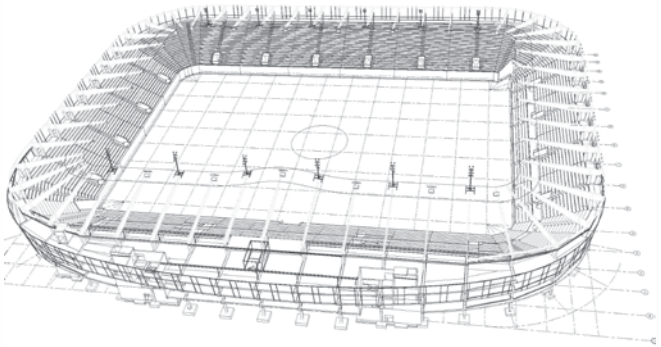
Electrical design/engineering: Rønning AS

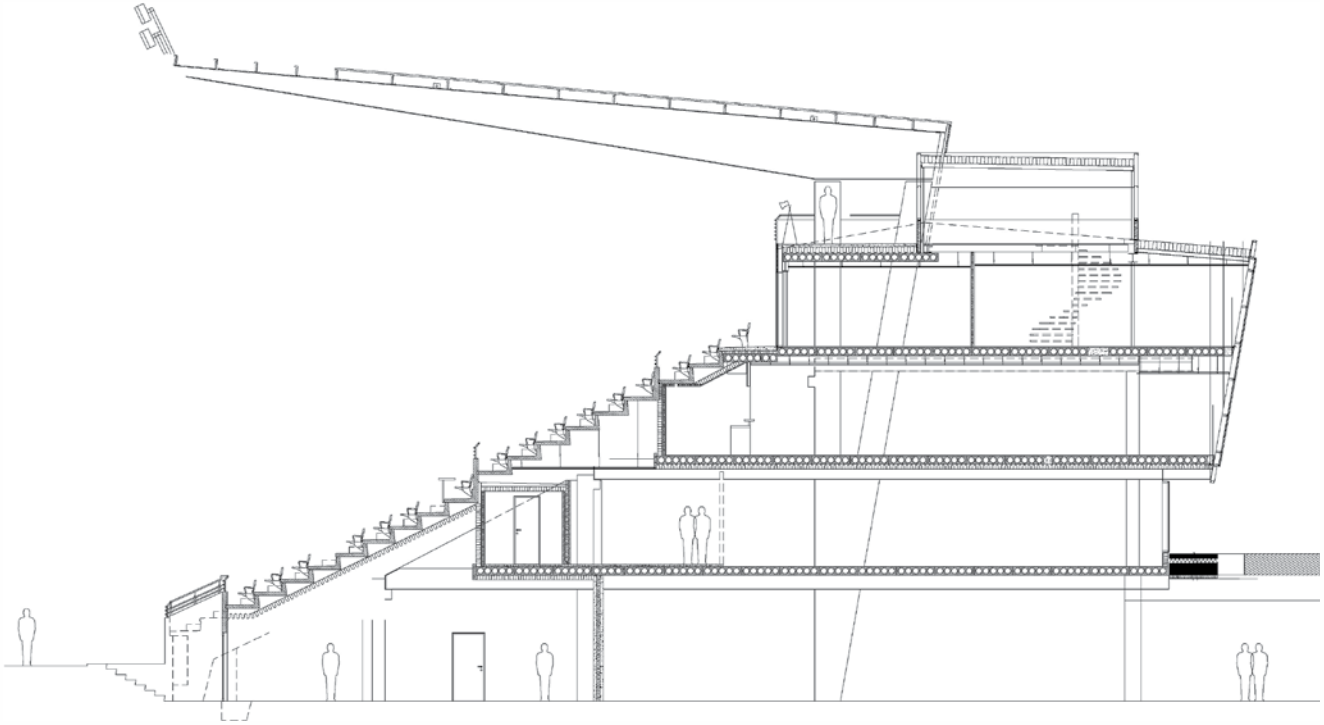
HVAC design/engineering: Energi & Miljø AS

Main concourse plan



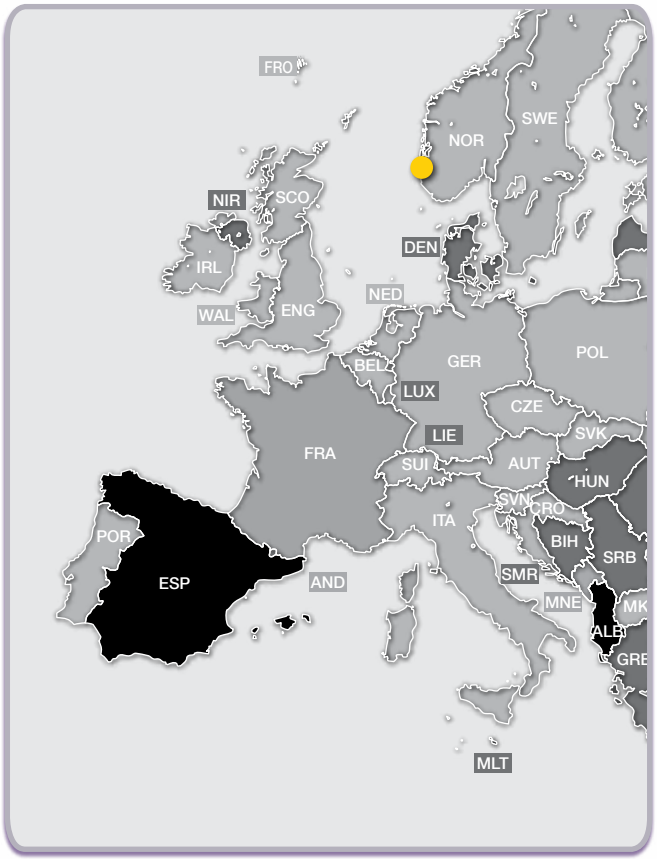
Construction plan





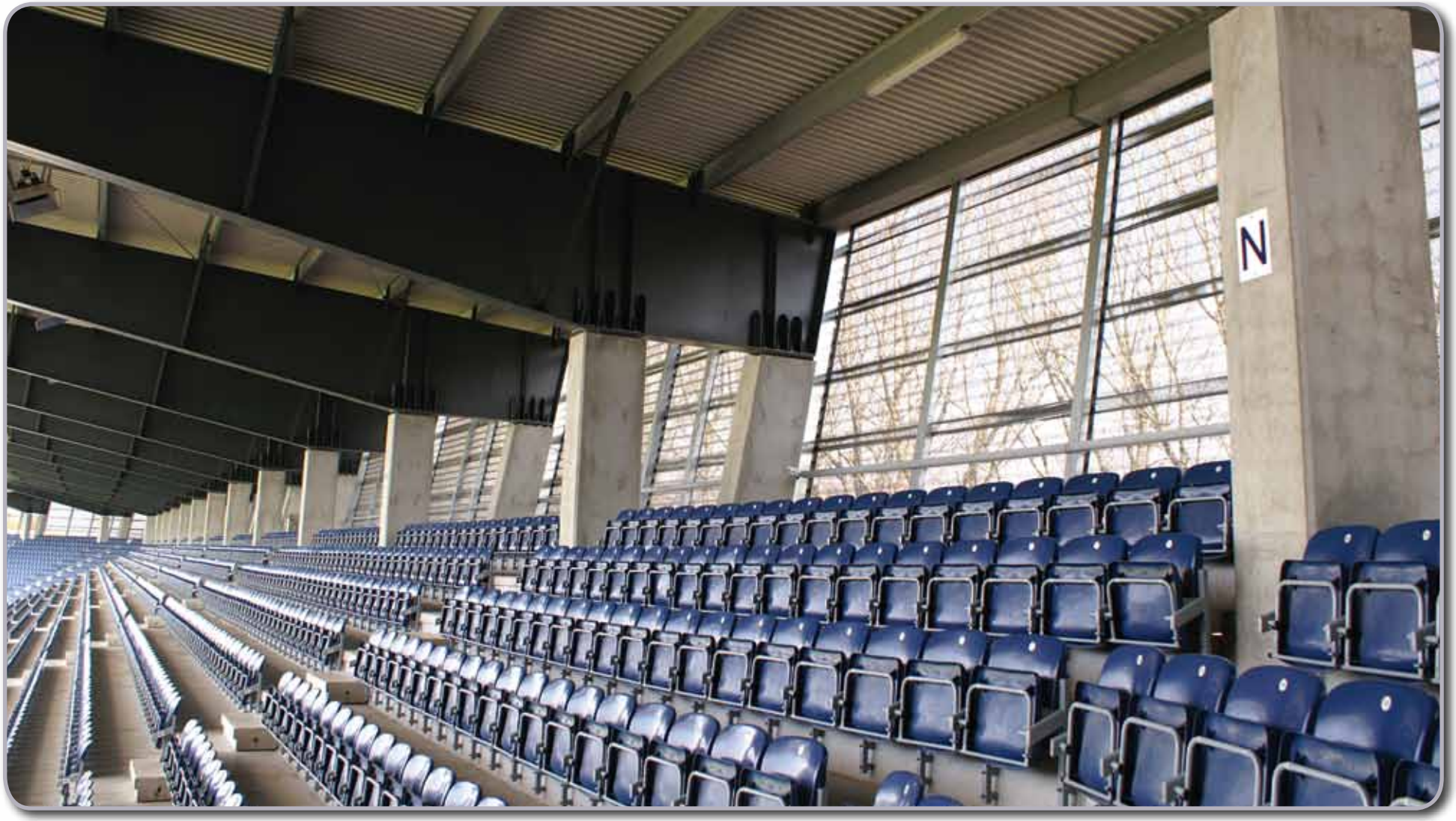
Main section of the stadium

Viking Stadion
Total capacity: 16,000 gross
Total construction area: 38,000m²
Total construction budget: €26,332,000
Project construction: 2003–04



CONSTRUCTION BUDGET

Preliminary budget chapter		
	Cost	Percentage
Rigging/running costs	€780,000	3.0%
Excavation/earthworks	€2,077,000	7.9%
Foundations	€1,532,000	5.8%
Main columns	€720,000	2.7%
Structure, incl. tiers (concrete)	€5,926,000	22.5%
Steel roof	€2,843,000	10.8%
Interior carpentry	€1,739,000	6.6%
Sheer rail	€183,000	0.7%
Facades	€562,000	2.1%
Boarding/flooring	€232,000	0.9%
Painting	€148,000	0.6%
HVAC/ventilation	€880,000	3.3%
Piping	€1,136,000	4.3%
Electrical	€1,624,000	6.2%
Lifts (2)	€176,000	0.7%
Floodlights	€1,024,000	3.9%
Seating	€816,000	3.1%
Pitch	€704,000	2.7%
Furniture/fixings	€528,000	2.0%
Consultants	€503,000	1.9%
Architectural design	€981,000	3.7%
Structural design/engineering	€342,000	1.3%
Miscellaneous	€876,000	3.3%
TOTAL	€26,332,000	100%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BAVARIA

J:4

Arena im Allerpark Wolfsburg

Located in the city centre, the Arena im Allerpark Wolfsburg first opened its doors in 2002. Being the home of the 2009 Bundesliga champions, VfL Wolfsburg, it is one of the most modern medium-sized football arenas in Europe in terms of architecture, facilities and comfort, not only due to its cutting-edge corporate and media facilities.

Appealing to everybody, the Arena im Allerpark Wolfsburg provides the highest infrastructural standards. With an overall capacity of 30,000 for national matches and a seating capacity of 26,400 for international matches, the stadium is the optimum size for football matches, live concerts and special events in southeast Lower Saxony.

Having gained an excellent reputation in international football after many UEFA Champions League, UEFA Cup and UEFA Europa League clashes, Wolfsburg was happy to host four matches in the 2011 FIFA Women's World Cup at its fantastic stadium.

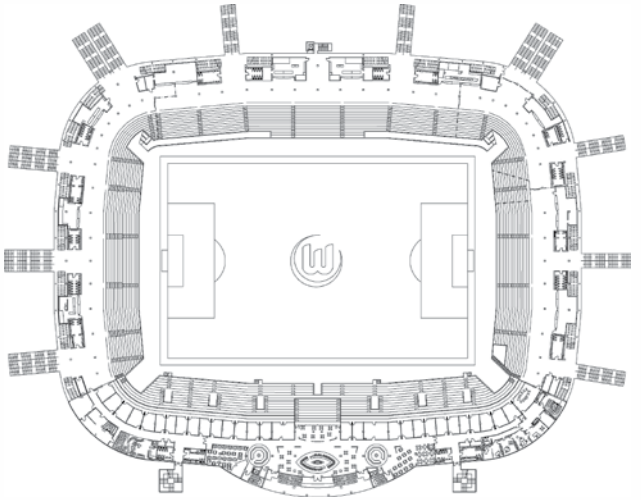
Location: Wolfsburg, Germany

Client: Wolfsburg AG (owner), VfL Wolfsburg-Fußball GmbH (tenant)

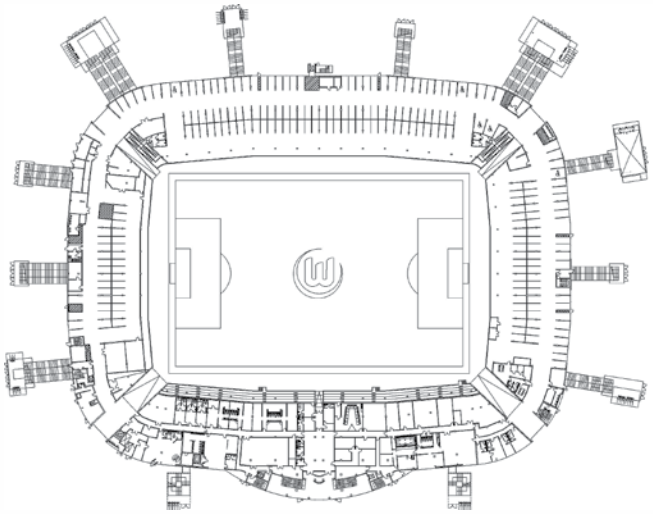
Architect: HPP Hentrich-Petschnigg & Partner (concept), nb + b Architekten und Ingenieure (implementation planning)

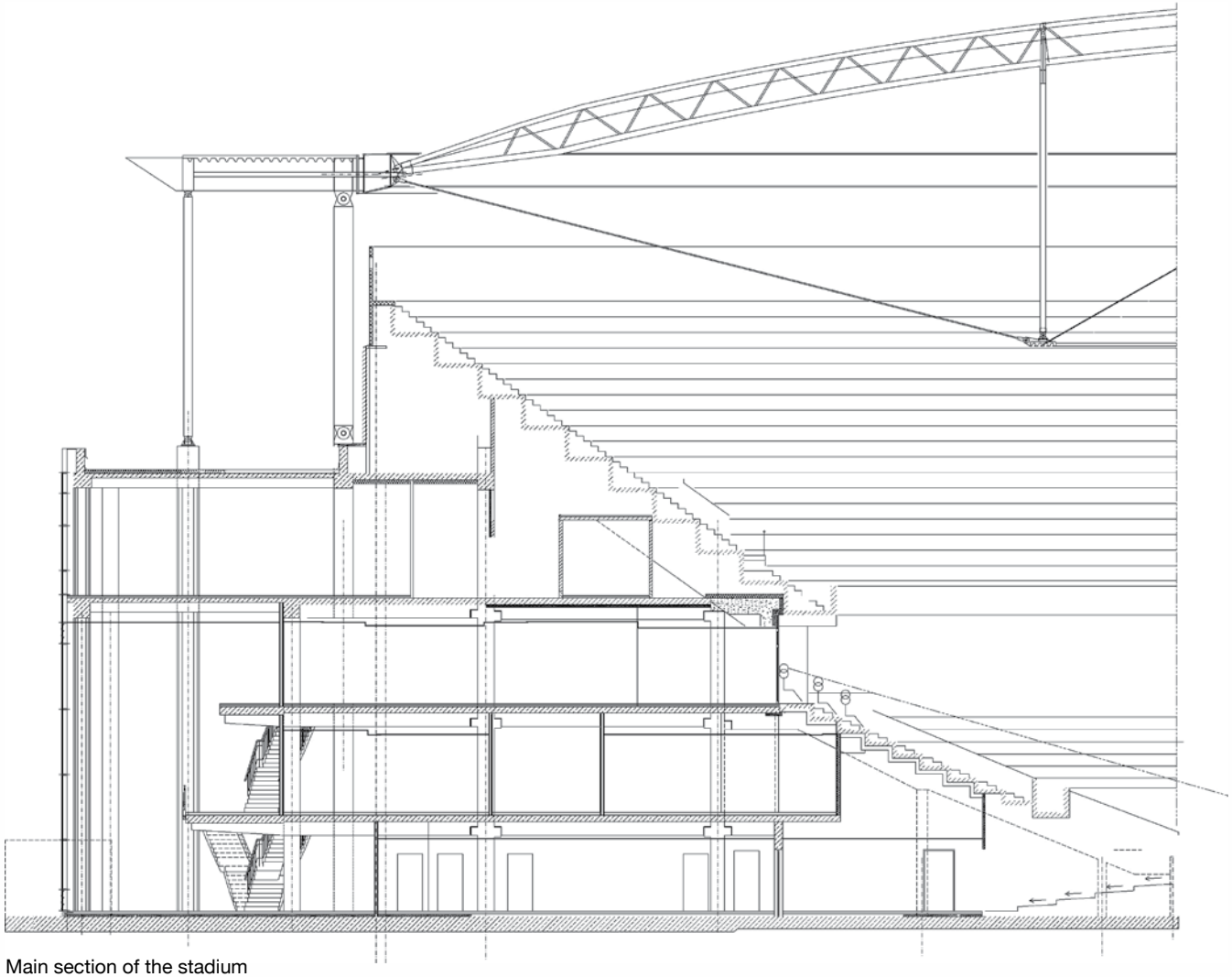
Stahm Architekten (outside facilities)

Main concourse plan



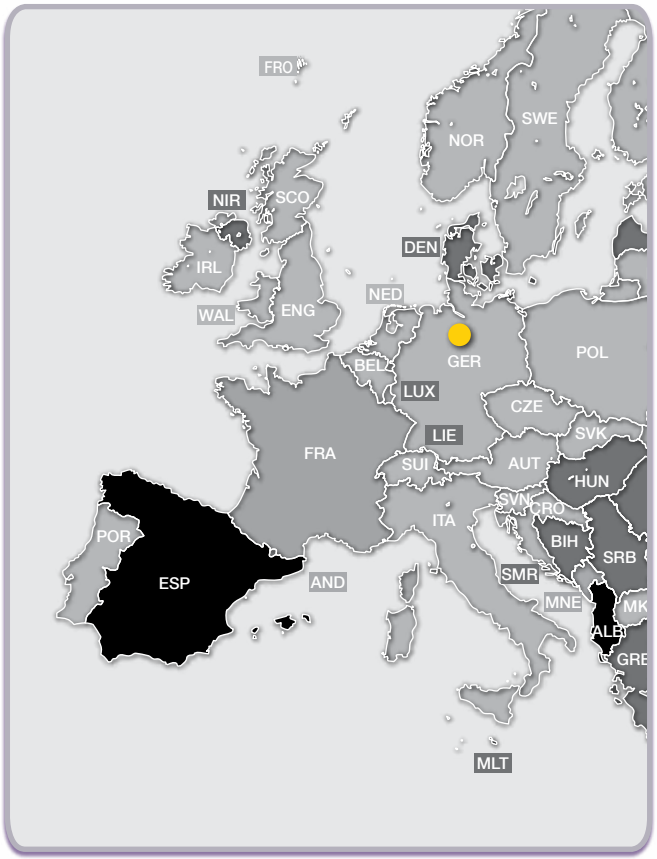
Media plan





Main section of the stadium

Arena im Allerpark Wolfsburg
Total capacity: 30,000 (26,400 international)
Total construction area: 25,300m²
Total construction budget: €53,000,000
Project construction: May 2001–December 2002



CONSTRUCTION BUDGET

Preliminary budget chapter		
	Cost	Percentage
Concrete	€10,000,000	18.87%
Roof	€9,900,000	18.68%
Development/planning	€7,363,000	13.89%
Equipment	€3,300,000	6.23%
Facades	€2,404,000	4.54%
Electronics	€1,600,000	3.02%
F&B	€1,500,000	2.83%
Locksmith	€1,369,000	2.58%
Excavation	€1,300,000	2.45%
Seating	€1,300.000	2.45%
Pitch	€1,227,000	2.32%
Drywall installation	€1,142,000	2.15%
Video screens	€1,063,000	2.01%
Outside facilities	€931,000	1.76%
Offices	€750,000	1.42%
Masonry	€680,000	1.28%
Earthworks	€460,000	0.87%
Panels/tiles	€453,000	0.85%
Training pitch	€370,000	0.70%
Screed	€300,000	0.57%
Paint	€230,000	0.43%
Lifts	€118,000	0.22%
Ticket booths	€115,000	0.22%
Various	€5,125,000	9.67%
TOTAL	€53,000,000	100%


EUROPA LEAGUE
SEAT
UEFA.com


VOLKSWAGEN ARENA

J:5

Estadi Cornellà-El Prat

In 2004, RFA Fenwick Iribarren Architects and Gasulla Arquitectura i Gestio were invited to enter a restricted architectural competition to design the new stadium and club headquarters for RCD Espanyol.

On winning the competition, RFA proceeded to develop the design for the 40,000-capacity stadium, which included not only new headquarters but also a hotel, museum, shop and other commercial facilities.

The designers looked to create a striking stadium with clean and simple lines but a dynamic, fresh image for the home of RCD Espanyol, who had been without a stadium of their own for 12 years since the demolition of their previous ground.

Great care was taken in the design of the bowl as the architects were eager to recreate the “cauldron” atmosphere of the old Estadi de Sarrià. At the opening game the acoustics were magnificent and the team said they felt totally surrounded by the cheering of their fans.

The stadium, although completed on a very tight budget, features the RCD Espanyol colours in a barcode-style circular facade of vertical glass elements. The varying tones of blue light up at night to become an icon on the Barcelona skyline and visible from afar.

Location: Cornellá de Llobregat, Barcelona, Spain

Client: Real Club Deportivo Espanyol

Architects: RFA Fenwick Iribarren Architects & Gasulla Arquitectura i Gestio

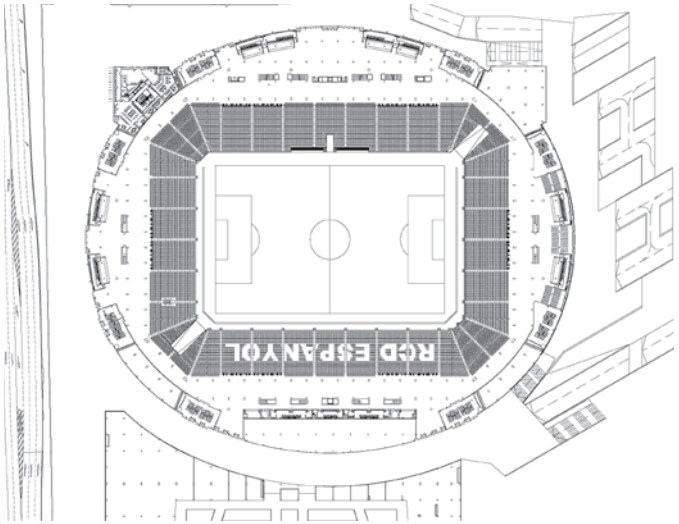
Consultants

Structural engineer: Arup, Indus

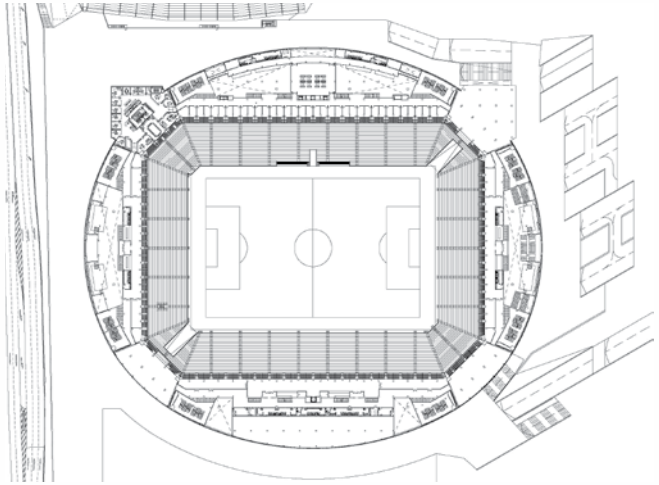
M&E engineer: PGI Grup

Landscape design: RFA Fenwick Iribarren

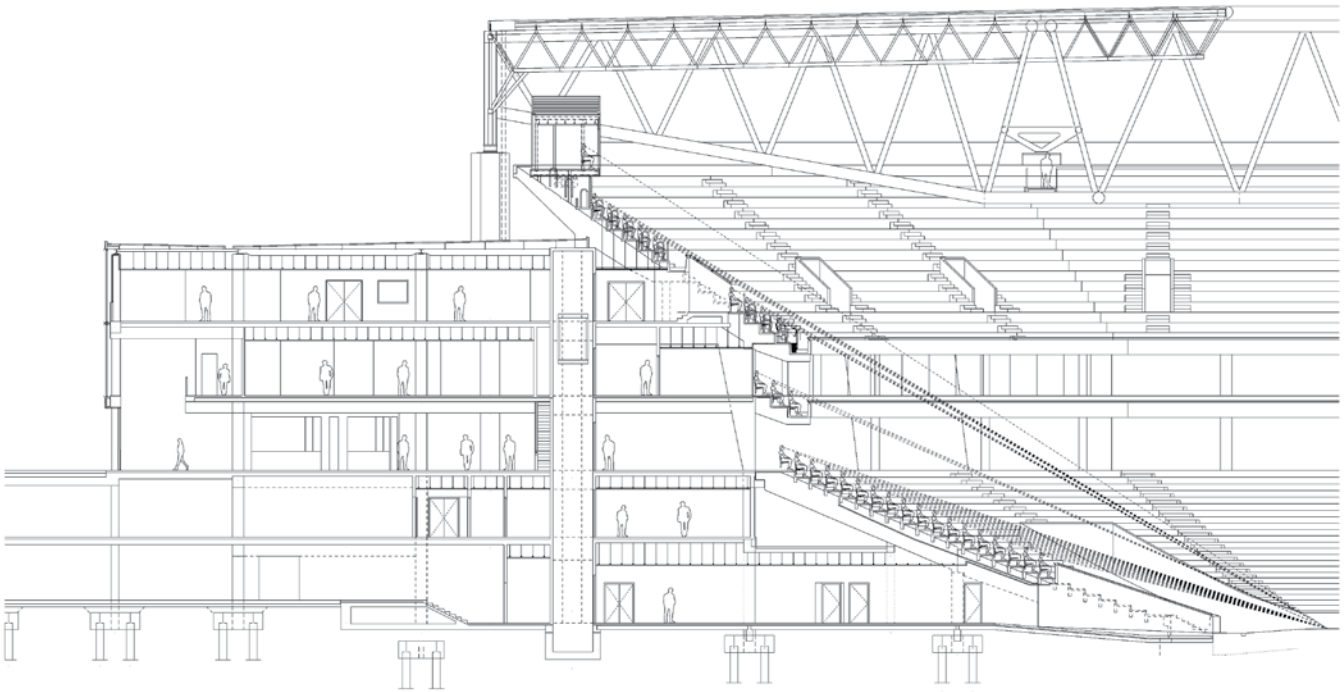
Main concourse plan



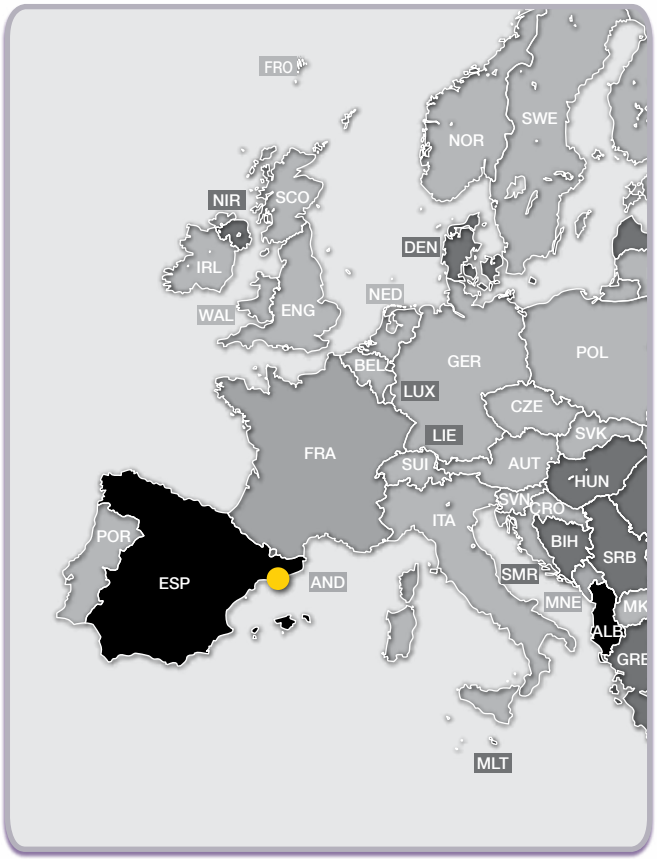
VIP concourse plan



Estadi Cornellà-El Prat
Total capacity: 40,000 gross
Total construction area: 70,000m²
Total construction budget: €62,000,000
Project construction: 2006–09



Main section of the stadium, showing three-tier configuration

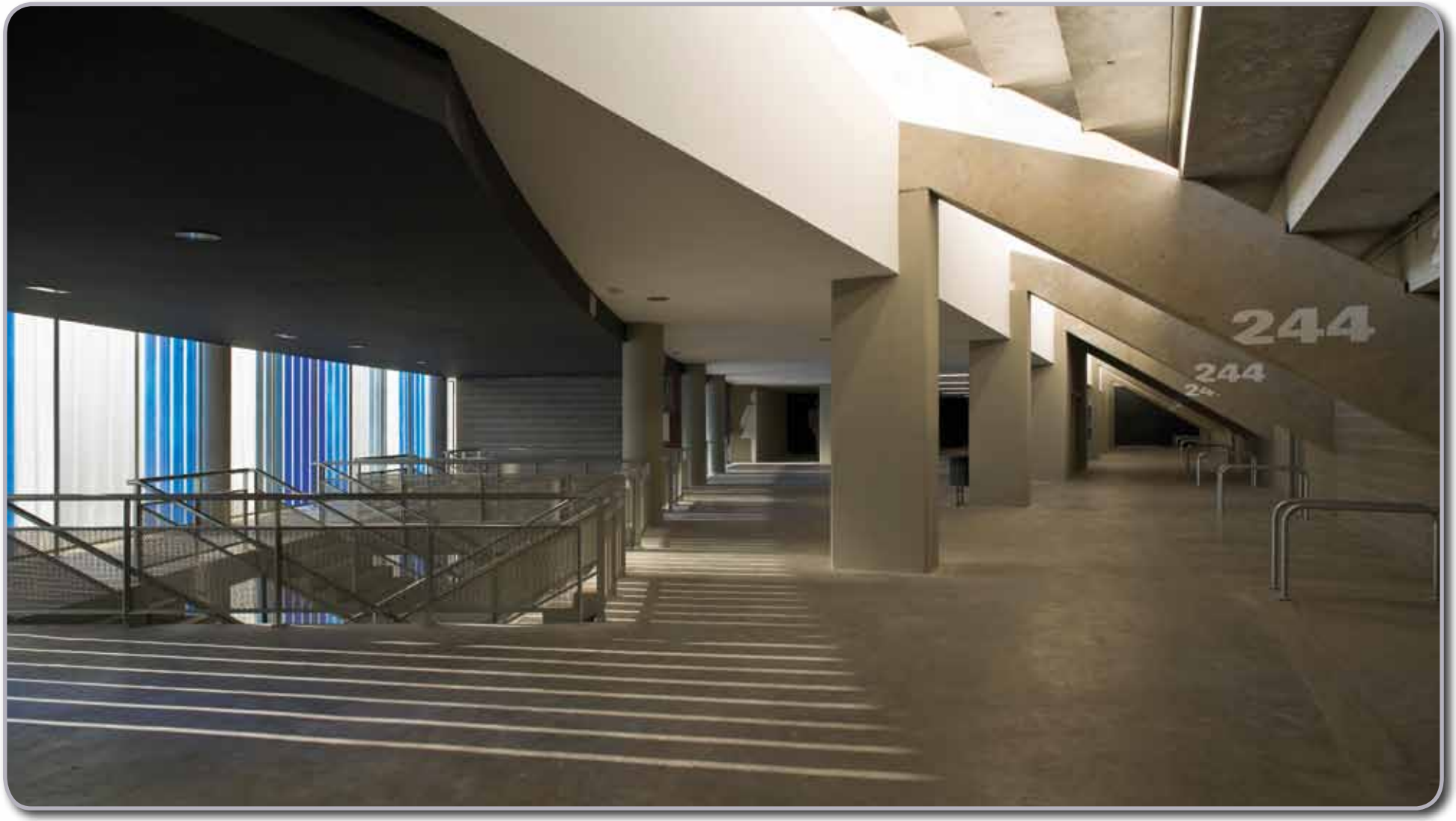


CONSTRUCTION BUDGET

Preliminary budget chapter		
	Cost	Percentage
Excavation/earthworks	€1,320,000	2.12%
Foundation	€3,976,000	6.39%
Structure	€9,570,000	15.39%
Tiers	€4,000,000	6.43%
Roof	€10,400,000	16.73%
Masonry	€3,000,000	4.82%
Paving/coverings	€2,470,000	3.97%
False ceiling	€600,000	0.96%
Facades	€2,980,000	4.79%
Interior carpentry	€570,000	0.92%
Ironmongery/metalwork	€1,950,000	3.14%
Glazing	€350,000	0.56%
Paint	€980,000	1.58%
Signage	€234,000	0.38%
Lifts	€200,000	0.32%
Pitch	€610,000	0.98%
Seating	€1,600,000	2.57%
M&E	€9,100,000	14.63%
Special M&E	€1,450,000	2.33%
Access control	€1,800,000	2.89%
Electronic scoreboards	€700,000	1.13%
Equipment	€1,600,000	2.57%
Furniture/fixings	€520,000	0.84%
Various	€2,200,000	3.54%
TOTAL	€62,180,000	100%

One of the successes of the Estadi Cornellà-El Prat was the cost control. The final cost of €62m implies a ratio cost per seat of about €1,500. These costs do not cover the external urbanisation costs around the stadium as they were part of an overall planning zone and shared with other landowners.


RCD ESPANYOL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blue architecture design philosophy based on sustainable architecture for people which places the emphasis on human well-being by focusing on the psychological, cultural and social context of the building

broadcast compound hub of broadcast operations at the venue, where core production and technical facilities (including OB vans) are located

business plan formal statement of a set of business goals, the reasons why they are believed attainable and the plan for reaching those goals

camera position position, usually a platform, for a television camera to cover a match

CCTV system closed circuit television system for camera surveillance of spectators

CCR commentary control room: the hub for connecting all commentary circuits to the telecoms network and to the broadcasters' own operational areas within the stadium

commentary positions area housing television and radio commentators, in which each position consists of one desk large enough to accommodate three people (seated) and associated equipment

concourse circulation area providing direct access to and from spectator accommodation

construction management tender construction process whereby individual sub-contractors are contracted separately and directly by the stadium developer and are coordinated by a construction or project manager on their behalf

corporate hospitality hospitality programme with packages on general sale

cost plan plan that provides a detailed breakdown of all of the costs involved in a stadium project

C-value quality of the sightline of a spectator expressed in millimetres

design build tender construction process in which the stadium developer appoints a main contractor to assume complete responsibility for the detailed design and construction of a building based on the architect's schematic design

emergency power power source available in case of grid failure, generally produced by a fuel or gas generator

ENG crew electronic news gathering crew: TV crew consisting of one journalist and one cameraman, operating an ENG camera

feasibility study a preliminary study undertaken to determine and document a project's technical and financial viability

feed signal transmission of a television or radio programme from a specific source to a broadcast partner

financial viability plan financial analysis identifying the sources of revenue and financial support to cover the procurement and ongoing financing of a stadium project

flash interview positions area between the pitch and the dressing rooms where live television and radio interviews can be conducted

flush water non-drinkable but clean water that can be used for toilet flushes or watering

functional requirements description of how a specific area of the stadium must function, including in relation to other areas.

Green Goal FIFA initiative aimed at promoting environmental sustainability in stadium projects

gross capacity total number of seats in a stadium including those not on sale to the general public

HVAC heating, ventilation and air-conditioning

inner security perimeter secure zone between the stadium turnstiles and the vomitory heads

lead consultant consultant, normally the architect, responsible for coordinating and leading the design process

main contractor company contracted directly by the stadium developer, responsible for the full construction works, including all work carried out by subcontractors, suppliers and installers

master plan programme of works for a new stadium or renovation/expansion project, for immediate, phased or future implementation

media stand dedicated central area of the main stand, with easy access to the media conference room, media working area and mixed zone, where the press positions, commentary positions and media rights holders are located

mixed zone large space between the teams' dressing rooms and their buses in which media representatives can interview players as they leave the stadium after the match

net capacity total number of seats available for sale or complimentary use, excluding those with an impeded view of the pitch or allocated to the media.

OB van outside broadcast van

operational plan the time frame and schedule for all the different works and activities involved in a stadium project

outer security perimeter secure zone around the stadium, serving as the first ticket checkpoint; for UEFA matches, the area within this zone is under UEFA's exclusive control throughout the relevant exclusivity period

PA system public address system, designed to convey spoken messages to all areas of the stadium; it is the main means of communication between management and spectators and overrides all other sound systems

pitch area secure area comprising the field of play and auxiliary space surrounding it

press positions seated area for the written press consisting of seats with and without tables

programme of client requirements comprehensive description of all client requirements with regard to the functioning and performance of the stadium

public catering facilities facilities for the preparation and sale of food and beverages to general ticket holders, usually located on the concourses

safe capacity safe capacity is whichever is lower: the actual capacity of the spectator accommodation or the number of spectators who can safely use the entrances, exits or emergency exits within a period prescribed by the local authorities

safety certificate certificate issued by the relevant authorities declaring that the stadium complies with all relevant local building, fire and safety legislation

sightline the ability of a spectator to see a predetermined focal point (in the pitch area) over the top of the head of the spectators immediately in front

skybox private area consisting of a fully furnished room with a view of the pitch and a private terrace with seats from which to watch the match

sound system entertainment system in addition to or integrated into the PA system, which can play high-quality music as well as spoken messages

stadium bowl the entire spectator seating area (stands, terraces, etc.) around the pitch

stadium brief key document that defines the stadium developer's requirements, intentions and objectives

stadium control room room for matchday safety and security management which has an overall view of the inside of the stadium and which must be equipped with PA system facilities, access control counting systems and CCTV screens

stadium envelope the stadium facade and roof that wraps around the stadium bowl and concourse. The facade and roof could be designed as a single integrated element or as two separate elements forming the stadium envelope

stadium level map floor plan of the stadium in a prescribed UEFA format, indicating the key spaces and functions on that floor level

SMC stadium media centre: the working area for written press and photographers, including auxiliary facilities such as catering, lockers and sanitary facilities

stadium surroundings area within the outer security perimeter, excluding the stadium and its direct 10-metre circumference

technical area secure area comprising the pitch area and the technical rooms

technical power power used exclusively for TV and other media activities, sourced by a minimum of two generators running in parallel

technical requirements description of the necessary technical performance of a room, area or technical installation

technical rooms all (dressing) rooms for players, officials, technical and medical staff

television studio soundproof room for use by TV broadcasters during football matches

topographic survey survey that defines the site contours and all visible and hidden physical features within and around the site

traditional tender construction process whereby a fully detailed project is prepared by the design consultants and packaged as a single tender, enabling the entire construction to be contracted to a single main contractor

viewing distance distance from any spectator to the furthest point of reference on the field of play (furthest corner flag)

VIP seats upholstered seats, generally of higher quality than the regular seats in the stadium, centrally located in the main stand

vomitory enclosed stairway or passageway built into the gradient of the stand which directly links spectator seats to concourses and/or routes for ingress, egress or evacuation

waste water dirty water from the toilets or kitchens

welfare facilities facilities provided for the welfare of the spectators, such as sanitary, first aid and public catering facilities

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Author Jose Javier Azanza

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Title ***Sporting Spaces*** *A pictorial review of sporting facilities, Volume 1*

Publisher Images Publishing Group

In memory of

Ernest Walker, CBE (1928–2011)

Chairman of the UEFA Stadia Committee (1990–2004)

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