Pre-Tender Phase

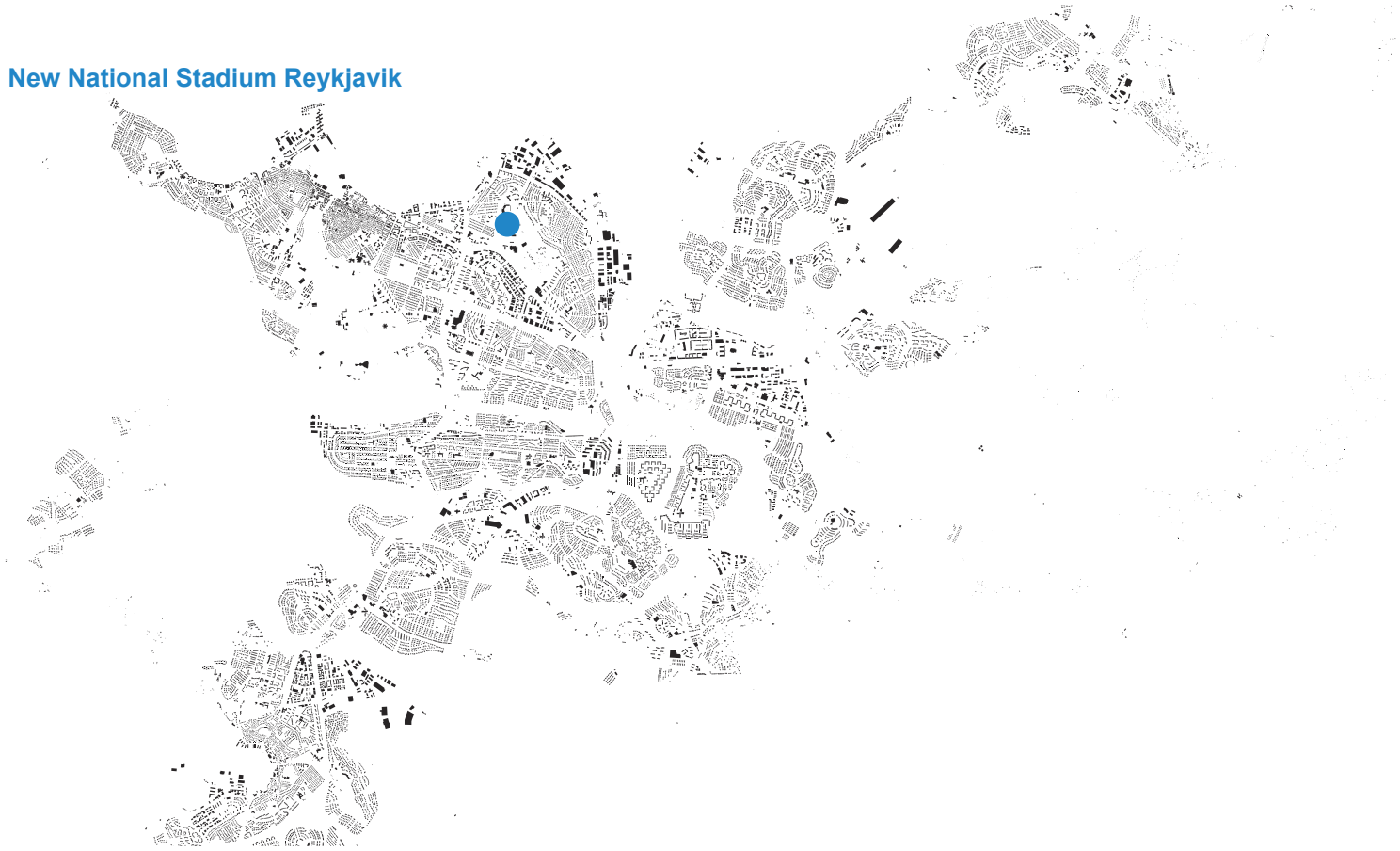
NEW NATIONAL STADIUM
REYKJAVIK / ICELAND

January 2017

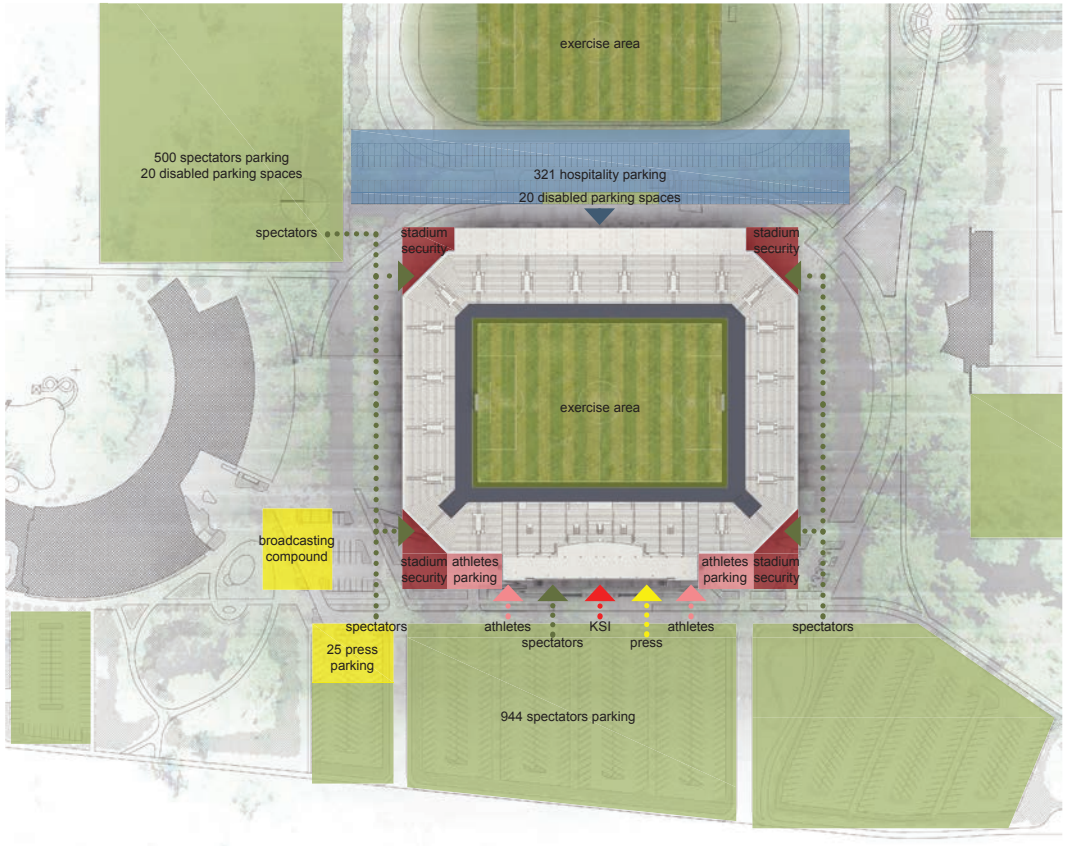
Index

1 Design and Construction Concept

New National Stadium Reykjavik



1 Design and Construction Concept



organisation

1.1 Architectural Components

> **general plan**

- exercise area:
  - seperated exercise area (east of the stadium)
- paved areas:
  - main circulation routes, concourse areas under bowl, parking areas
- planting areas:
  - depending on circulation routes
- parking areas:
  - minimum of 2 busses
  - miminum of 321 hospitality parking spaces (located in a safe and secure area)
  - about 1000 parking spaces on current site including improved public transportation system (FIFA/UEFA requirements up to 3000 spaces)
  - at least 1000m² for broadcasting compound (van area, close to grand stand)

- hospitality
- athletes & officials
- press & media
- general spectators
- stadium security

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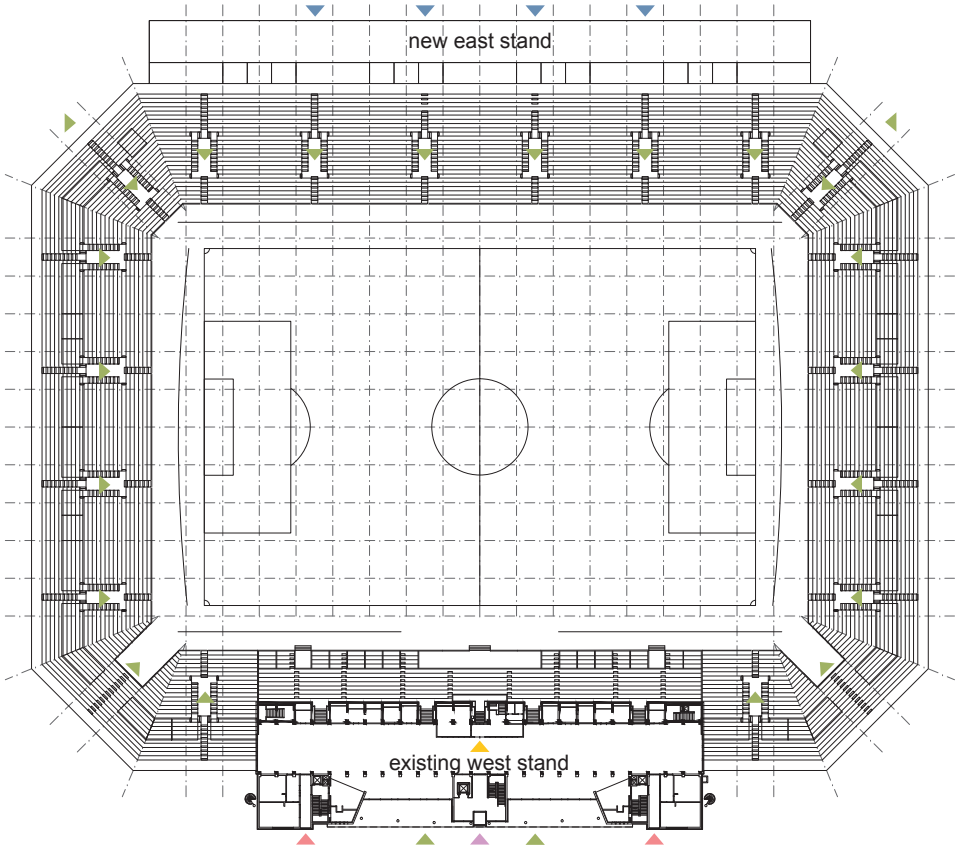


1.1 Architectural Components

> **route guidance**

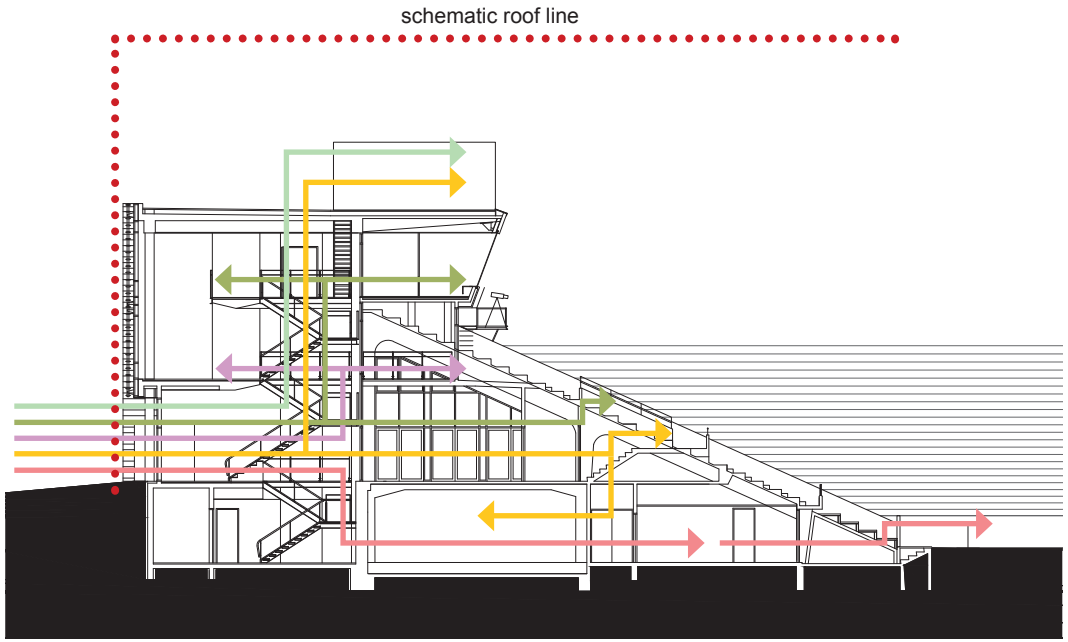
• Skybox visitors (sponsors & KSI), Business Club and Family & Friends entrance is located at the new east stand

• athletes & officials, press & media and offices & other usage modes will use the existing west stand to enter the stadium

• spectators entrances located at north- and south stand, vomitories for circulation

- hospitality
- athletes & officials
- press & media
- general spectators
- offices & other usage modes

1 Design and Construction Concept



1.1 Architectural Components

> **route guidance existing west stand**

• the stadium security is placed in level 03, next to the television units

• spectators are getting to their seats through vomitories in level 00

• fan museum, -shop and -restaurant are accomodated in level 02

• KSI and operator offices are remaining stationary in level 01

• athletes‘ facilities are located in level -01, next to the mixed zone and working area for press

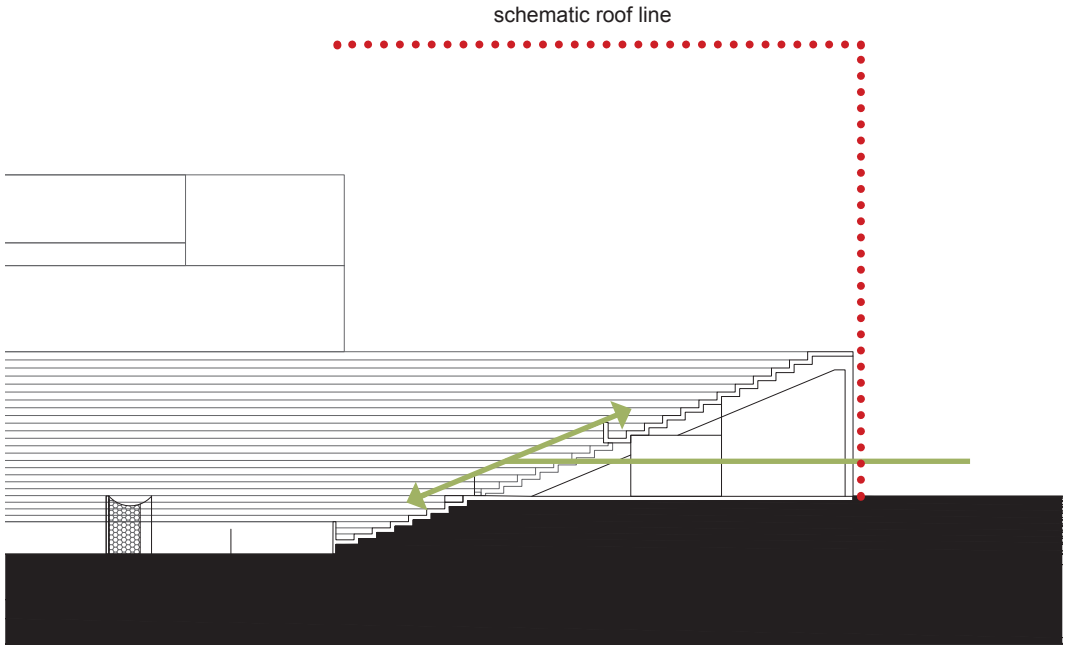
- stadium security
- athletes & officials
- press & media
- general spectators
- offices & other usage modes

1 Design and Construction Concept

1.1 Architectural Components

> **route guidance (north- & south stand)**

• vomitories for spectators circulation



general spectators

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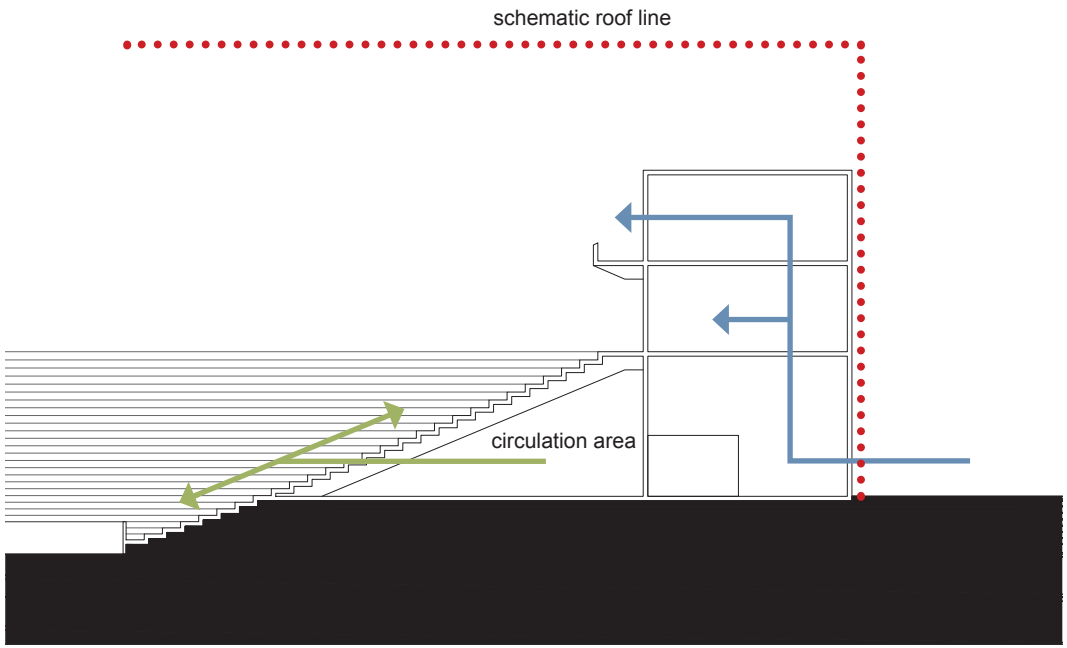
1.1 Architectural Components



> **route guidance (new east stand)**

- spectators circulation area located below east stand
- Business Club, Family & Friends and Skybox visitors will be led through hospitality and catering area to reach seats
- Skyboxes situated on level 02, exposed position, balcony with seats in front of the boxes

general spectators

hospitality

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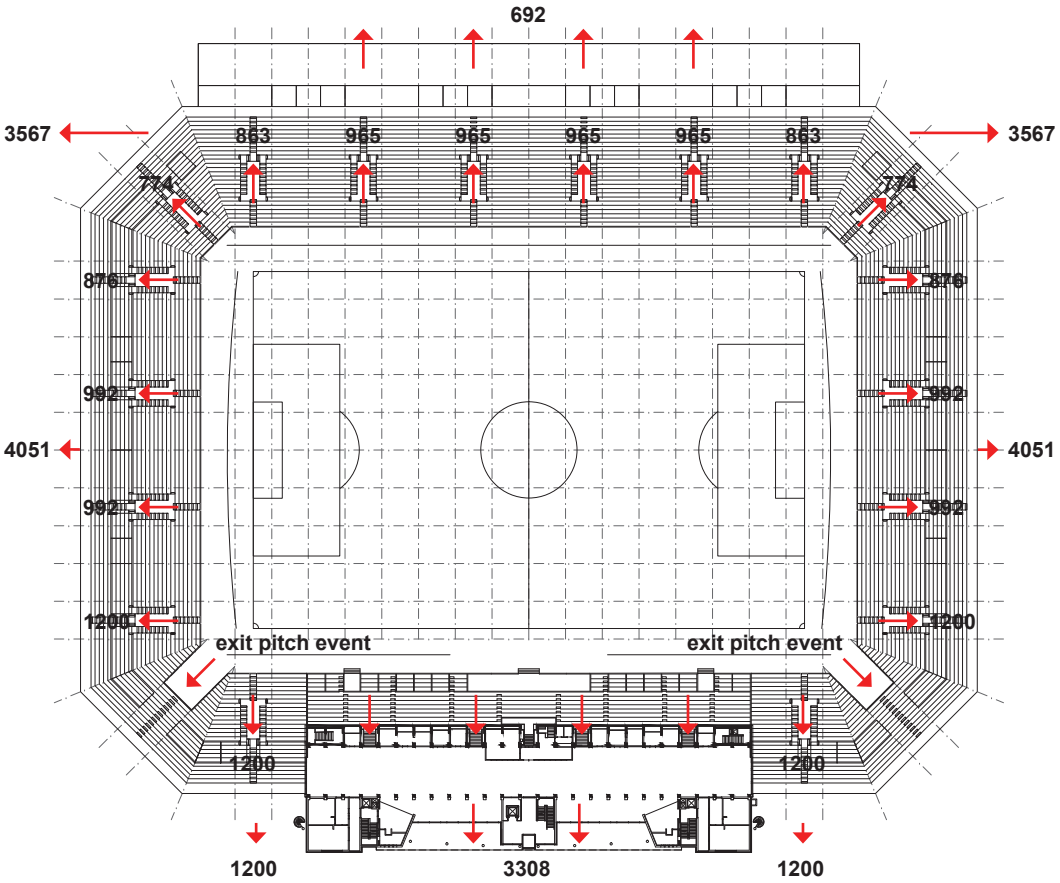

1.1 Architectural Components

> **route guidance | escape routes**

- spectators overall: 20944
- Skybox visitors + Business Club + Family & Friends: 692
- the graphic includes the amount of spectators and hospitality guests, staff not considered

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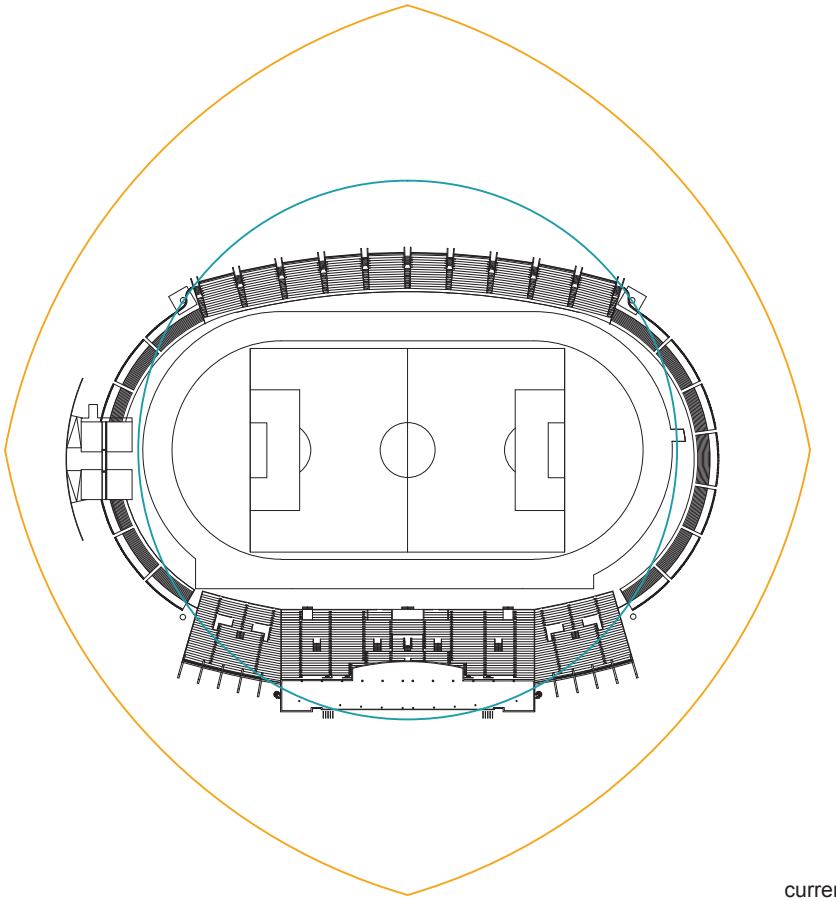
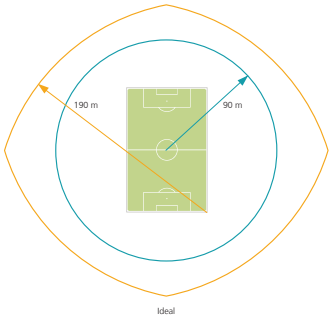


current situation

1.1 Architectural Components

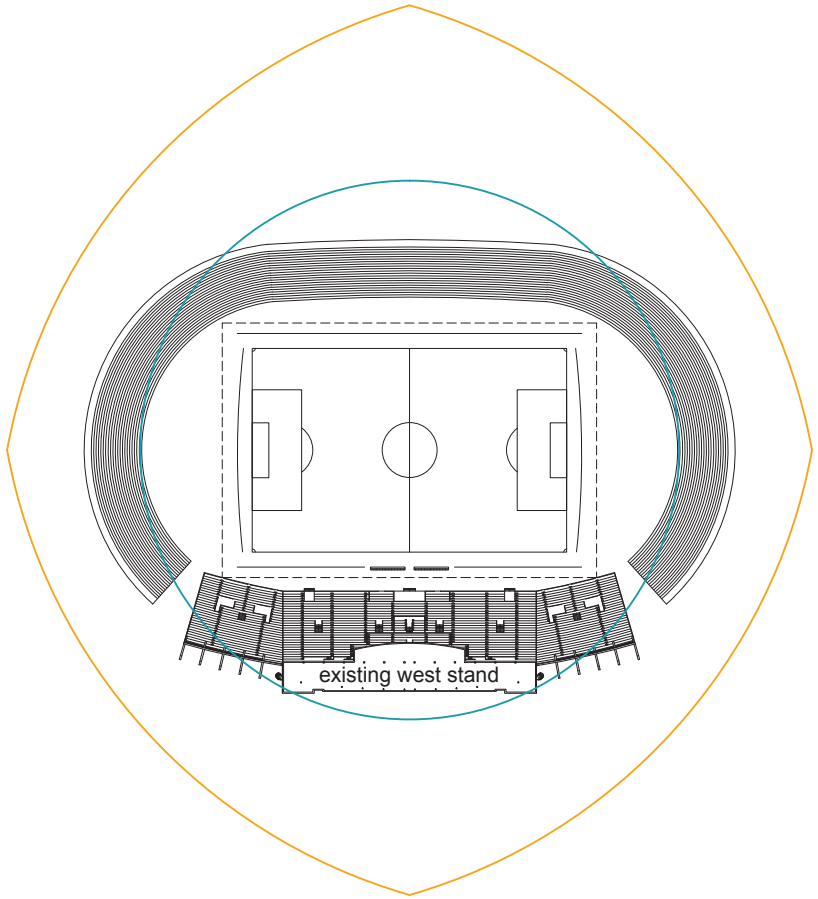
> **stands / seating configuration**

FIFA recommendation for the distance
spectators - pitch | current situation



optimal distance (90m)
maximum distance (190m)

1 Design and Construction Concept



option 1

1.1 Architectural Components

> **stands / seating configuration** | option 1

FIFA recommendation for the distance
spectators - pitch | continued curvature stand

+

• better view from the existing west stand

-

• bad view from north and south stands
(distance between 8.60 - 27.0m)

• no possibility to situate the pitch in minimal distance to the existing west stand because of stand additions 2006

optimal distance (90m)
maximum distance (190m)

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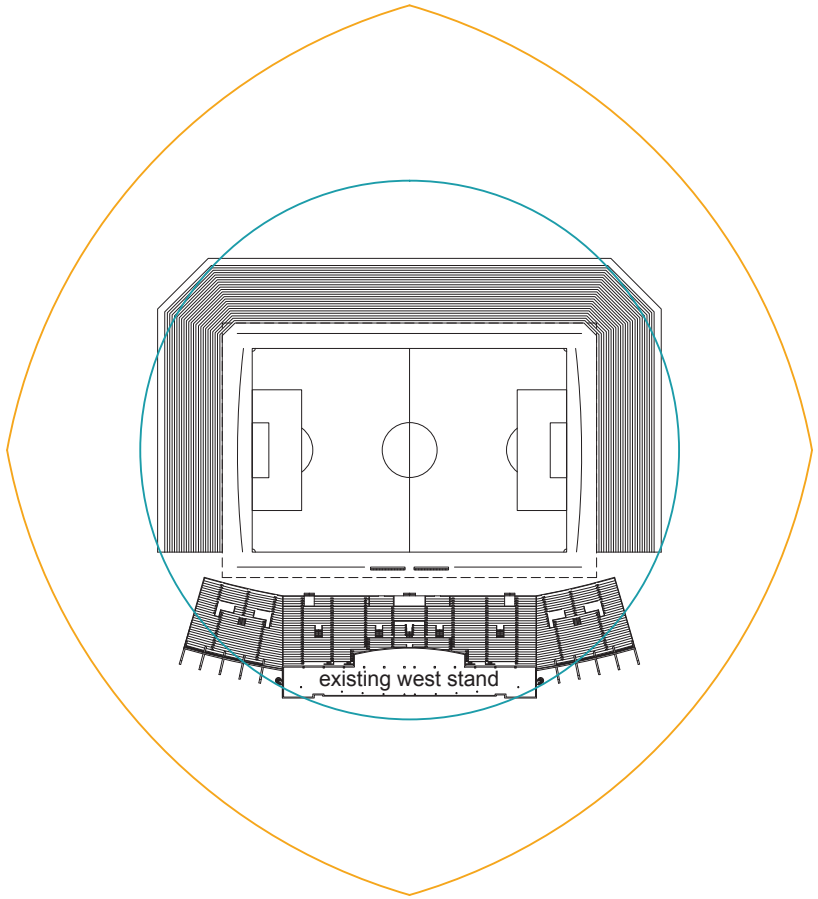


option 2

1.1 Architectural Components

> **stands / seating configuration** | option 2

FIFA recommendation for the distance
spectators - pitch | three-sided closed stand

+

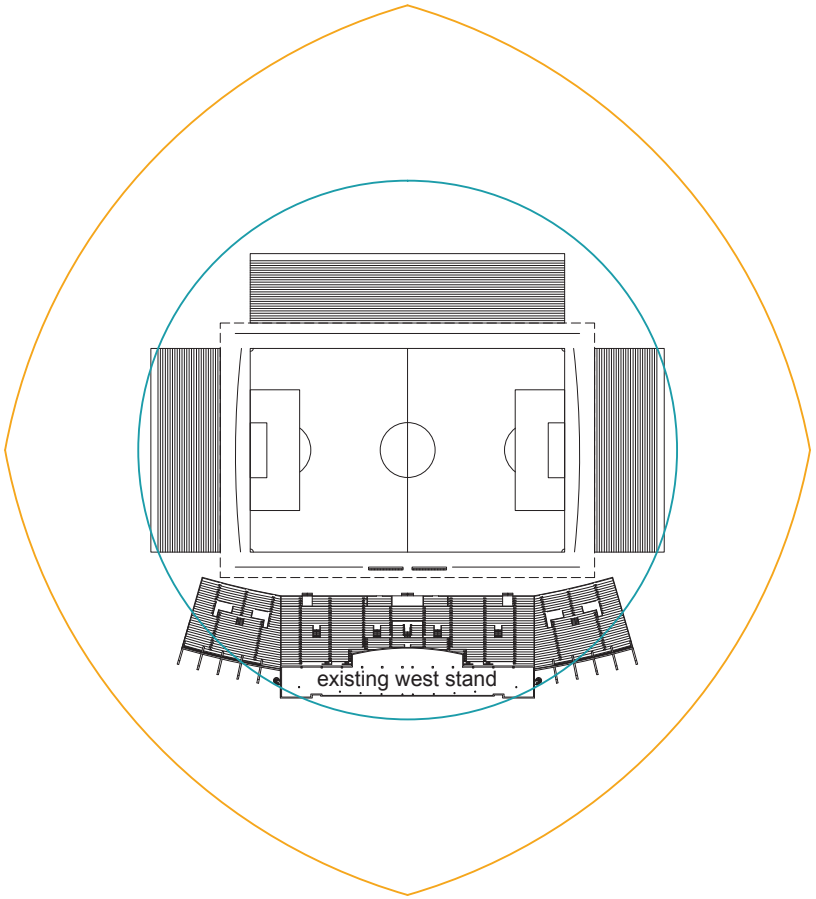
- better view from the existing west stand
- very good view from north, south and east stands
- better acoustics inside and outside the stadium (noise insulation)
- possibility to realise a closed roof

-

- no possibility to situate the pitch in minimal distance to the existing west stand because of stand additions 2006

optimal distance (90m)
maximum distance (190m)

1 Design and Construction Concept



option 3

1.1 Architectural Components

> **stands / seating configuration** | option 3

FIFA recommendation for the distance spectators - pitch | three single stands

+

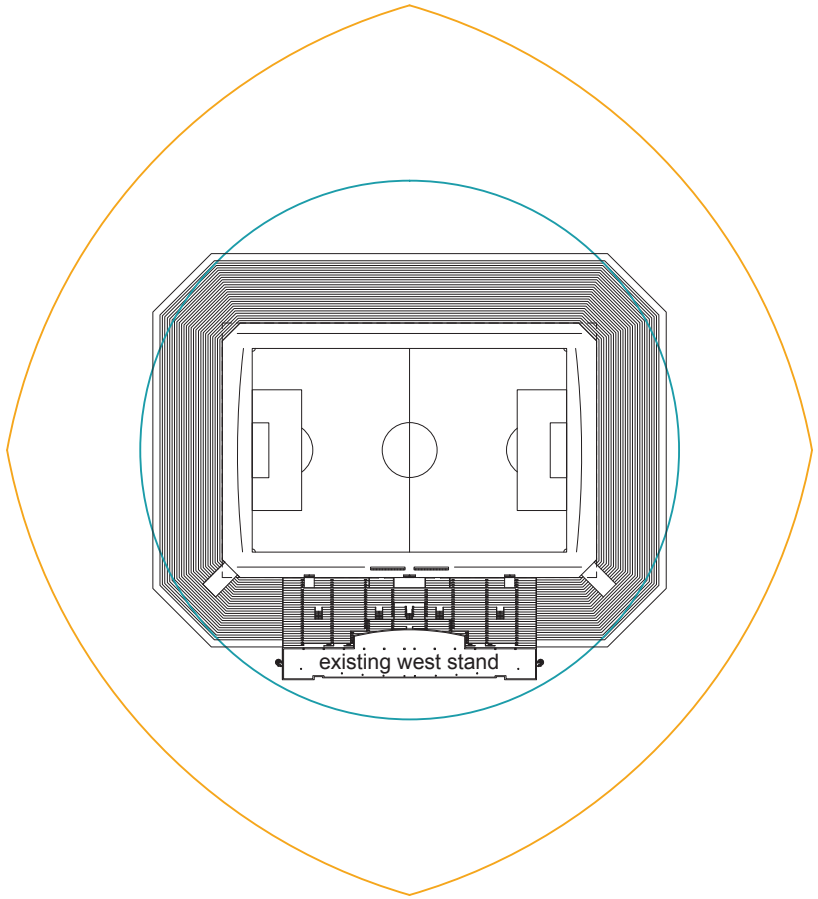
- better view from the existing west stand
- very good view from north, south and east stands
- possibility to realise a closed roof

-

- no possibility to situate the pitch in minimal distance to the existing west stand because of stand additions 2006
- sound pollution

optimal distance (90m)
maximum distance (190m)

1 Design and Construction Concept



option 4

1.1 Architectural Components

> **stands / seating configuration** | option 4

FIFA recommendation for the distance spectators - pitch | closed stand

\+

• due to the closeness to the pitch very good viewing conditions

• better acoustics inside and outside the stadium (noise insulation)

• possibility to realise a closed roof

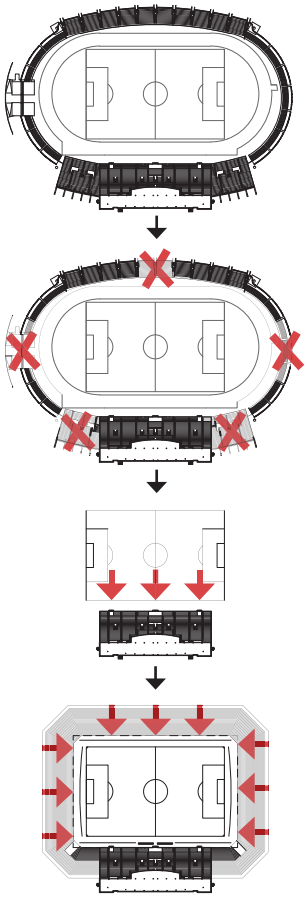
• best atmosphere inside the stadium

• possibility to create a landmark

• recommended option

optimal distance (90m)
maximum distance (190m)

1 Design and Construction Concept



starting point

demolition of the north, south and east stands, plus extensions of main stand

moving the pitch towards the main stand (distance pitch - main stand = 8.5m)

moving the new north, south and east stands as close as possbile to the pitch

option 4

1.1 Architectural Components

> **stands / seating configuration** | option 4

design derivation

1 Design and Construction Concept

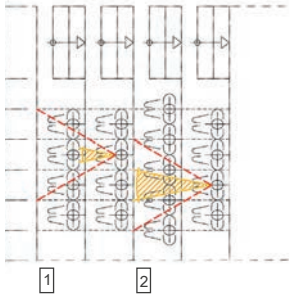
1.1 Architectural Components

> **stands / seating configuration | principles of sightline calculation**

• a perfect construction with regards to sightlines is the key to an extraordinary atmosphere within a stadium bowl

• the global geometry of the stadium is a consequence of the priority foci: good view quality for all the spectators

• optimal sightlines combine the desired proximity for the fans to the pitch as well as no interfering between upper and lower rows' sightlines and leaves enough functional space around the pitch



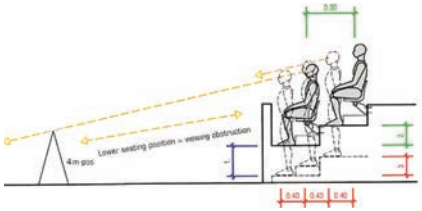
1 2

seating place grid

1 stadium type
non-staggered layout (seating grid 50cm)

2 theatre type
staggered layout (half seating grid)

The term „sightline" refers to a spectators ability to see a critical point on the playing field over the head of the spectator below and is measured by the „ C" value



Sightline elevation "C" value
Hospitality ≥12 cm
Admission 12-9 cm
In exceptional cases 9-6 cm

Sightline tolerance
Maximum of admissible deviation ±5 cm

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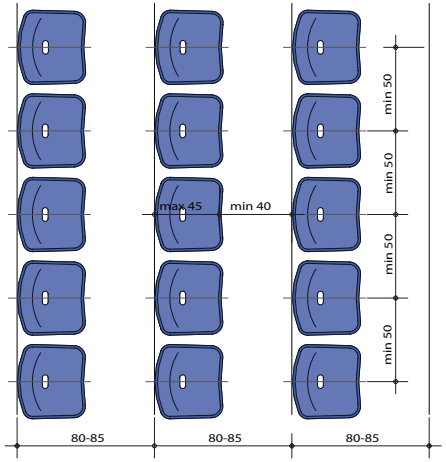

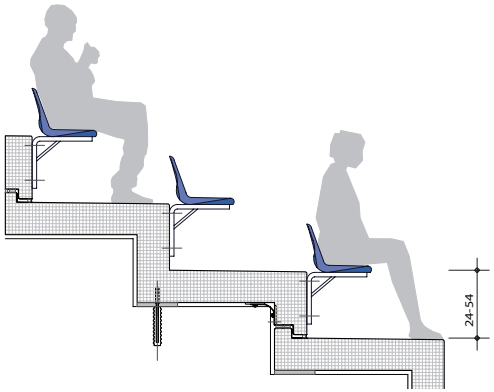

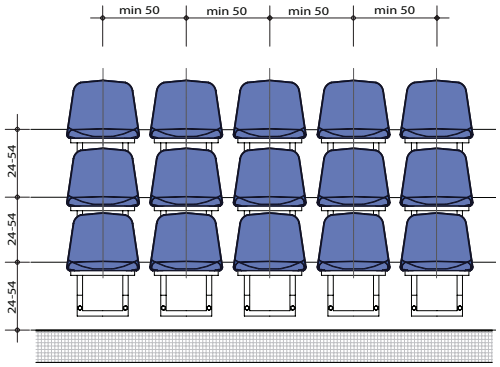

1.1 Architectural Components

> **stands / seating configuration | dimensions spectator seats**

- row depth 80cm
- axial distance between seats 50cm
- space per seat 80x50cm

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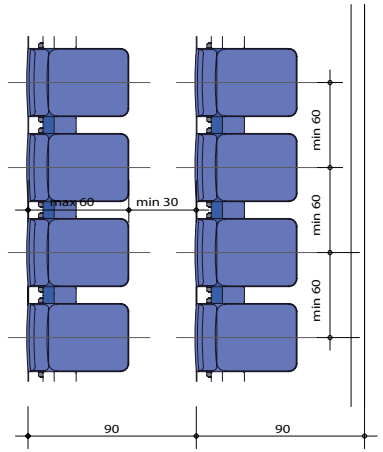
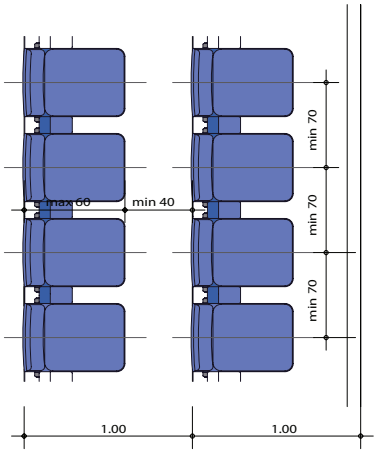
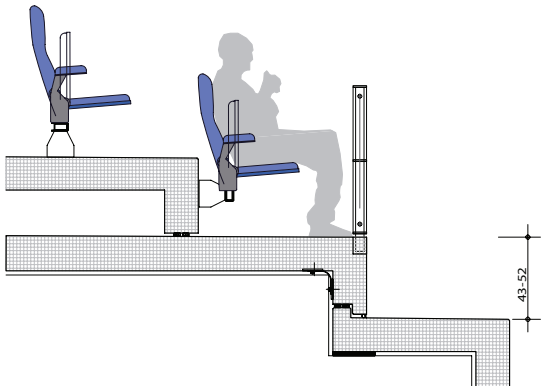
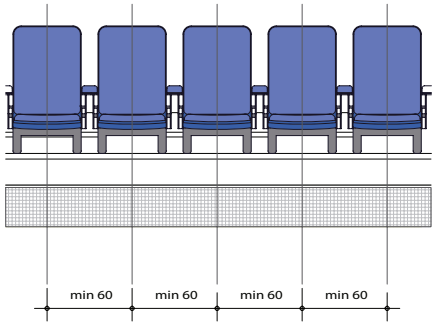


Business Club + Family & Friends seats



skybox seats





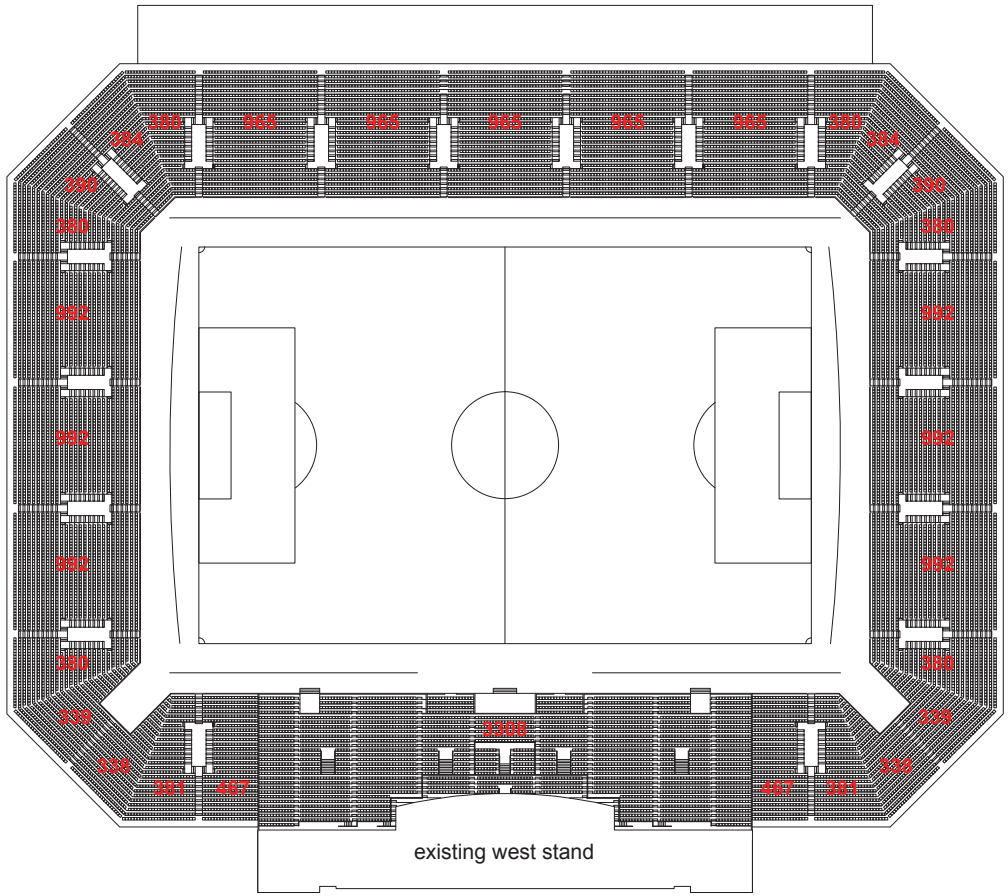
1.1 Architectural Components

> **stands / seating configuration | dimensions hospitality seats**

• Sky box seats:
row depth 100cm
axial distance between seats 70cm
space per seat 100x70cm

• Business Club + Family & Friends seats:
row depth 90cm
axial distance between seats 60cm
space per seat 90x60cm

1 Design and Construction Concept



1.1 Architectural Components

> **stands / seating configuration | capacity plan overall**

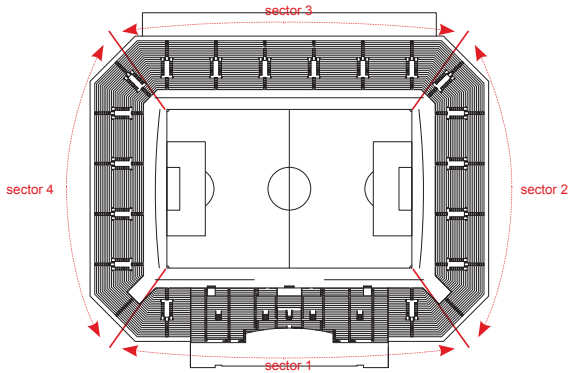
• home team spectators: about 20000

• away team spectators: 1000 (UEFA recommendation) / 350 on average (KSI information), implemented flexible

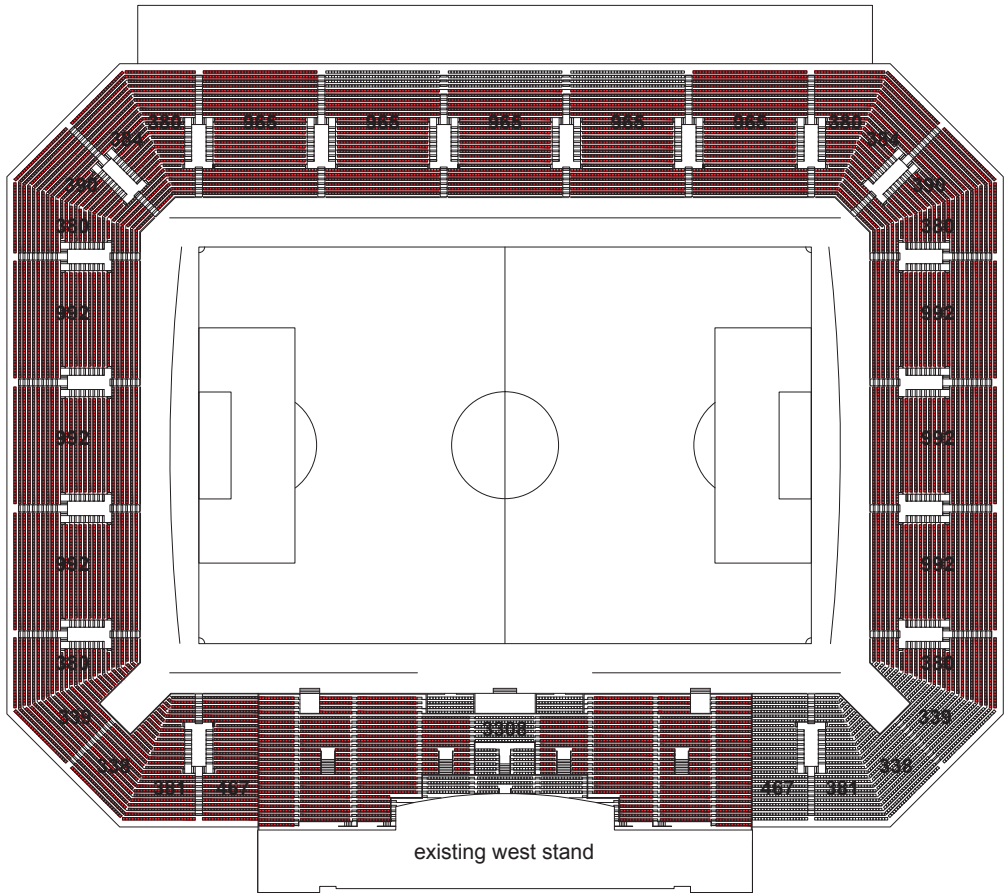
• 192 Skybox / 450 Business Club + Family & Friends seats

• 100 press seats, 25 commentators positions (UEFA recommendation) / 50 press seats, 20 commentator positions, 8 studios, 50 flexible seats (KSI information)

• schematic sectors:



1 Design and Construction Concept

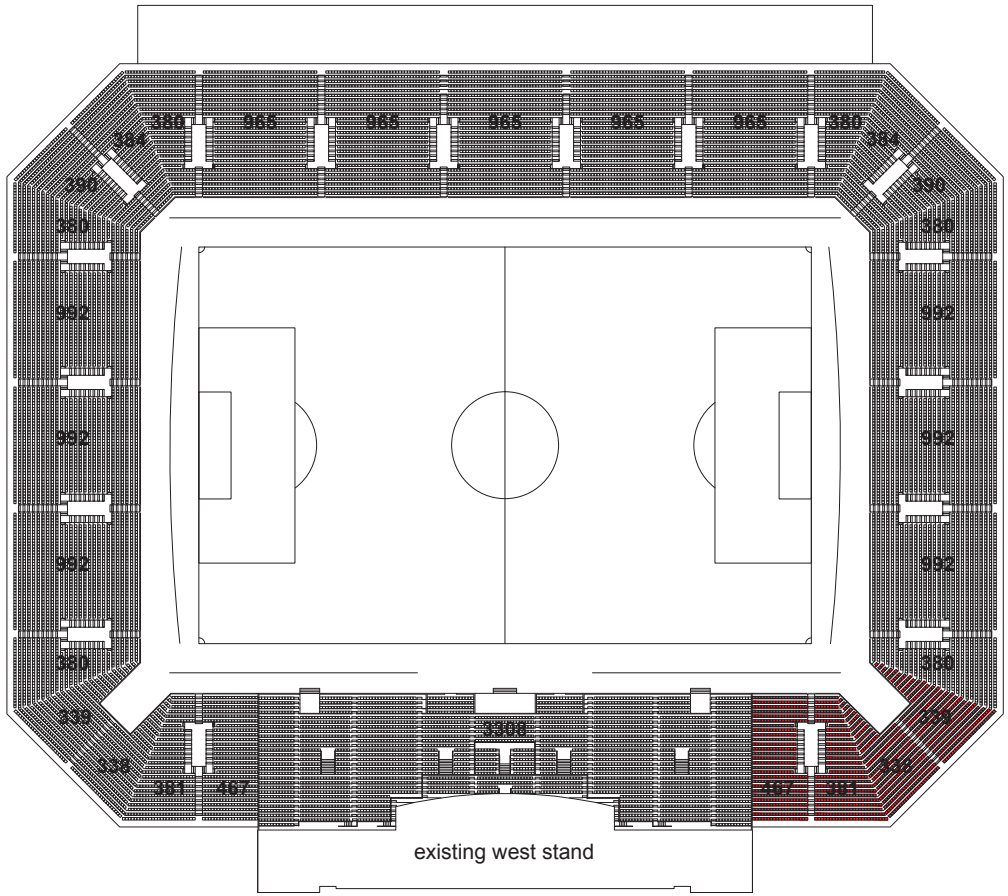


1.1 Architectural Components

> **stands / seating configuration | capacity plan**

• about 20000 spectators home team

1 Design and Construction Concept



1.1 Architectural Components

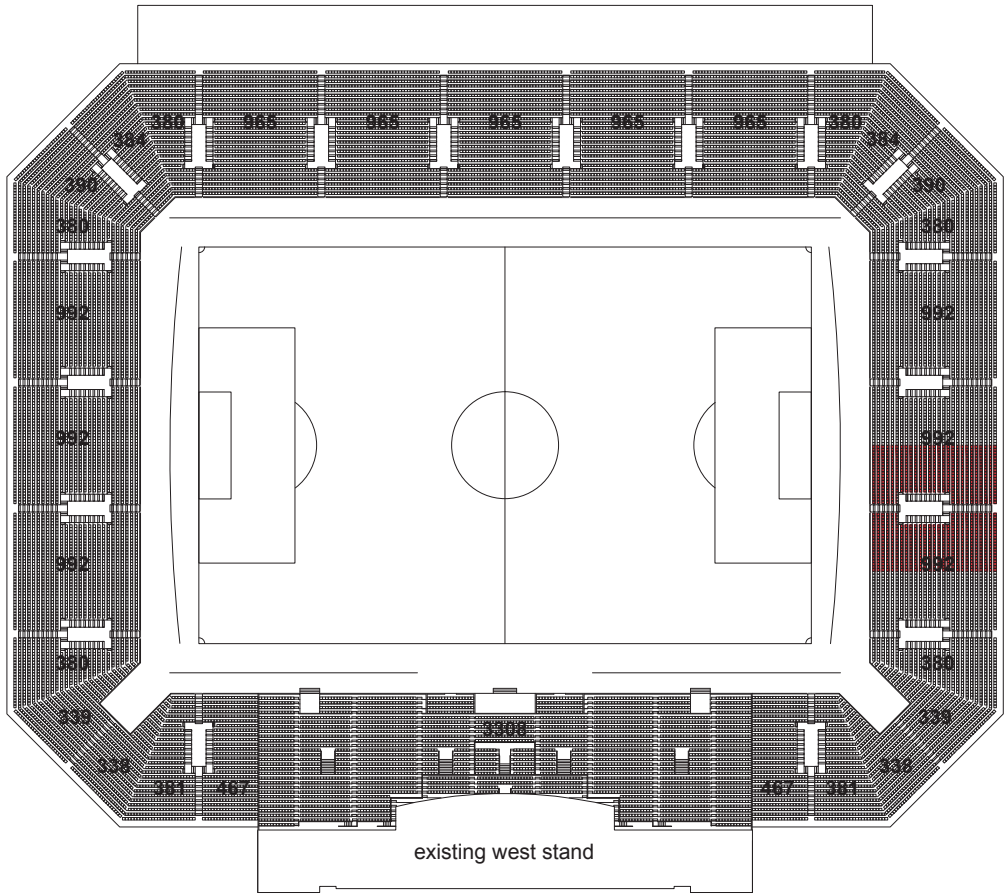
> **stands / seating configuration | capacity plan |** option 1

• about 1000 spectators away team (recommendation UEFA)

• 350 spectators away team (recommendation KSI)

• additional possible segregation via moveable fencing

1 Design and Construction Concept

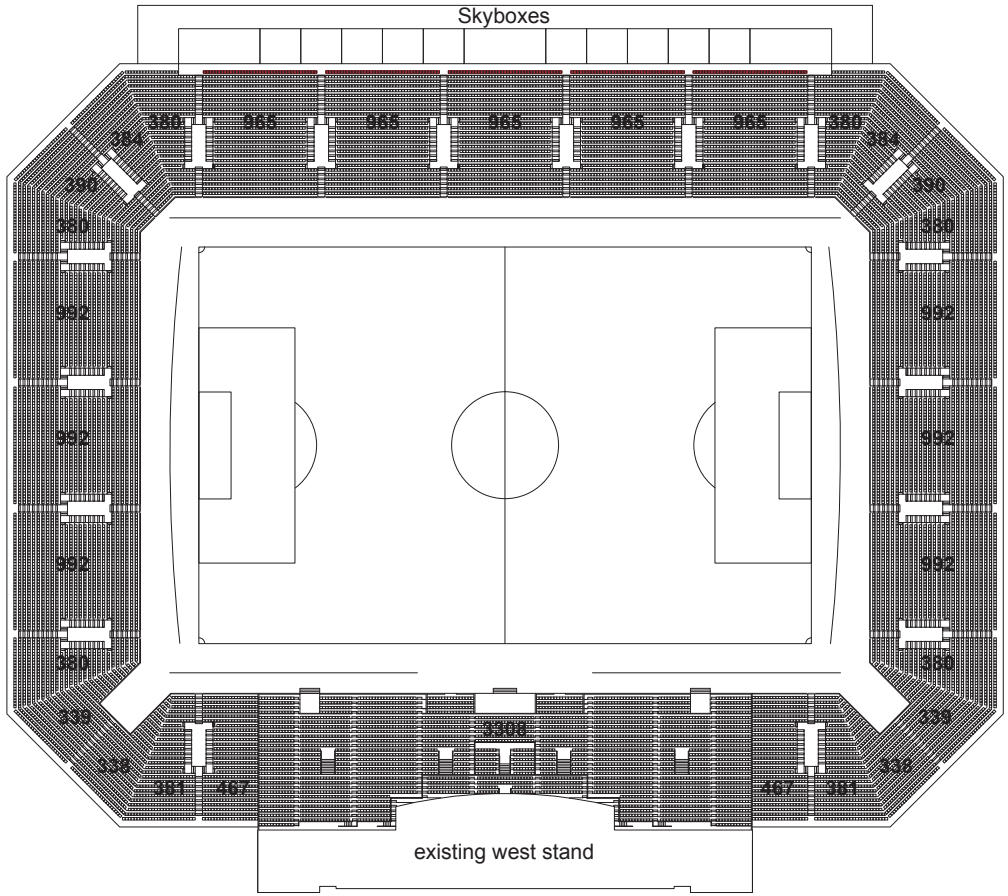


1.1 Architectural Components

> **stands / seating configuration | capacity plan | option 2**

- about 1000 spectators away team (recommendation UEFA)
- 350 spectators away team (recommendation KSI)
- additional possible segregation via moveable fencing

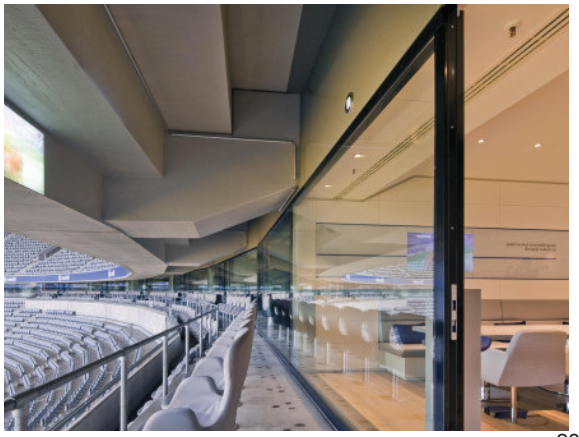
1 Design and Construction Concept



1.1 Architectural Components

> **stands / seating configuration | capacity plan**

- 192 Skybox seats in front of skyboxes



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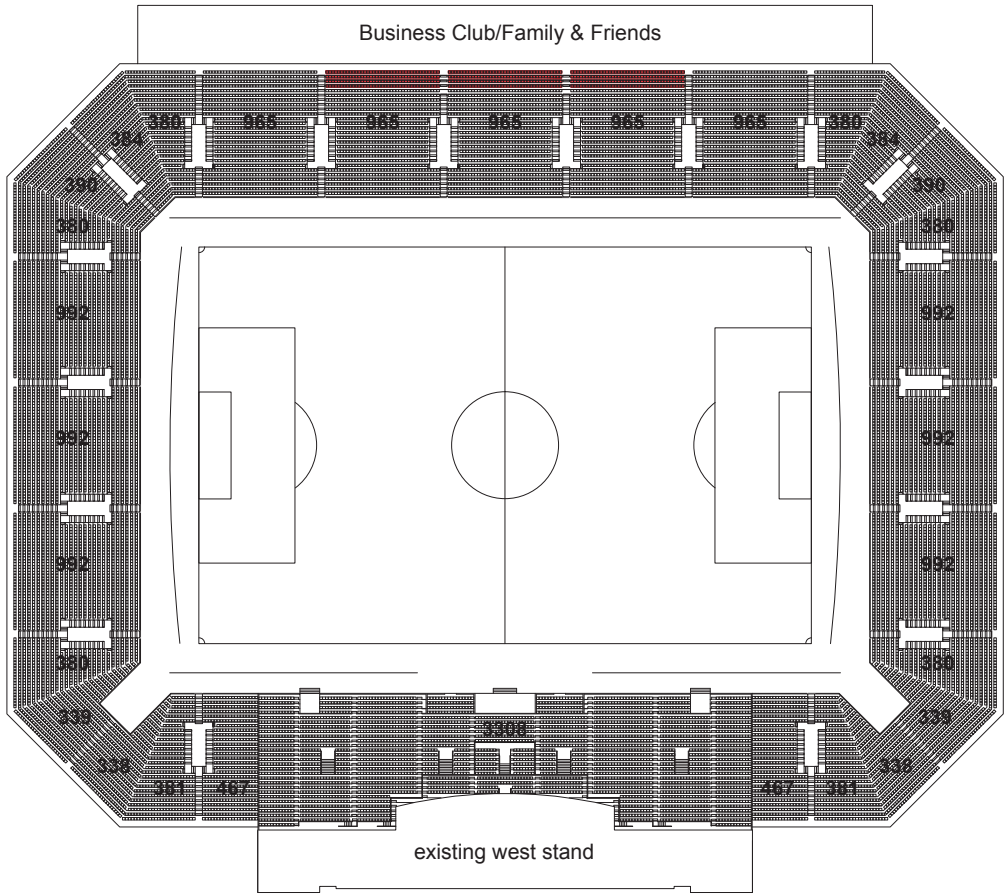
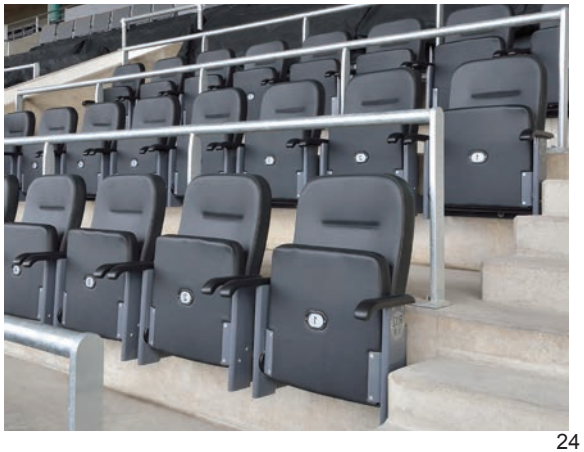


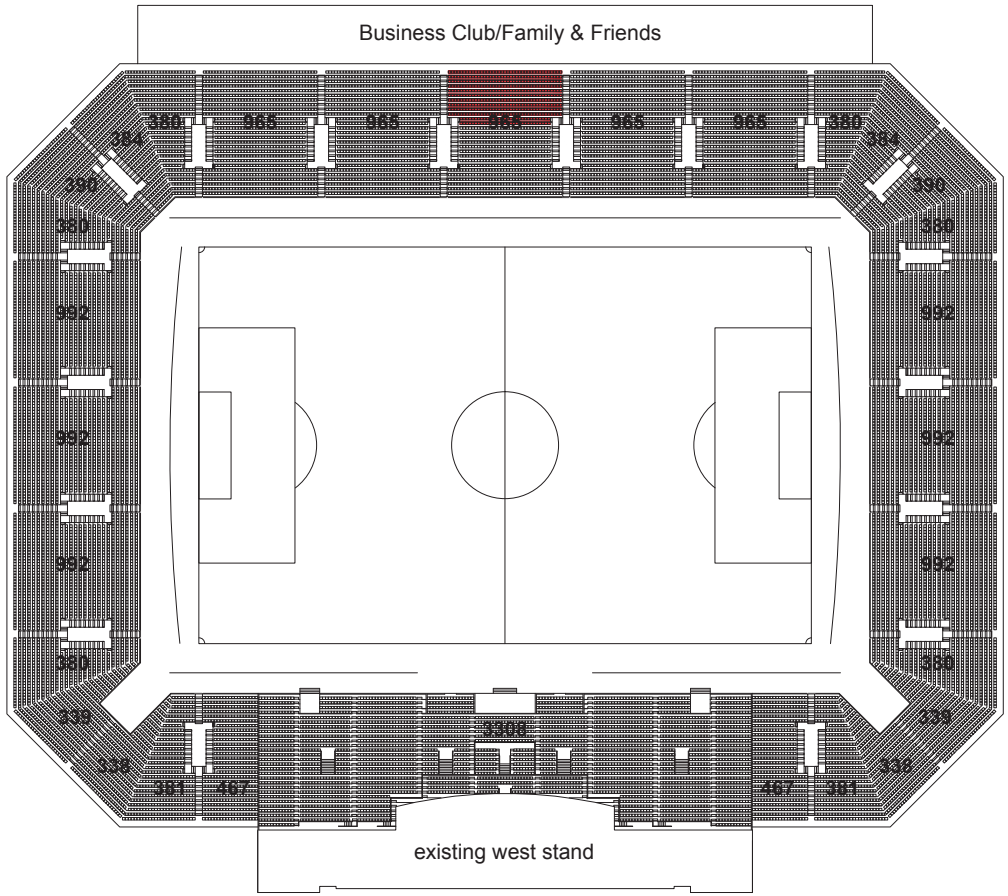
1.1 Architectural Components

> **stands / seating configuration | capacity plan | option 1**

450 Business Club + Family & Friends seats
separated in three blocks



1 Design and Construction Concept

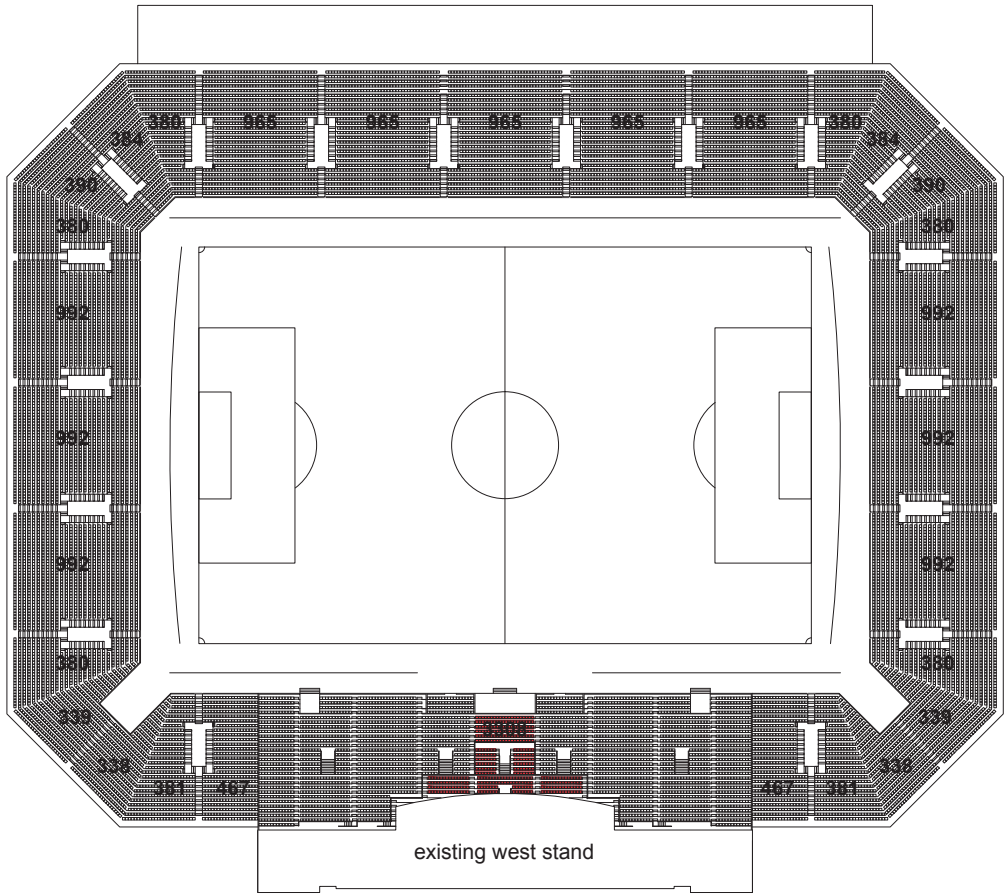


1.1 Architectural Components

> **stands / seating configuration | capacity plan |** option 2

450 Business Club + Family & Friends seats
arranged in one block

1 Design and Construction Concept



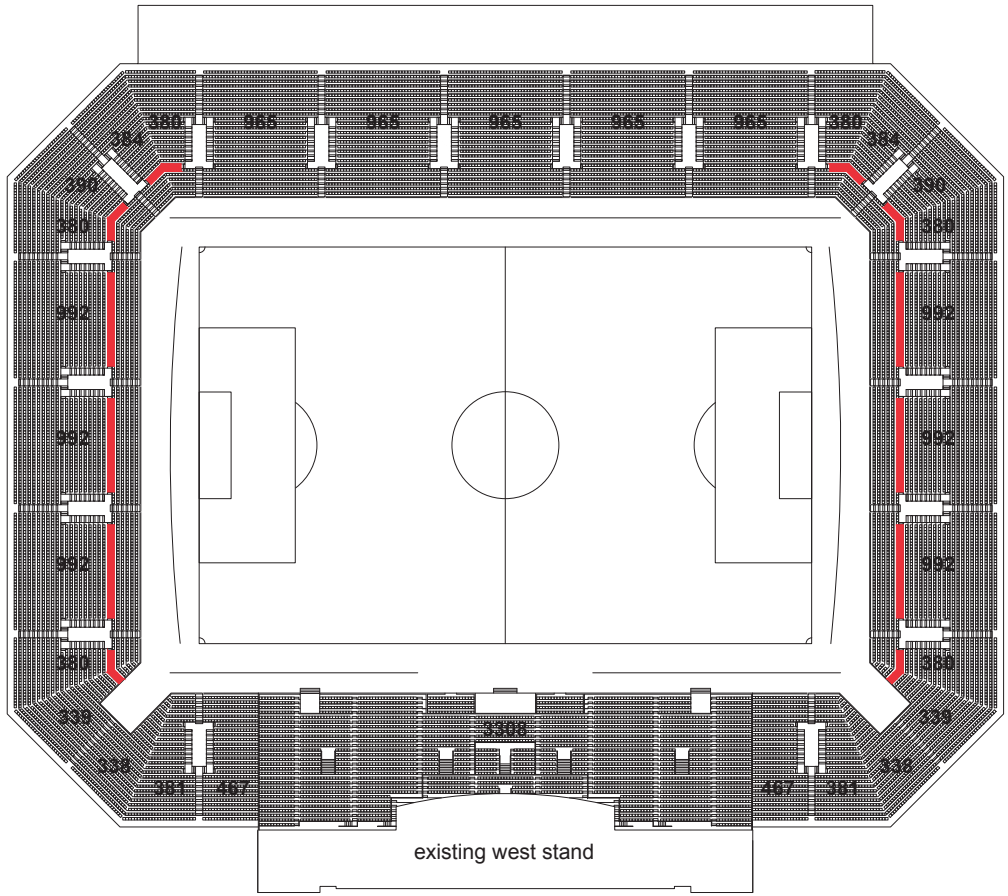
1.1 Architectural Components

> **stands / seating configuration | capacity plan**

• 100 press seats & 25 commentator positions (75 seats) appropriated to UEFA requirements

• 50 press seats + 20 commentator positions, 8 studios and 50 flexible seats (appropriated to recommendation KSI)

1 Design and Construction Concept

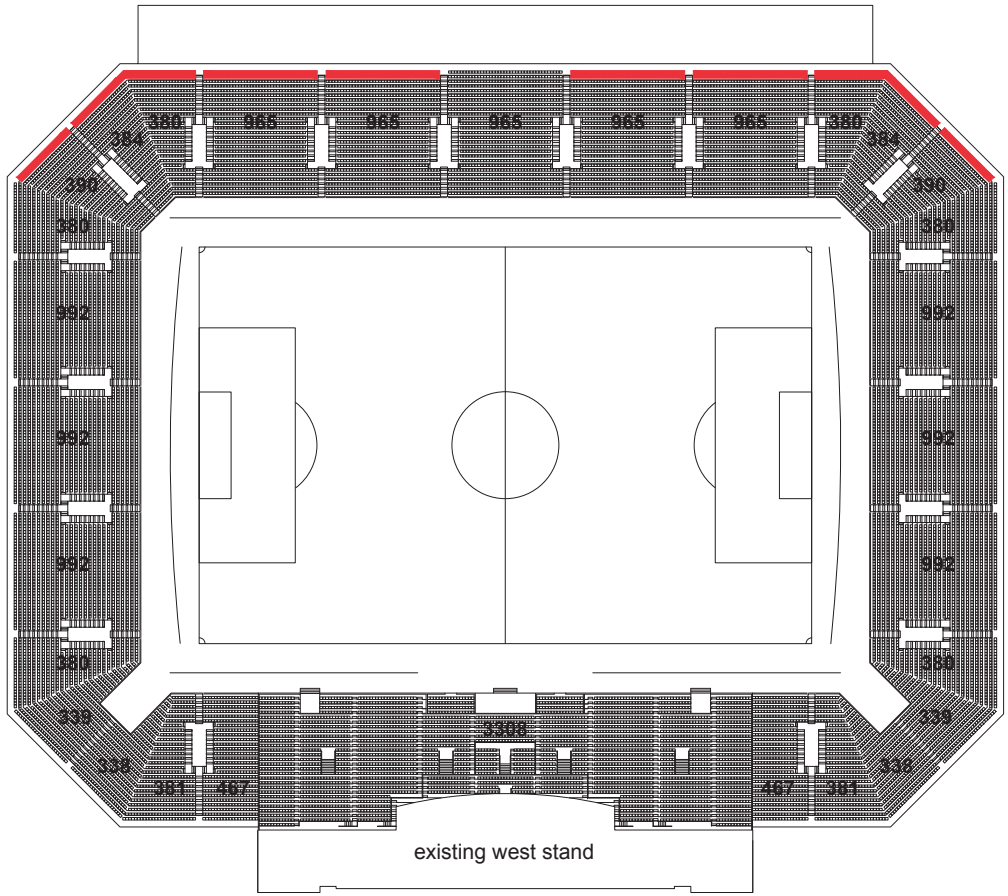


1.1 Architectural Components

> **stands / seating configuration | capacity plan | option 1**

100 places for people with disabilities in north and south stands

1 Design and Construction Concept

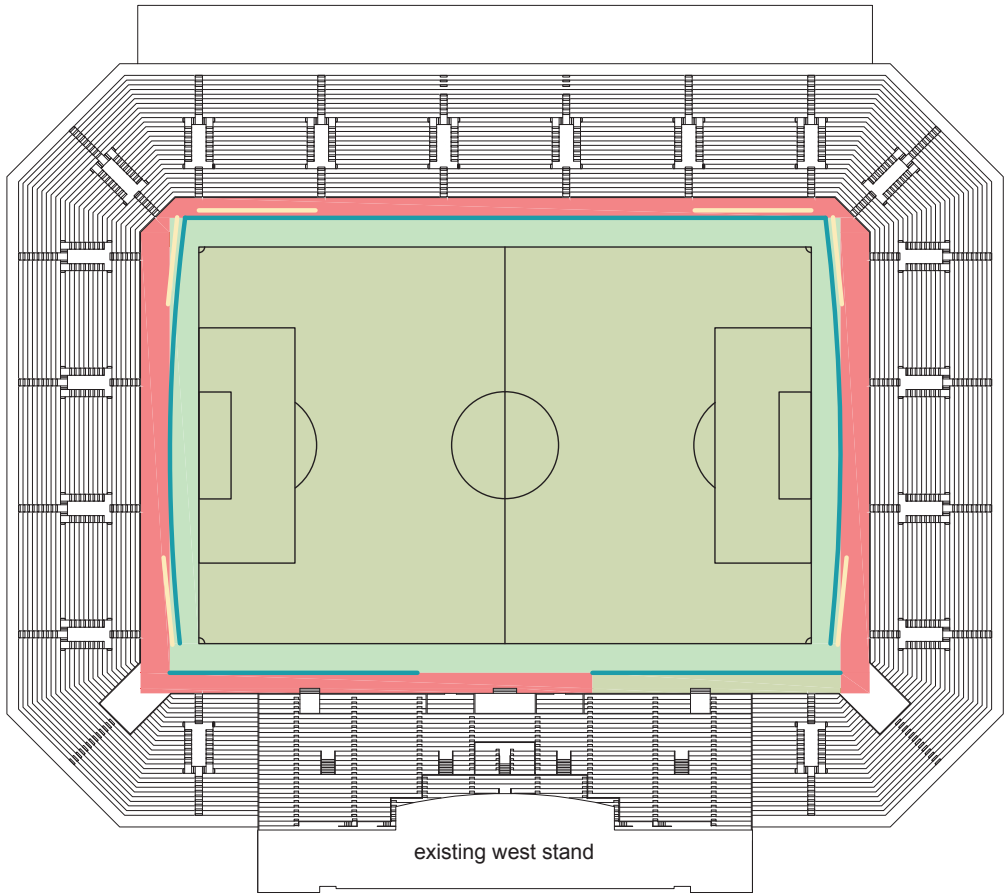


1.1 Architectural Components

> **stands / seating configuration | capacity plan** | option 2

100 places for people with disabilities in the east stand

1 Design and Construction Concept



1.1 Architectural Components

> **pitch position and function | FIFA recommended dimensions**

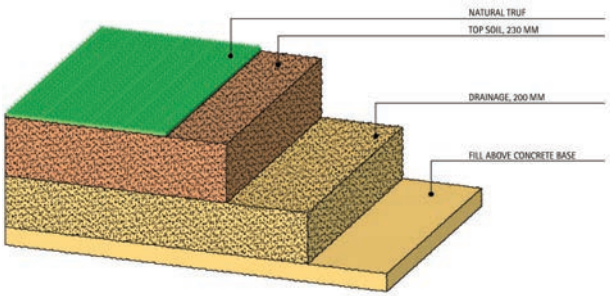
• to ensure space for advertising boards and media, it's important to follow official recommendations (FIFA/UEFA) paired with operational knowledge

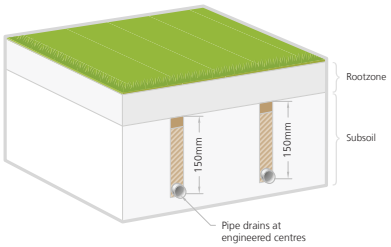
• total size of the pitch - 125 x 85m

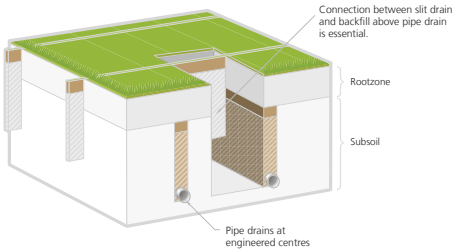
• size of the pitch appropriated to UEFA - 120 x 80m

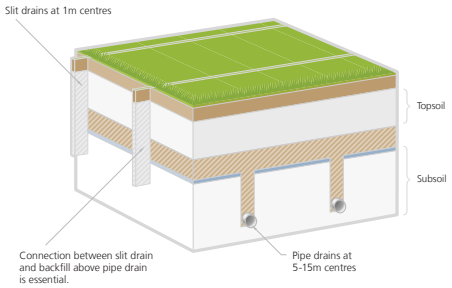
field of play	-105 x 68m
grass area	-115 x 78m
auxiliary area	-125 x 85m (max. by UEFA)
advertising boards	
photographers' position	

1 Design and Construction Concept









1.1 Architectural Components

> **pitch position and function | natural grass**

• playing field dimensions are 68 m x 105 m plus security zones behind the goal lines and behind the sidelines

• the pitch is equipped with a drainage system with several layers of granule and a turf topping

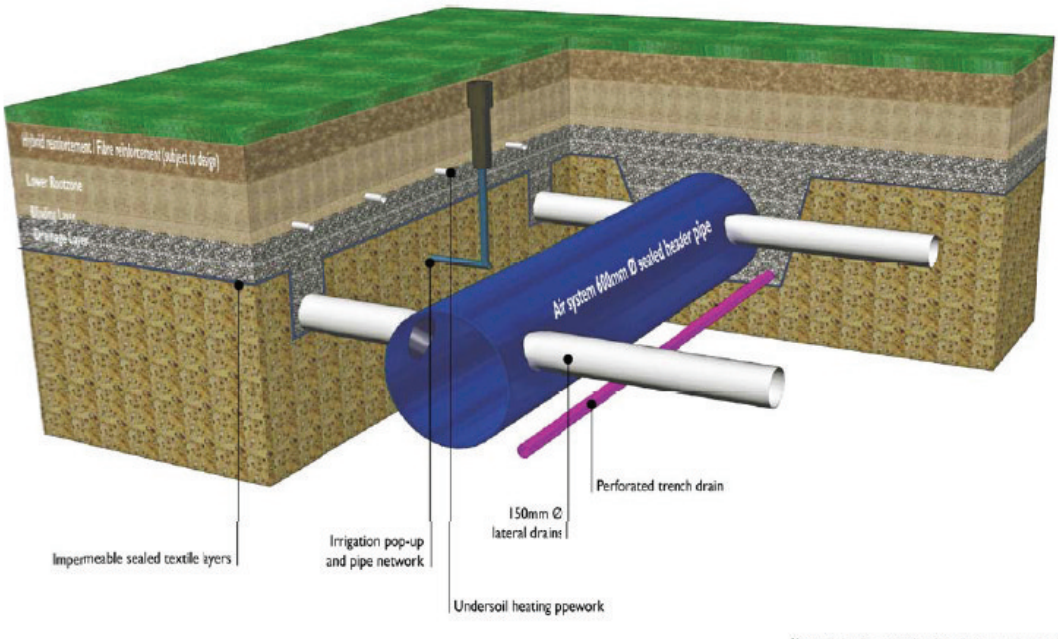
• the pitch section has a depth of 65cm and has to be designed by a pitch expert according to UEFA/FIFA requirements; this scope of work will be attended by the landscape architect

• the playing field is planted with a layer of natural turf; as a result of the expected short construction phase, the grass will be laid out with a natural turf product

• during the cultivation of the grass, the soil base will be checked for the following qualities and will be balanced with the topsoil:

- distribution of granule sizes
- content of non-organic substances
- water retention capability
- water permeability

1 Design and Construction Concept



1.1 Architectural Components

> **pitch position and function | watering & heating system**

• the stadium shall be equipped with an efficient and electronically controlled watering system

• the pitch shall only be watered in an effective pattern that involves long and penetrative watering

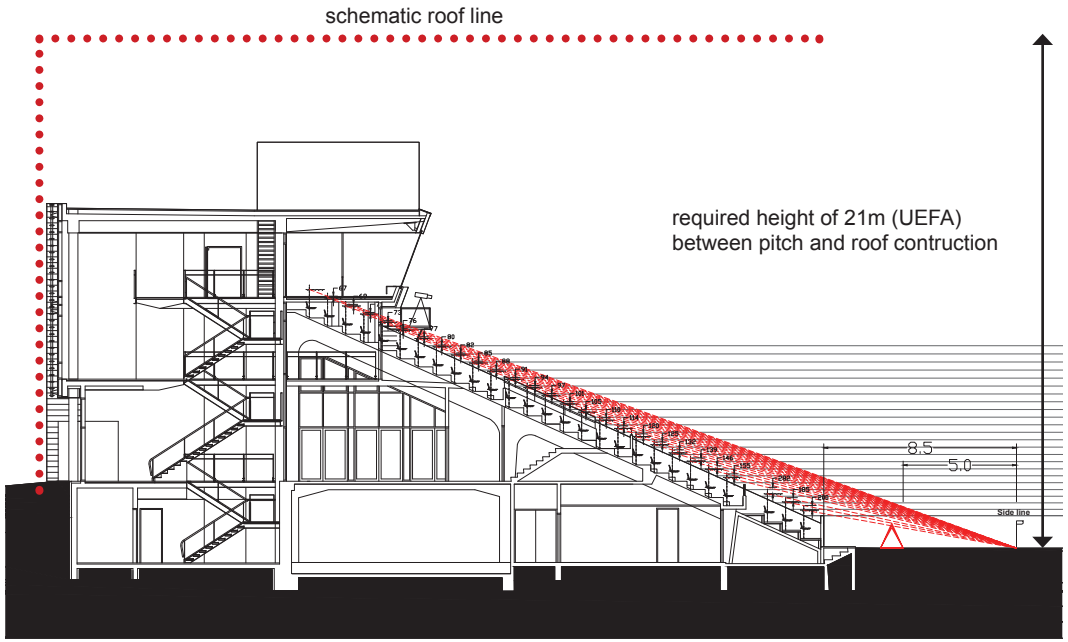
• pre-match watering will involve the central sprinklers, which will provide a uniform application of water to the main body of the pitch; pre-match watering is only required to wet the leaf of the plant to speed up the playing surface and is noct required to penetrate the soil

• for the operations of the Electronic Perimeter Boards the positioning and function of the sprinklers it is important that any sprinklers near the Electronic Perimeter Boards can be disabled or adapted so that they do not direct their water trajectory into the faces or mechanics of the panels; it could becme necessary to manually water the grassed areas in front of and behind Electronic Perimeter Boards

• the playing field shall be equipped with an underground pitch heating system to prevent it from freezing in extreme winter conditions

• the preferred heating system will be glycol filled heating pipes and electronic cables

1 Design and Construction Concept



1.1 Architectural Components

> **pitch position and function | sightlines existing west stand**

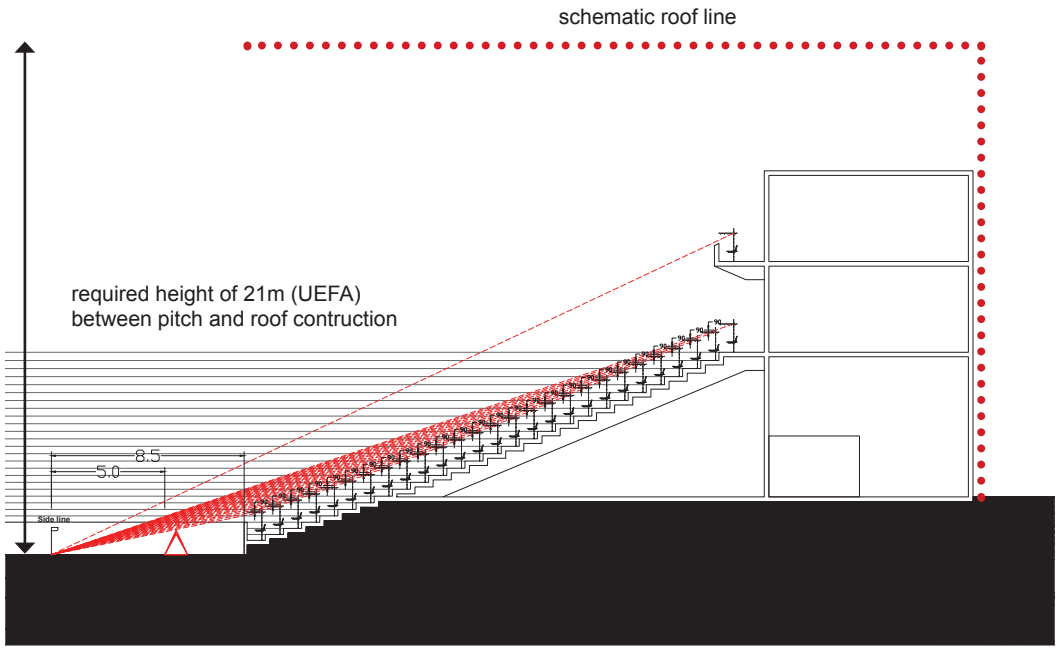
• moving the pitch 8.5m to the existing west stand implies sightline elevations between 67 - 282mm

• every spectator is able to watch above 1.0m high advertising boards

• the pitch height was not changed to save costs in groundworks

1 Design and Construction Concept

1.1 Architectural Components



> **pitch position and function | sightlines hospitality stand (new east stand)**

• the east stand was designed for an ideal sightline elevation „C“ value of 90mm for every spectator

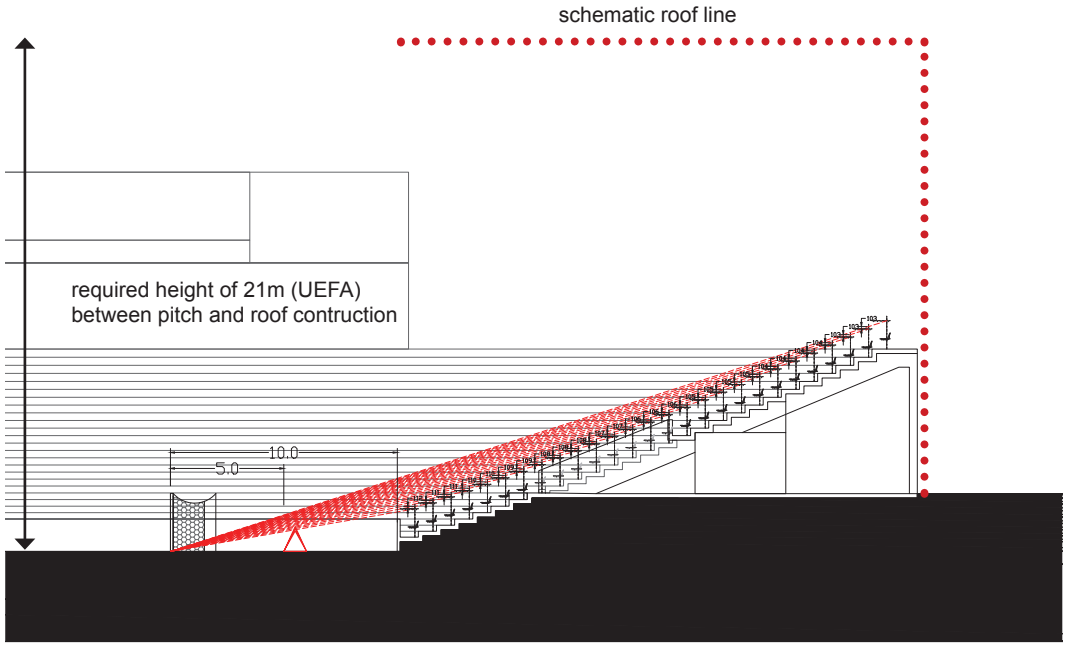
• increase to 12cm for Business Club visitors

• Skybox visitors have their own balcony

• through lifting the first row (20cm), every spectator is able to watch above 1.0m high advertising boards

1 Design and Construction Concept

1.1 Architectural Components

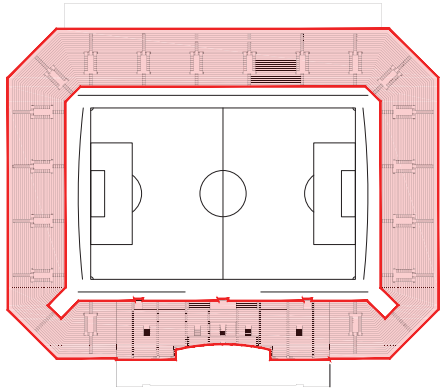


> **pitch position and function | sightlines north and south stands**

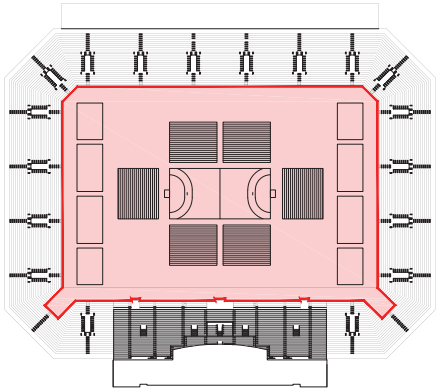
• the sightline elevation „C“ value is ranging between 103-112mm for every spectator influenced by the distance pitch - first row of 10.0m

• through lifting the first row (20cm), every spectator is able to watch above 1.0m high advertising boards

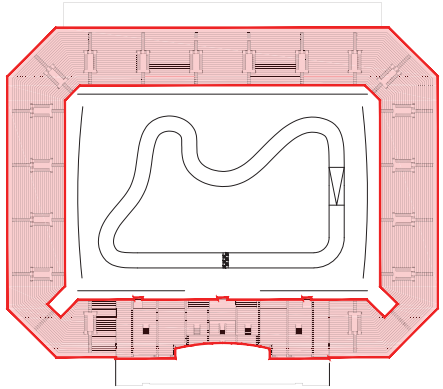
1 Design and Construction Concept



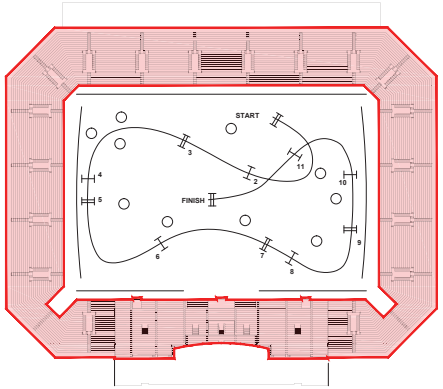
football events



handball & basketball events



motorsport events



equestrian events

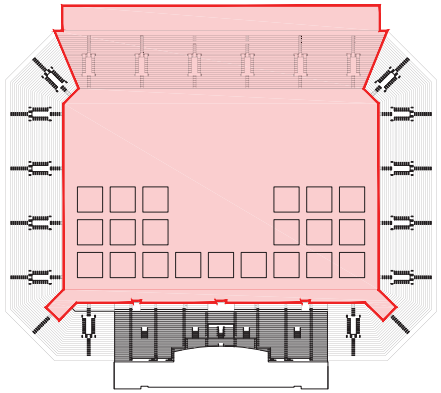
1.1 Architectural Components

> **pitch position and function | functions**

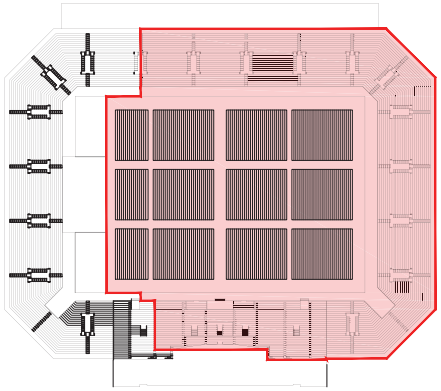
- •football events
  - national teams
    - men‘s national team
    - women‘s national team
    - u21 / u19 national teams
  - other football
    - national cup competitions
- handball events (pitch size 40 x 20m)
  - cup competitions / exhibition games
  - mobile stands on pitch area
- basketball events (pitch size 26 x 14m)
  - cup competitions / exhbition games
  - mobile stands on pitch area
- motorsport events
  - Race of champions / Monster Jam
  - Nitro Circus / Night of the Jumps
  - Red Bull X-Fighters / stock cars
- equestrian events
  - equestrian shows / galas
  - theme days, conventions, trade fairs

areas used by spectators

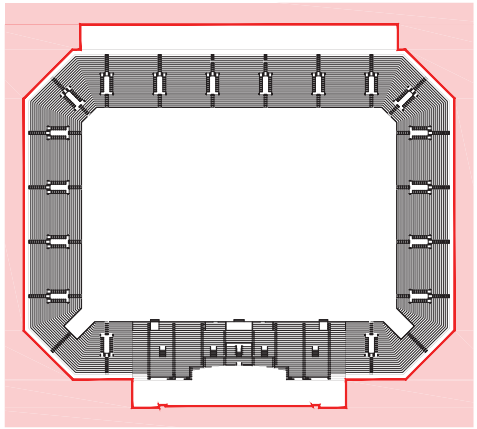
1 Design and Construction Concept



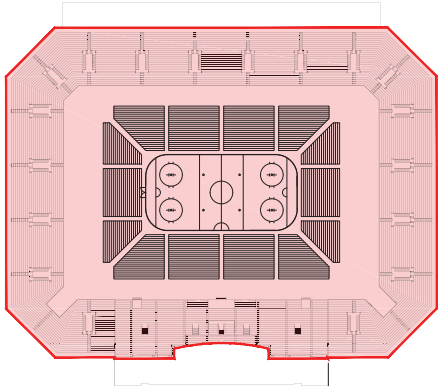
business events



concerts



territory & special events



wintersports events

1.1 Architectural Components

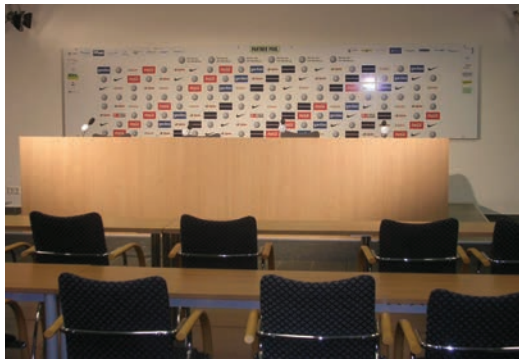
> **pitch position and function | functions**

- business events
  - MICE
  - sponsor events
- concerts
  - international & national concerts
  - festivals / shows
  - public viewings
- territory & special events
  - social & sports
  - community festivals
- wintersport events
  - ice hockey
    - exhibition games ice hockey
    - figure skating gala
  - ski / snowboard
    - Air & Style
    - Winter X-Games
    - freestyle FIS competitions
  - cross-country skiing / biathlon
    - FIS competitions / exhibitions
    - national competitions / schools

areas used by spectators

1 Design and Construction Concept

sports area



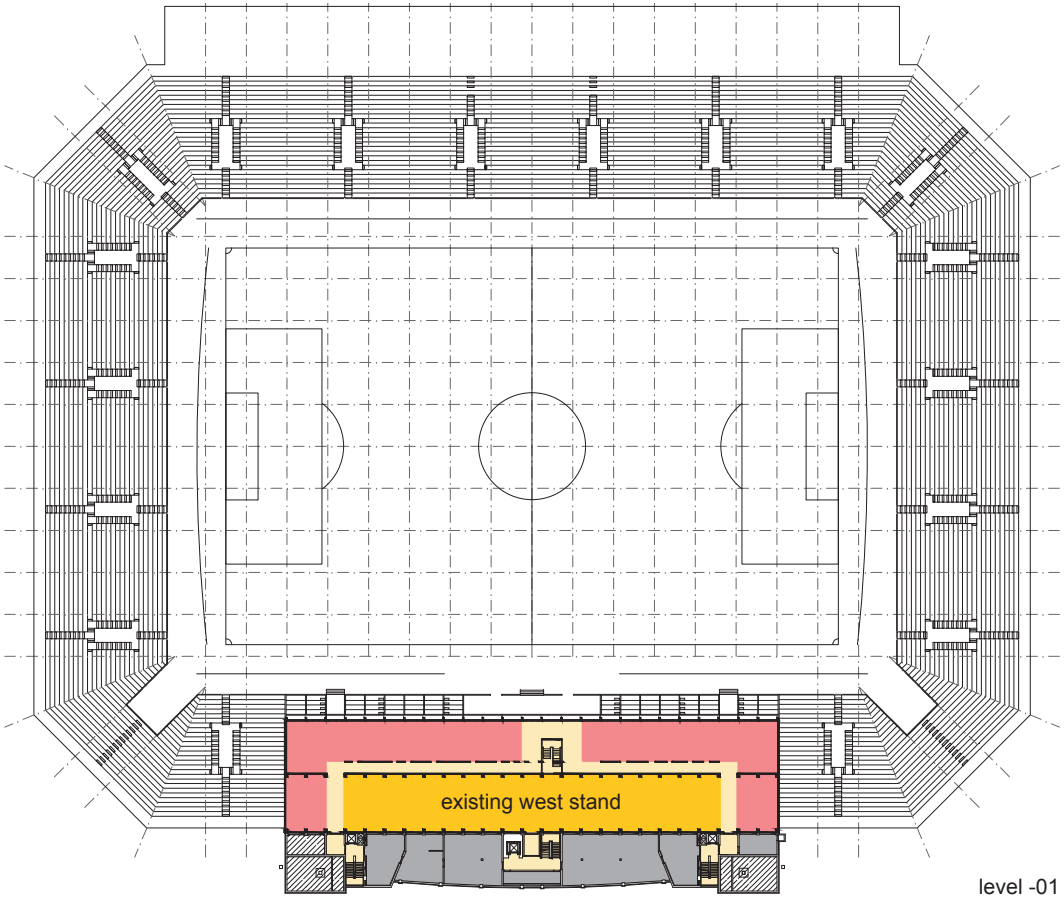
media area

1.1 Architectural Components

> **sports and media | level -01**

all surface designs according to appendix „room book New National Stadium Reykjavik“

1 Design and Construction Concept



level -01

1.1 Architectural Components

> **level -01 | sports and media (existing west stand)**

sports area including:
- warm-up area
- storages
- dressing units home and away team with sanitary facilities
- dressing rooms for coaches & referees
- massage area & revitalizing pool
- first aid players & officials
- ball boys and girls
- delegate's room
- greenkeeper incl. sanitary facilities
- doping control area

press & media including:
- media conference
- media working area
- sanitary facilities
- storage media
- mixed-zone
- press & media catering

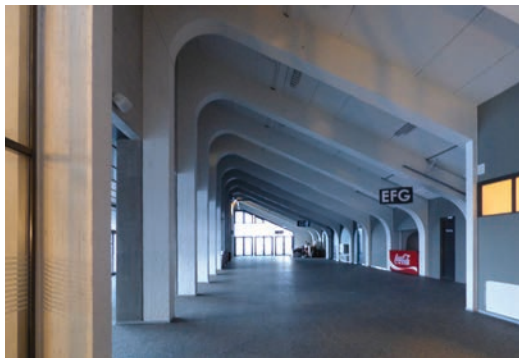
athletes & officials

press & media

circulation

MEP

1 Design and Construction Concept



circulation & catering area

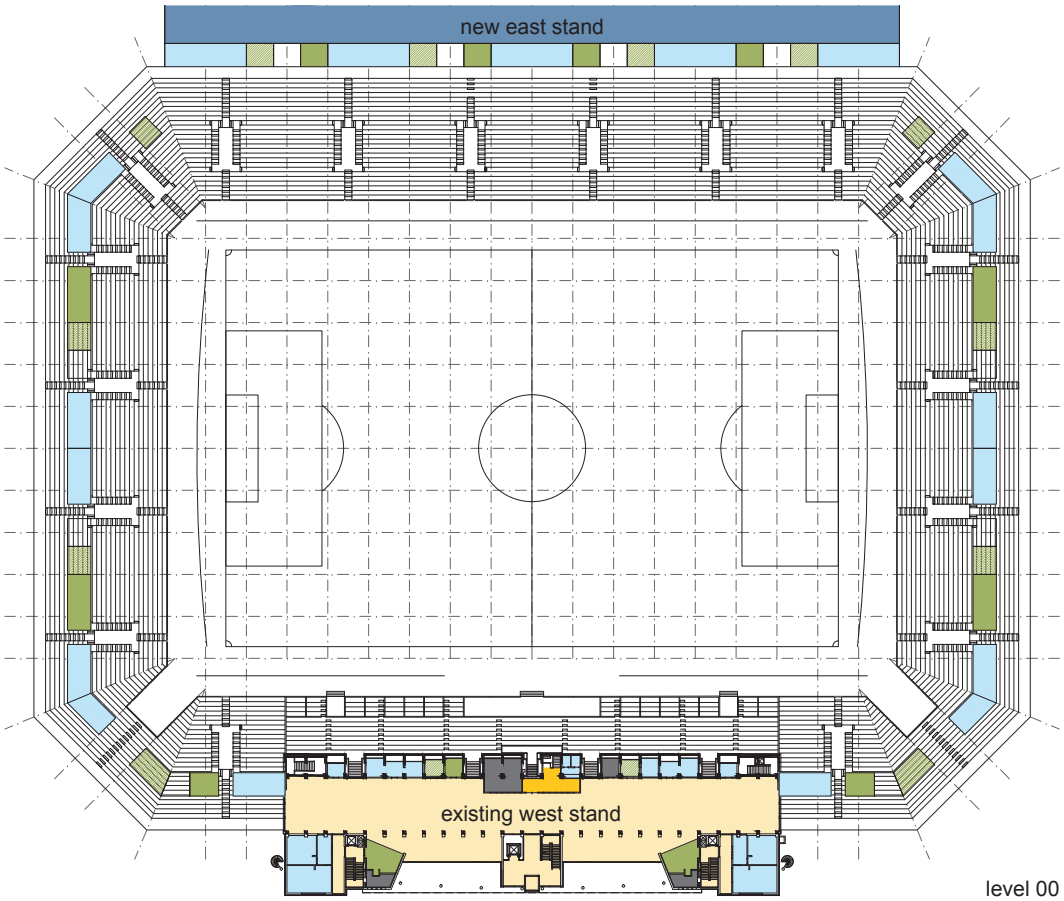
concessions & sanitaries

1.1 Architectural Components

> **hospitality + catering areas | level 00**

all surface designs according to appendix „room book New National Stadium Reykjavik“

1 Design and Construction Concept



level 00

1.1 Architectural Components

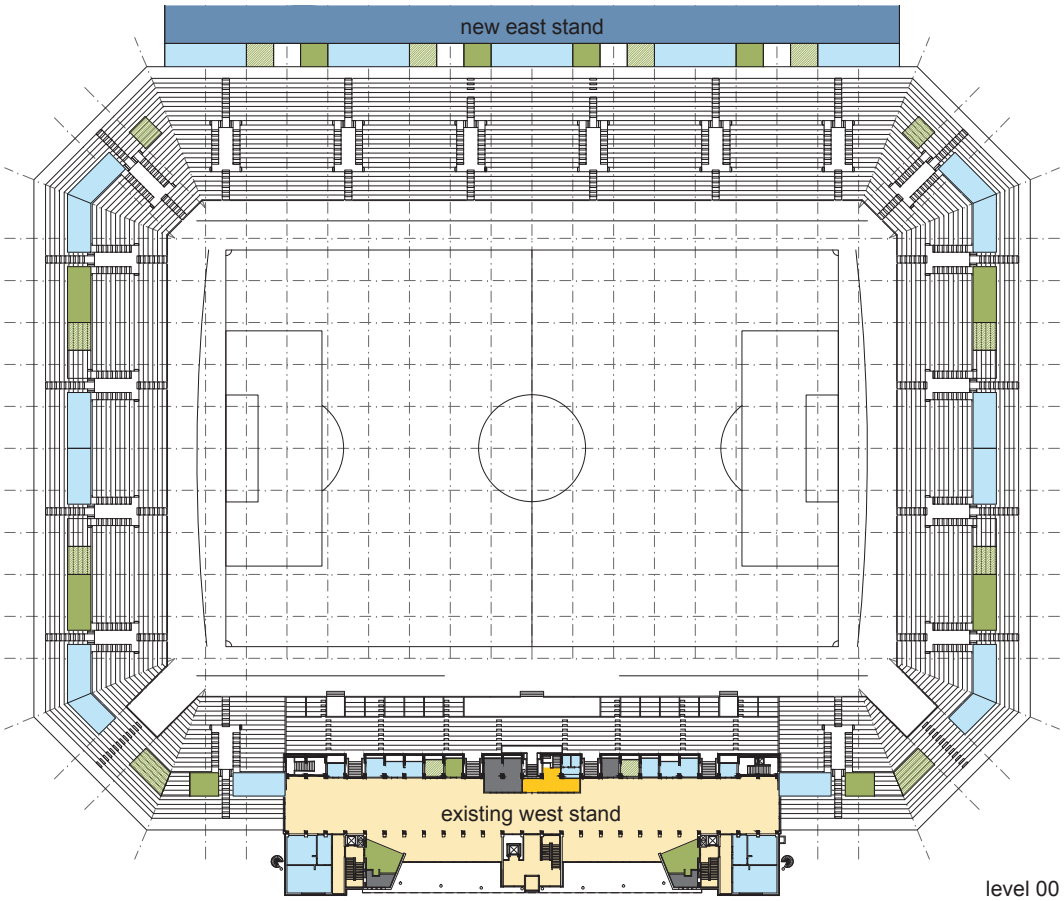
> **level 00 | hospitality (new east stand)**

hospitality + catering areas for Business Club and Family & Friends including:
- hospitality entry area
- main kitchen
- scullery
- main refrigerator area
- storerooms (food & beverages)
- central storage area
- sanitary units delivery
- accreditation area
- waste

- rental spaces as required to be added in further design stages (foodprint of new east stand to be adapted)

- hospitality + catering areas
- temporary concessions
- permanent concessions
- sanitary facilities
- press & media
- circulation
- miscellaneous rooms

1 Design and Construction Concept



level 00

1.1 Architectural Components

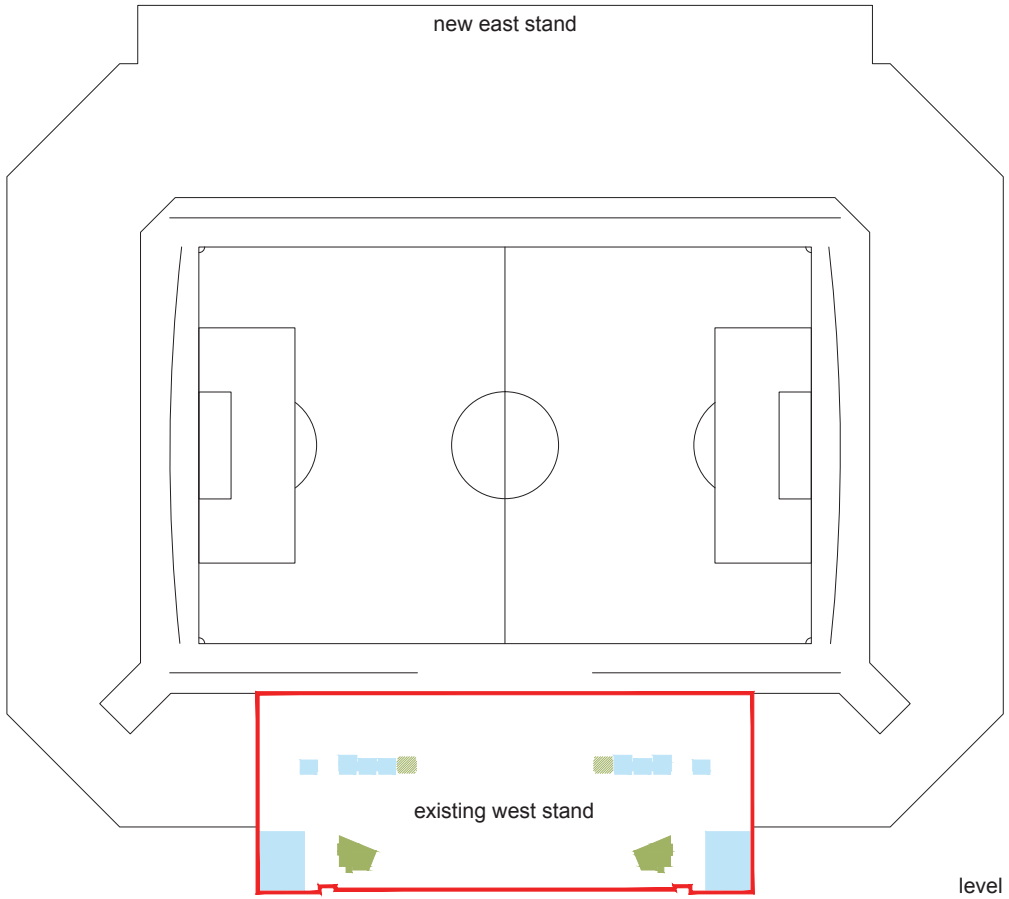
> **level 00 | catering areas**

press and media areas (existing west stand) including:
• access and accreditation

miscellaneous rooms (existing west stand) including:
• arrest rooms
• first aid and rescue service

- hospitality + catering areas
- temporary concessions
- permanent concessions
- sanitary facilities
- press & media
- circulation
- miscellaneous rooms

1 Design and Construction Concept



level 00

1.1 Architectural Components

> **concessions and sanitary facilities | existing west stand**

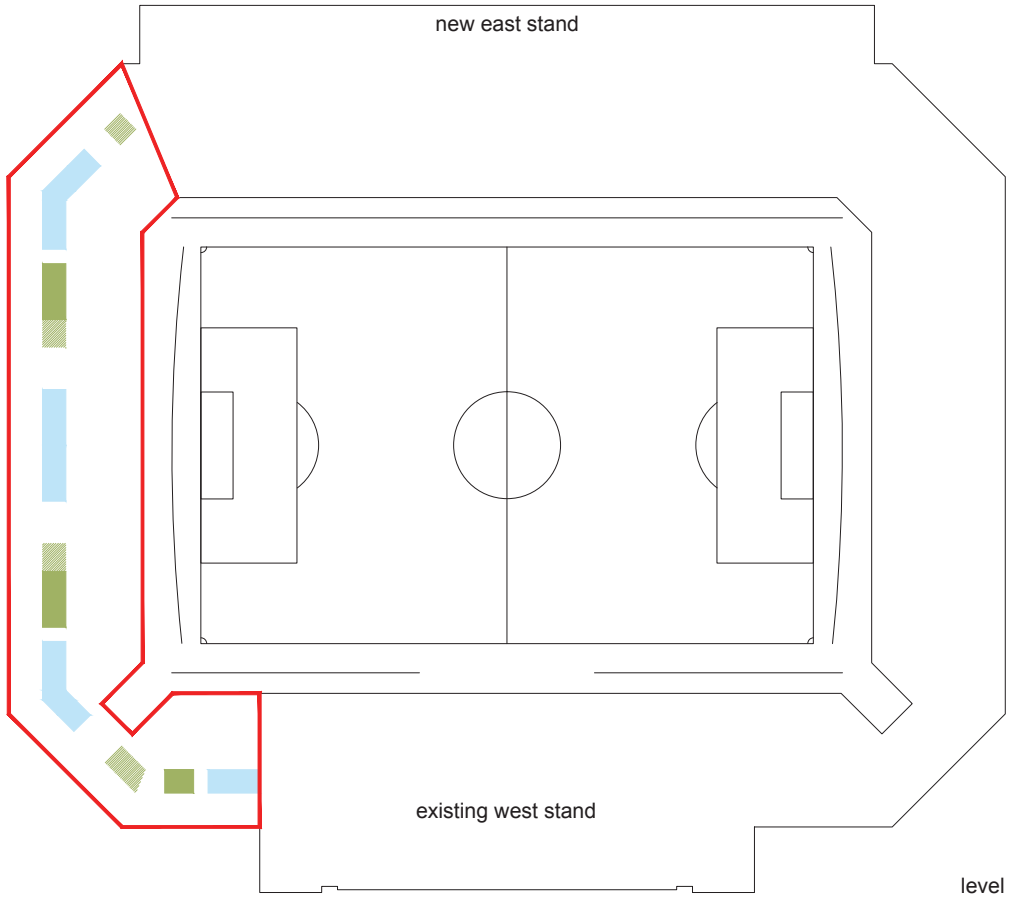
- 3308 spectators using the stand
- permanent concessions: ~47sqm
- temporary concessions: 12 points of sale
  = 4 à 18sqm = 72sqm
  2 indoor concessions, 2 outdoor concessions
- mobile stands: 3 à 4sqm = 12sqm
- sanitary facilities: 200sqm
- requirements Lagardère, UEFA fulfilled

sanitary facilities

temporary concessions

permanent concessions

1 Design and Construction Concept



level 00

1.1 Architectural Components

> **concessions and sanitary facilities | north stand**

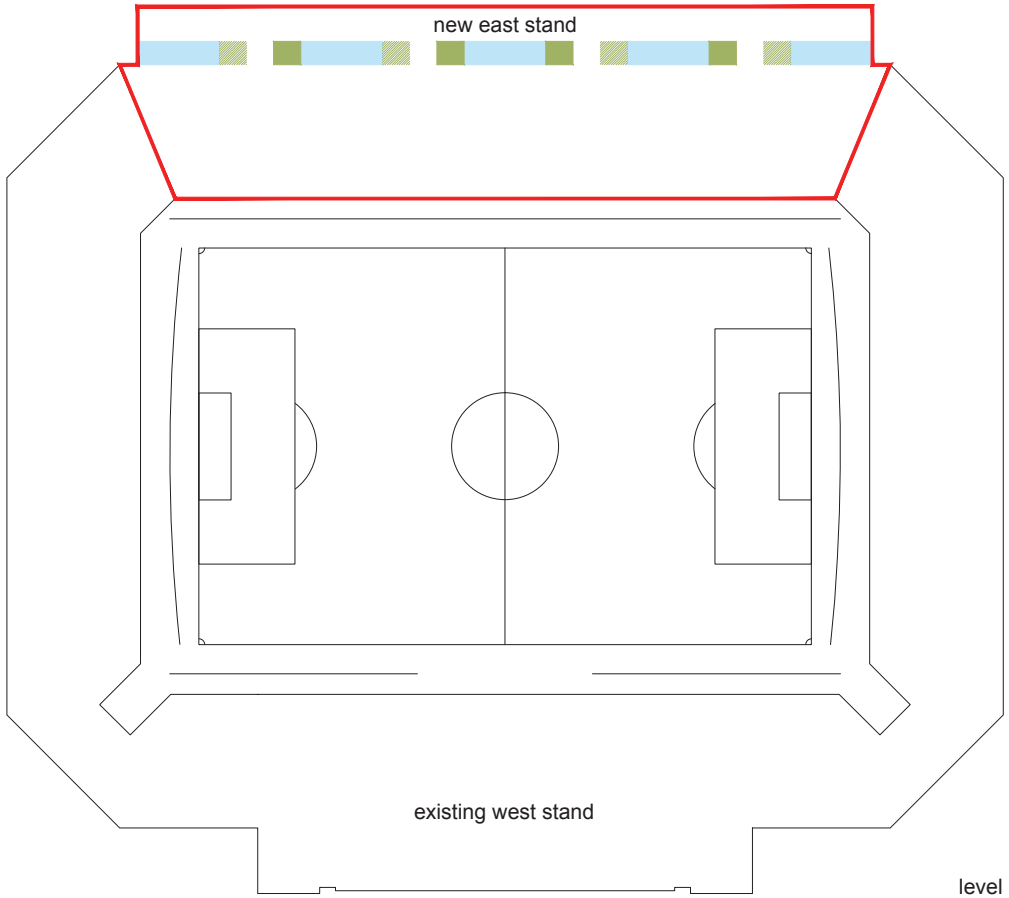
- 6040 spectators using the stand
- permanent concessions: ~ 87sqm
- temporary concessions: 24 points of sale
  = 8 à 18sqm = 144sqm
  4 indoor concessions, 4 outdoor concessions
- mobile stands: 6 à 4sqm = 24sqm
- sanitary facilities: 265sqm
- requirements Lagardère, UEFA fulfilled

sanitary facilities

temporary concessions

permanent concessions

1 Design and Construction Concept



level 00

1.1 Architectural Components

> **concessions and sanitary facilities | new east stand**

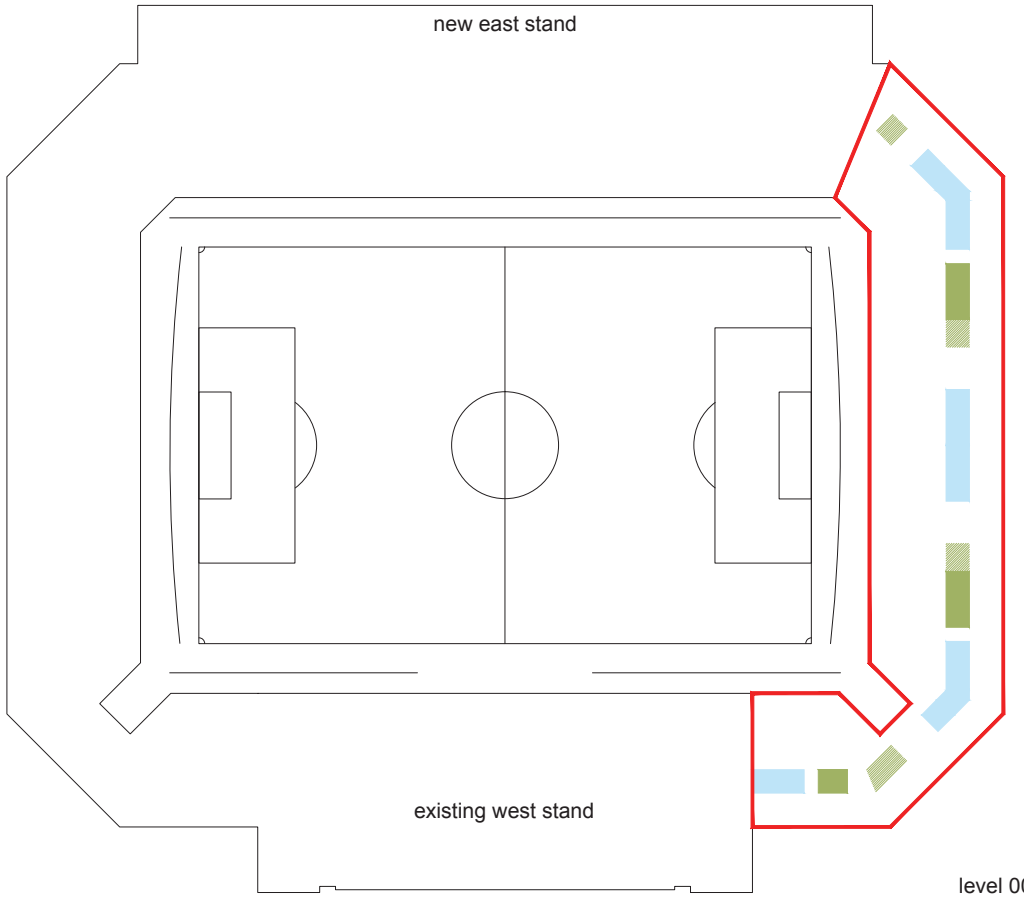
- 5580 people
- permanent concessions: ~ 47sqm
- temporary concessions - 24 points of sale
  = 8 à 18sqm = 144sqm
  4 indoor concessions, 4 outdoor concessions
- mobile stands: 5 à 4sqm = 20sqm
- sanitary facilities: 250sqm
- requirements Lagardère, UEFA fulfilled

sanitary facilities

temporary concessions

permanent concessions

1 Design and Construction Concept



level 00

1.1 Architectural Components

> **concessions and sanitary facilities | south stand**

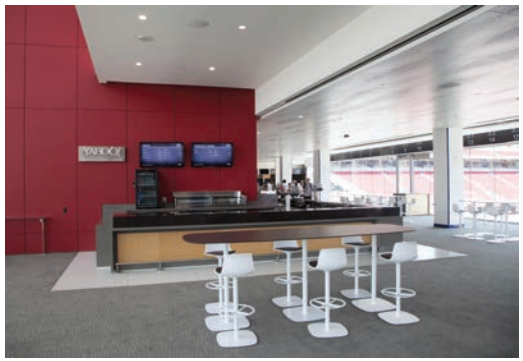
- 6040 people
- permanent concessions: ~ 87sqm
- temporary concessions: 24 points of sale
  = 8 à 18sqm = 144sqm
  4 indoor concessions, 4 outdoor concessions
- mobile stands: 6 à 4sqm = 24sqm
- sanitary facilities: 265sqm
- requirements Lagardère, UEFA fulfilled

sanitary facilities

temporary concessions

permanent concessions

1 Design and Construction Concept



hospitality area

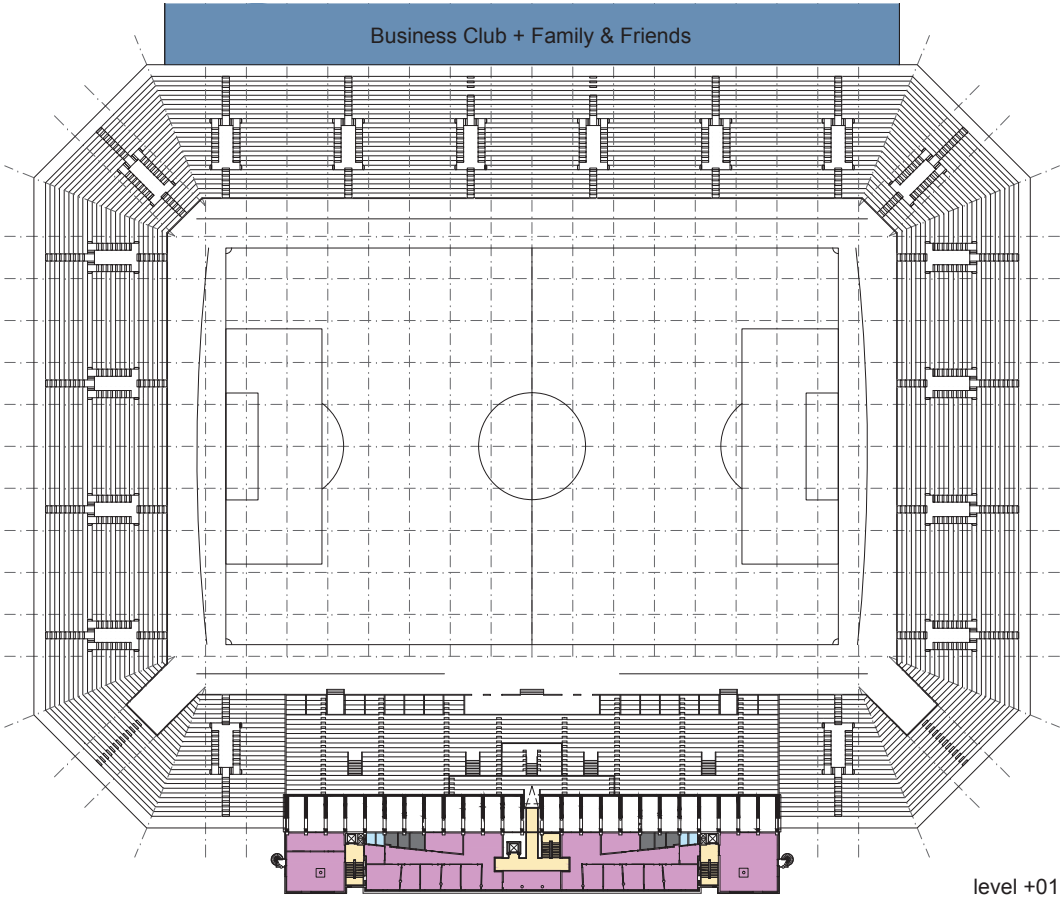
KSI

1.1 Architectural Components

> **hospitality / KSI | level +01**

all surface designs according to appendix „room book New National Stadium Reykjavik“

1 Design and Construction Concept



level +01

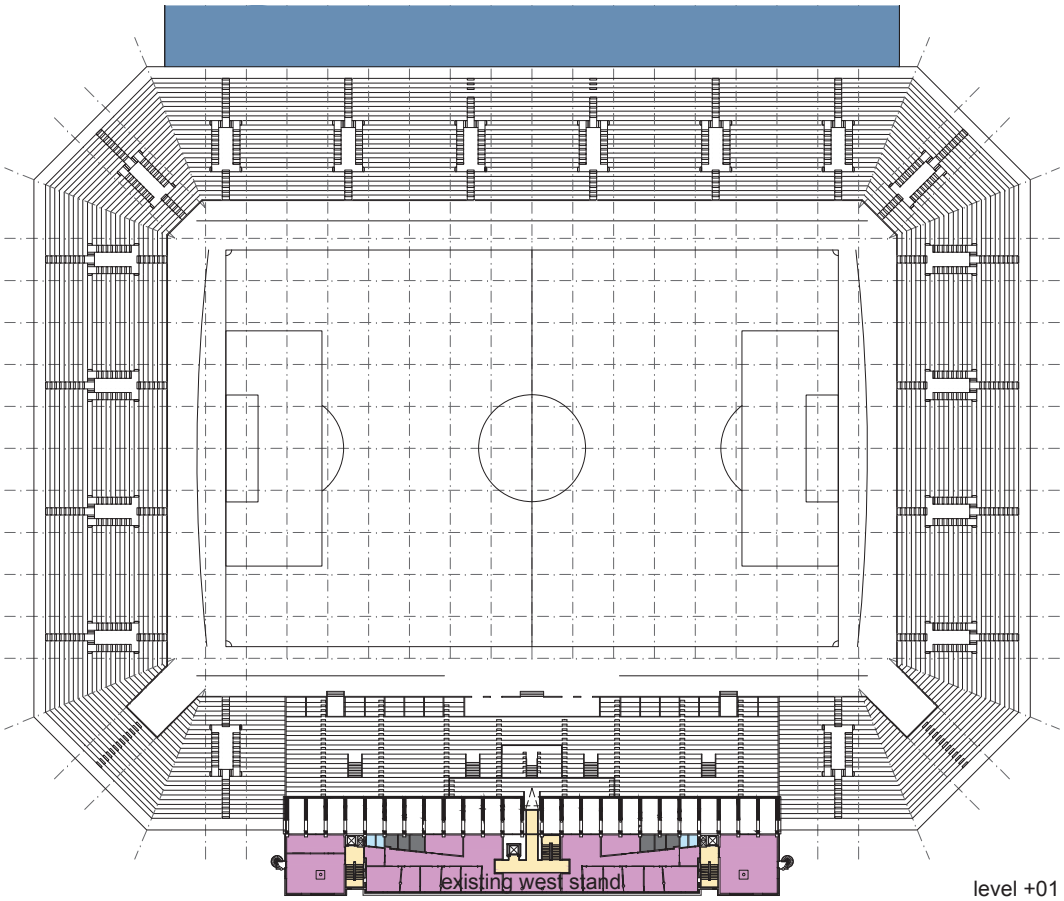
1.1 Architectural Components

> **level +01 | hospitality areas (new east stand)**

hospitality + catering areas for Business Club and Family & Friends including:
- interior space
- serving counters
- serving areas
- front cooking areas
- uniform room staff
- money / security room staff
- staff / event accounting room
- office & administration space
- office delivery
- staff room
- staff dressing room

- hospitality + catering areas
- offices
- sanitary facilities
- circulation
- miscellaneous rooms

1 Design and Construction Concept



level +01

1.1 Architectural Components

> **level +01 | KSI (existing west stand)**

KSI / operator offices including:
- offices presidium, directors
- single offices
- double offices
- further office areas
- meeting rooms
- copy and storage rooms
- sanitary facilities

- hospitality + catering areas
- operator offices
- sanitary facilities
- circulation
- miscellaneous rooms

1 Design and Construction Concept

skyboxes

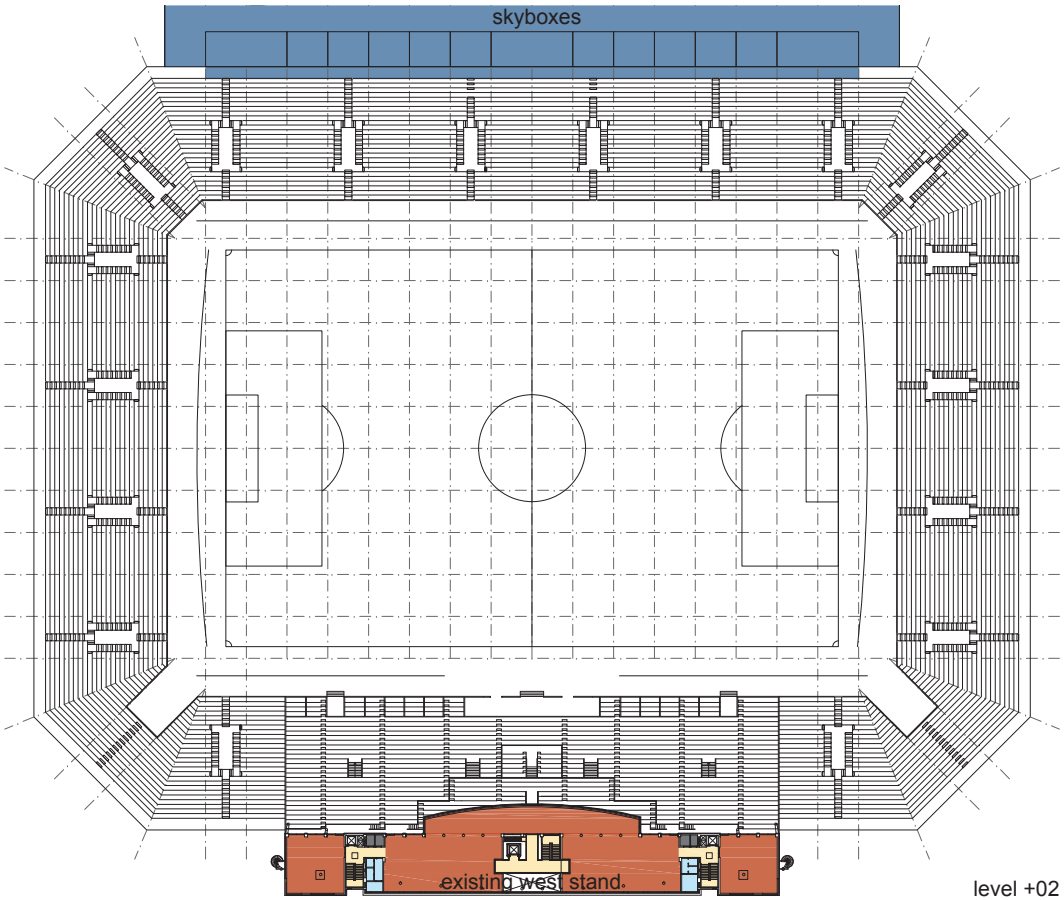
fan facilities

1.1 Architectural Components

> **hospitality / fan facilities | level +02**

all surface designs according to appendix „room book New National Stadium Reykjavik“

1 Design and Construction Concept



level +02

1.1 Architectural Components

> **level +02 | hospitality / fan facilities**

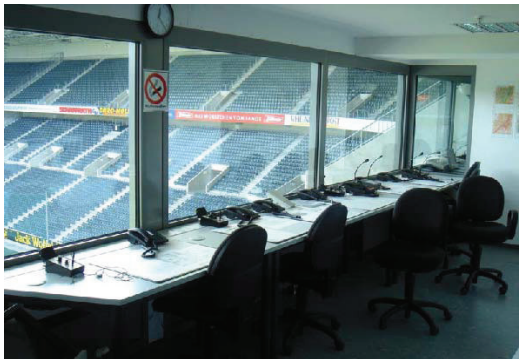
hospitality + catering areas for Skyboxes (new east stand) including:
- 10 standard Skyboxes (à 12 seats, à 43 sqm)
- 1 KSI Skybox (à 24 seats, à 86 sqm, central position),
- 2 event boxes (à 24 seats, à 86 sqm)
- balcony
- serving counters
- serving areas
- front cooking areas

fan facilities (existing west stand) including:
- fan shop
- museum
- fan restaurant
- sanitary facilities

- hospitality + catering areas
- fan facilities
- sanitary facilities
- circulation
- miscellaneous rooms

1 Design and Construction Concept

media area



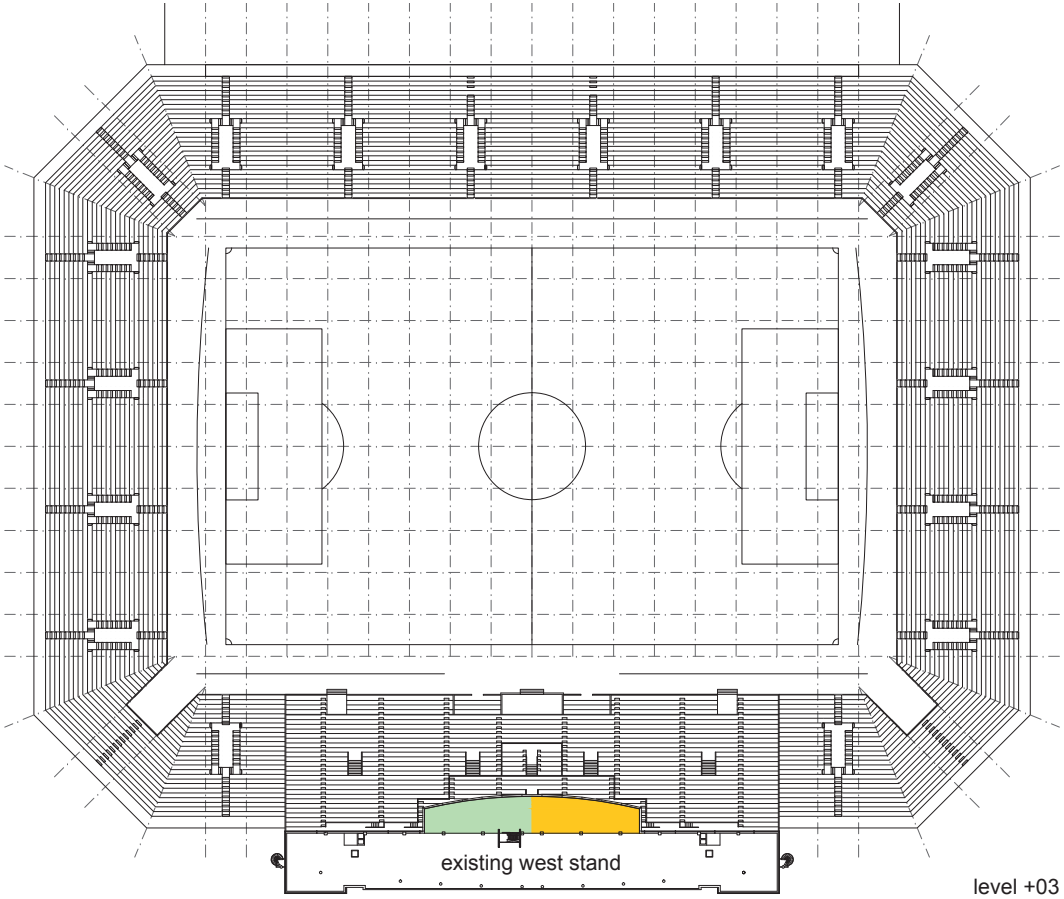
stadium security

1.1 Architectural Components

> **media areas / stadium security | level +03**

all surface designs according to appendix „room book New National Stadium Reykjavik“

1 Design and Construction Concept



level +03

1.1 Architectural Components

> **level +03 | media area / stadium security (existing west stand)**

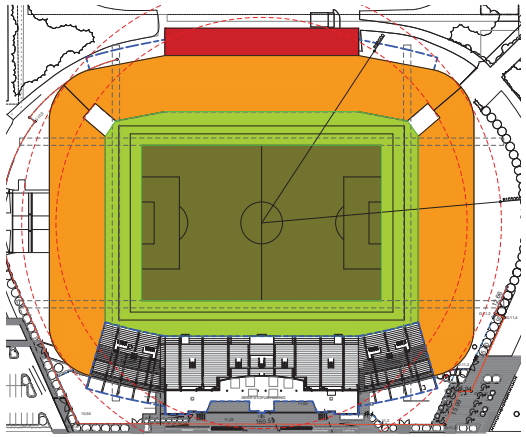
press and media area including:
- TV studio
- presenter TV studio
- mask room
- main camera platform

stadium security / event control including:
- stadium control room
- meeting room
- stadium announcer / central speaker

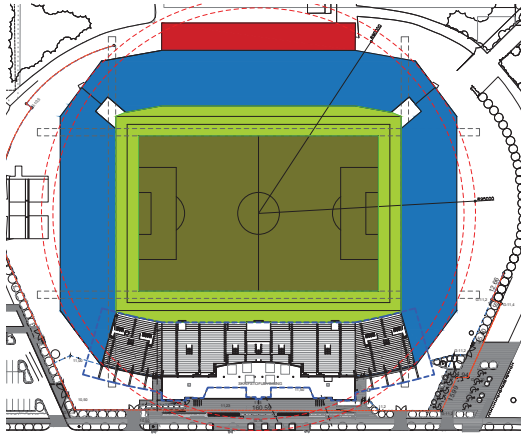
press & media

stadium security / event control

1 Design and Construction Concept



option 1



option 2

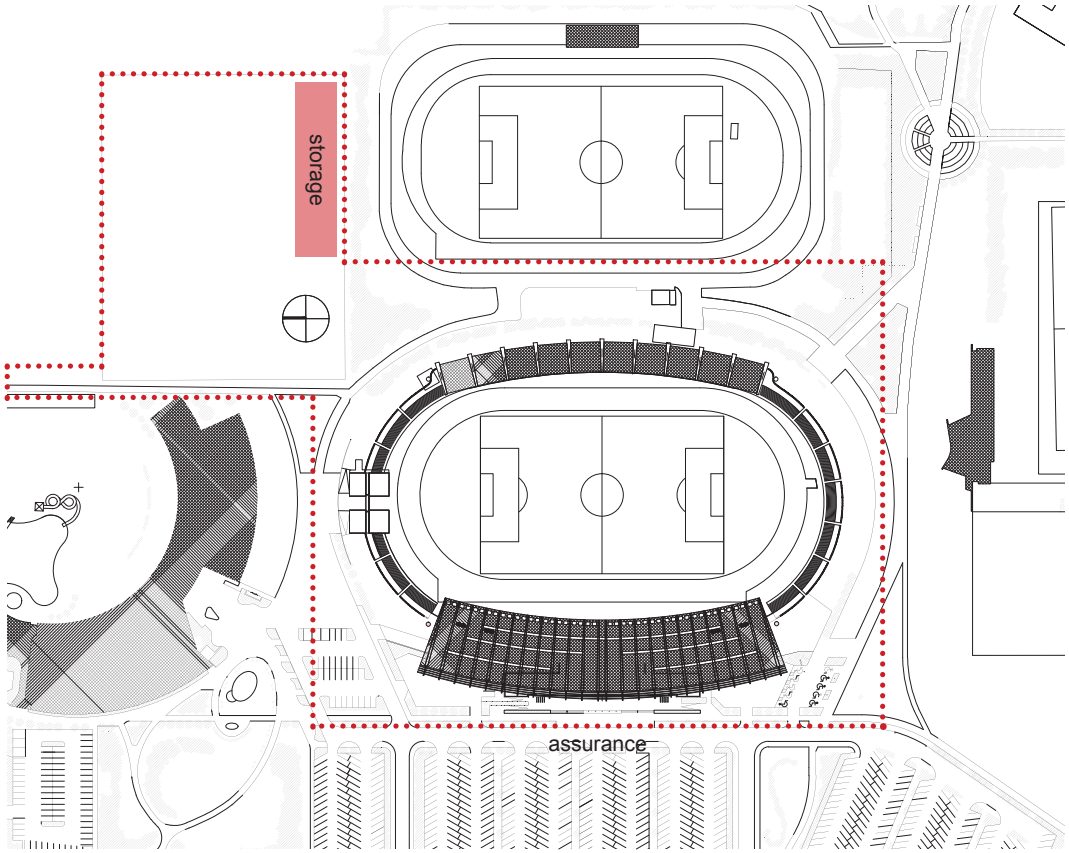
1.1 Architectural Components

> **preserving of new additions from 2006 | existing west stand**

• the following issues have to be discussed:

- cost saving (on demolition and construction)
- minimization of distance between pitch, existing west stand and new stands
- optimization of stadium bowl and stadium footprint
- reduction of span widths, facade and roof surfaces
- avoidance of geometrical problems in the bowl corners
- sightlines
- positioning of truck access

1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | assurance**

• protection of the environment to preserve from dangers and disturbances of building activities:

- damages of external cables and pipelines
- noise protection
- pollution of buildings in the neighbourhood
- barriers and fall protection to neighbours and traffic routes
- traffic to and from construction site
- usage of traffic routes for construction works

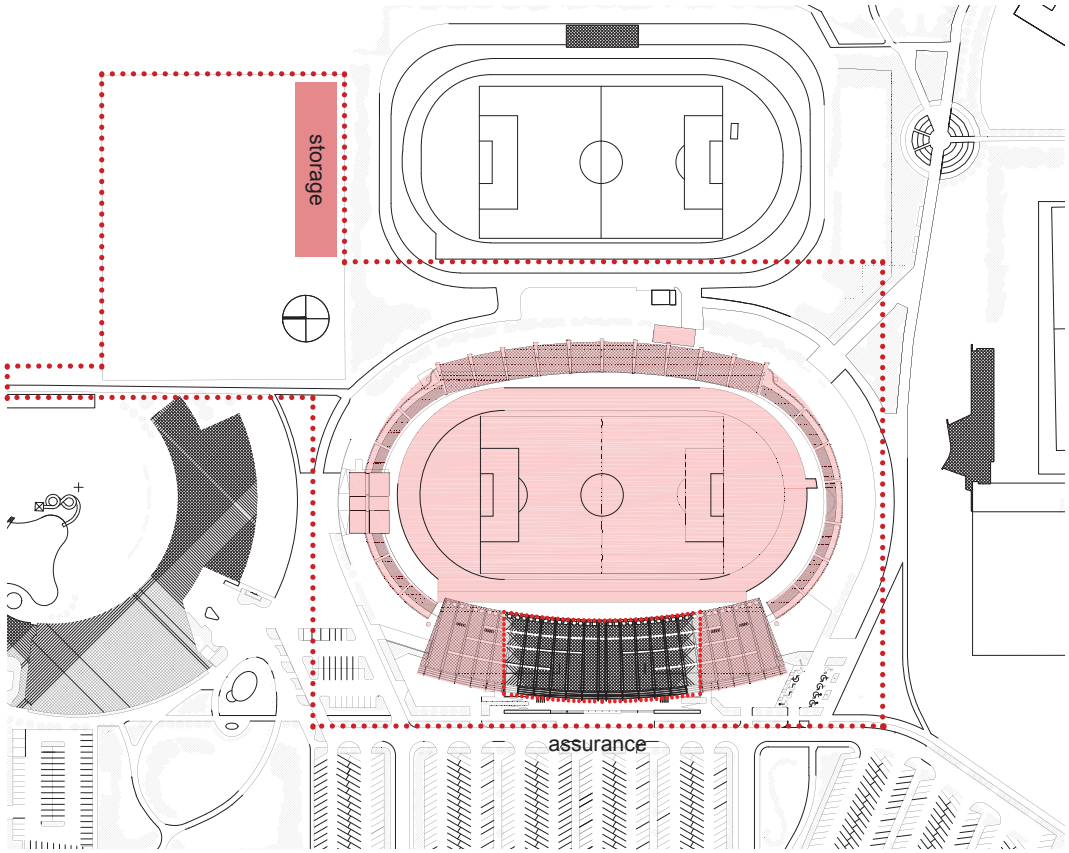
• preservation measures on construction site:

- tree guard
- fire control
- line protection
- general lighting of construction site
- prevention of storm damages
- protection in pivoting range of large equipment

• protection of construction site, construction works, employees and the arising stadium from external dangers:

- entering of the construction site through unauthorized persons
- stealing
- vandalism
- dangers through neighbouring pipelines

1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | demolition**

• after assurance of construction site the demolition of building structures to be started

• demolition of the following building structures:

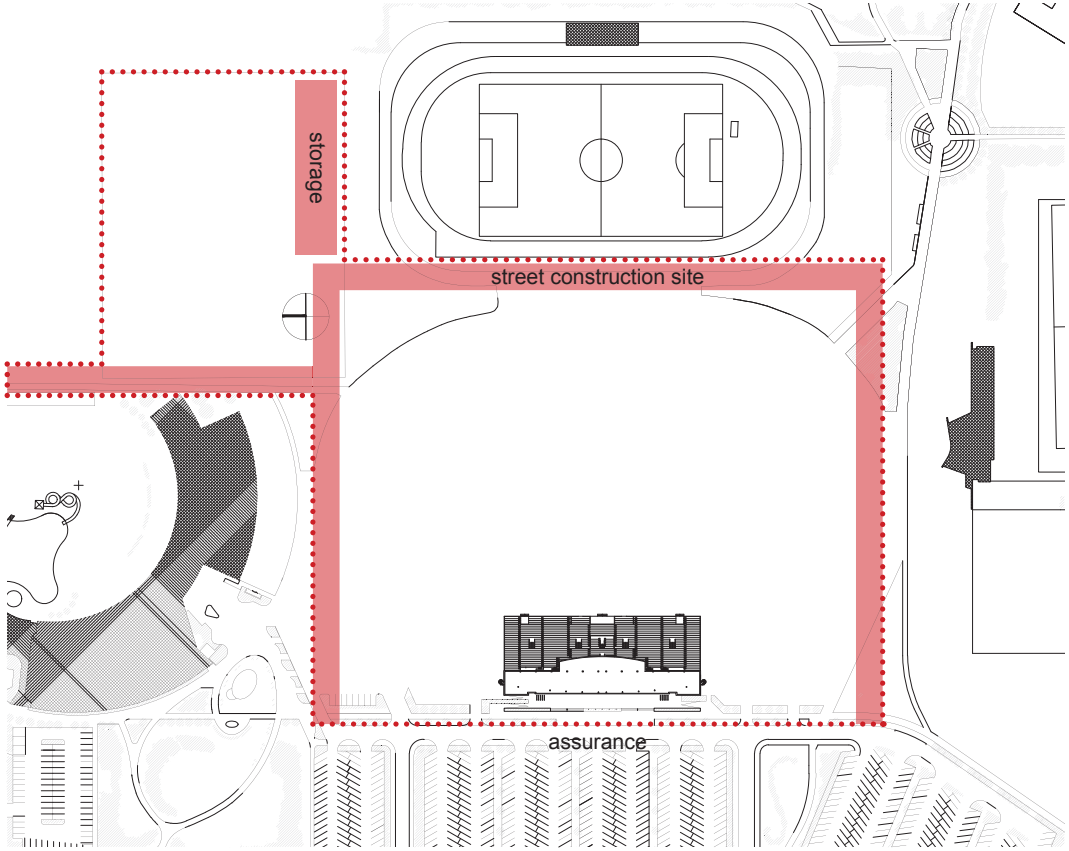
  • concrete structures:
  pillars, toothed beams, walls etc. of north, south and east stands, plus extensions of the west stand

  • metal structures:
  supporting roof structures / roof of the east stand and west stand, flood light pole

  • pitch and other structures

demolition of building structures

1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | clean up**

• construction site must be prepared and cleared from any vegetation and building structures

• for economic and legal reasons on the construction site waste segregation should be considered

• excavated soil should primary be used to backfill and refill the soil

• topsoil has to be stored separated for recycling usage

• important for easy utilization of building rubble is a varietal collection according to assumption requirements of building rubble processing plant

• basis for waste disposal on site construction is the correct dimensioning of the collecting boxes

• the collecting boxes should be easy-to-reach for all employees and goods vehicles

• style and size of the collecting boxes is dependent on:

- expectable generated waste
- number of collecting boxes
- existing space

1 Design and Construction Concept

1.2 Site Access

> **Definition of site preparation/access functions | pollution**

- air pollution:
  - land clearing, operation of diesel engines, demolition, burning, and working with toxic materials
  - diesel is also responsible for emissions of carbon monoxide, hydrocarbons, nitrogen oxides and carbon dioxide
- water pollution:
  - diesel and oil, paint, solvents, cleaners and other harmful chemicals, construction debris and dirt
  - surface water run-off also carries other pollutants from the site such as diesel and oil, toxic chemicals and building materials like cement
- noise pollution:
  - construction sites produce a lot of noise, mainly from vehicles, heavy equipment and machinery

1 Design and Construction Concept

1.2 Site Access

> **Definition of site preparation/access functions | pollution**

• measures to prevent pollution:

• control dust through fine water sprays used to dampen down the site

• consider using alternatives to diesel plant, i.e. an electric belt conveyor offers a ‘clean’ solution to pollution issues

• screen the whole site to stop dust spreading, or alternatively, place fine mesh screening close to the dust source

• cover piles of building materials like cement & sand, regularly inspect for spillages, and locate them where they will not be washed into water-ways or drainage areas

• segregate, tightly cover and monitor toxic substances to prevent spills and possible site contamination

• cover up and protect all drains on site

• reduce noise pollution through careful handling of materials; modern, quiet power tools, equipment and generators; low impact technologies; and wall structures as sound shields

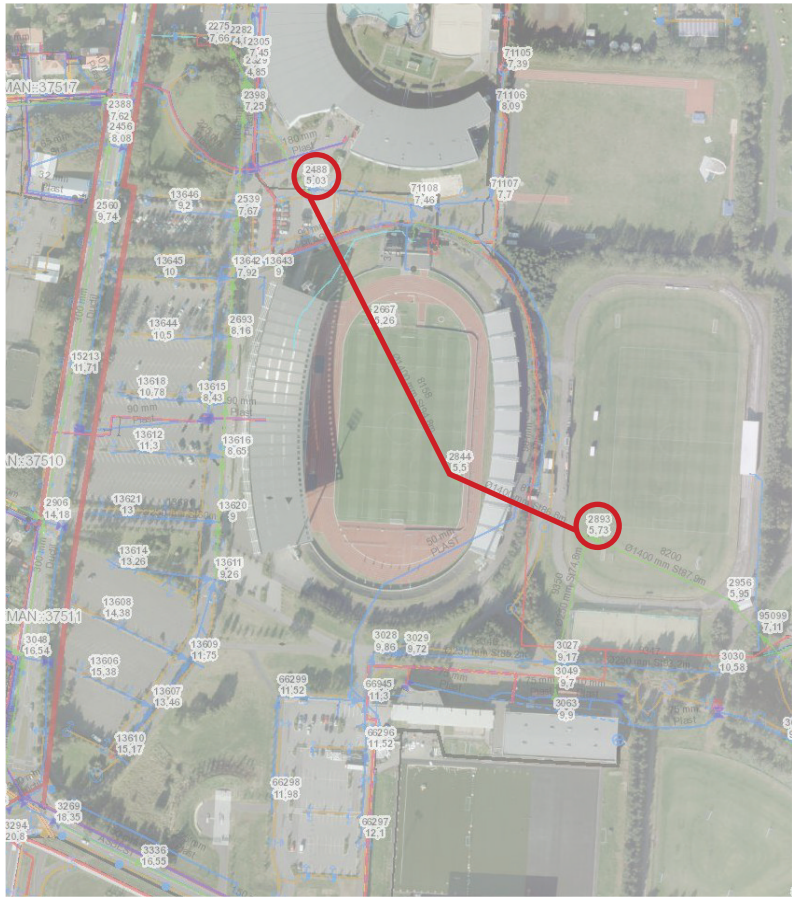
1 Design and Construction Concept

1.2 Site Access

> **Definition of site preparation/access functions | preparing the ground surface**

- site preparation:
  - remove all vegetation and other unsuitable material from the foundation area
- ground investigation:
  - a ground investigation of the site is generally carried out to help identify stability and potential problems
  - these investigations allow data to be accumulated and used for effective design, as well as allowing any potential defects or issues, such as contamination
  - examination carrying capacity of the existing soil
- site clearance:
  - as part of the initial preparatory works, the site will generally need to be cleared and the topsoil taken up from the footprint of the structure
  - the depth will depend on the lay of the land
- substructure preparing (pile foundation)
- preparing of entire media connections

1 Design and Construction Concept



1.2 Site Access

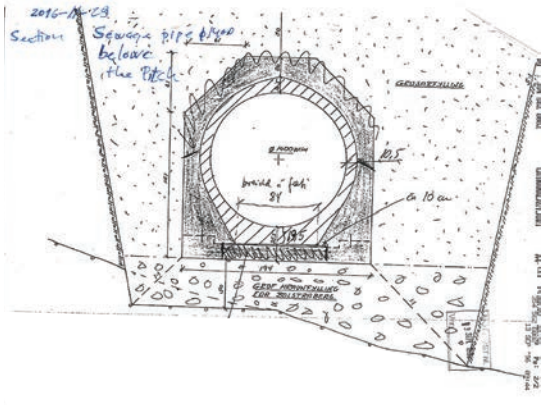
> **Definition of site preparation/access functions | sewerage**

• the current sewage system is running under the Laugardalur field (see the attached figure)

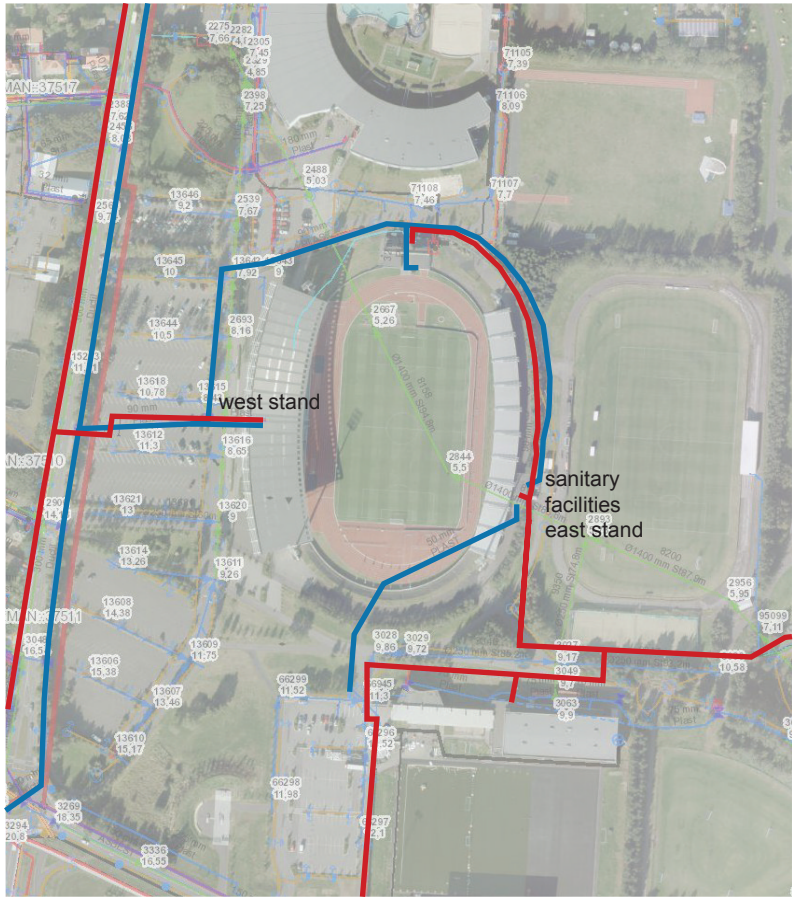
• in the case of building the New National Stadium Reykjavik this system might be moved or reorganized according to needs (due to the reason of retention of pitch level height not to be expected)

• today, the slope of the sewage system is 2.5-2.6 per mill, between manholes 2893 og 2488

sewerage



1 Design and Construction Concept



1.2 Site Access

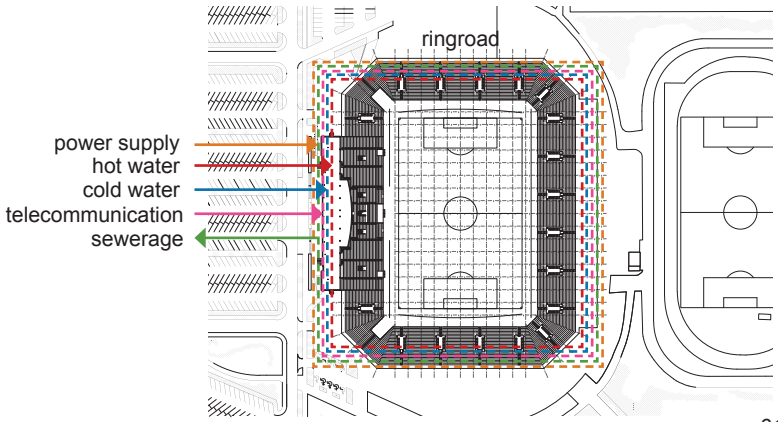
> **Definition of site preparation/access functions | water supply**

• the existing water supply (hot & cold water) for the west stand arises from Reykjavegur in the west of the existing west stand

• sanitary facilities of the east stand getting served by pipe-lines from from north and south

• the water supply of the New National Stadium Reykjavik should be newly organized (see the attached figure)

hot water supply
cold water supply



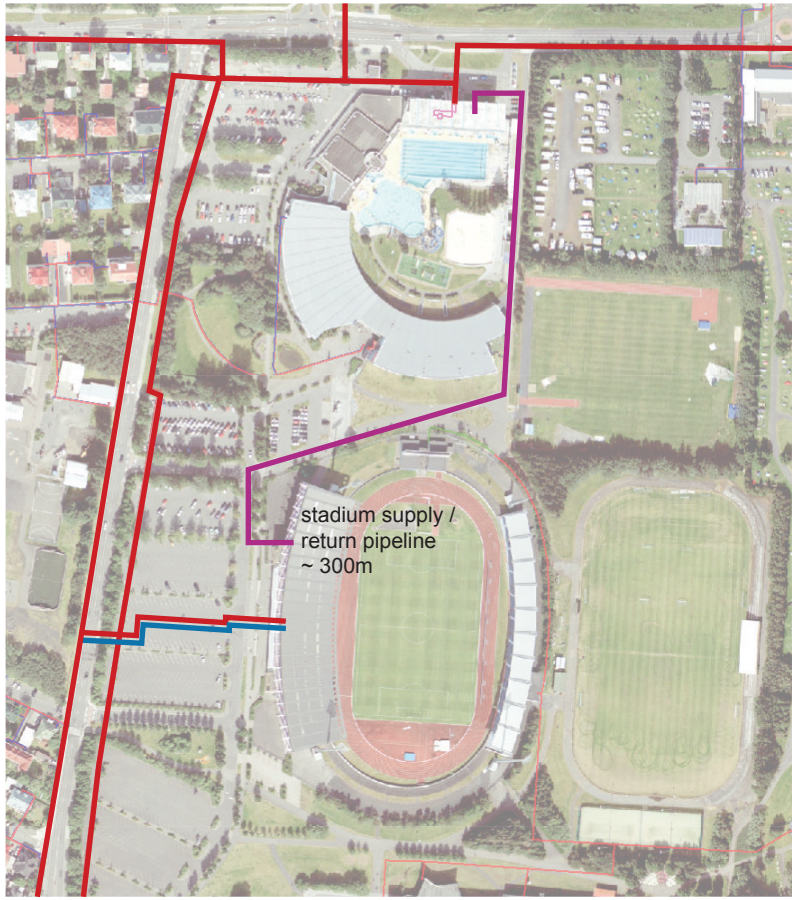
1 Design and Construction Concept

1.2 Site Access

> **Definition of site preparation/access functions | gas supply**

No gas supply system is required. Potential specifications to be defined at a later project stage.

1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | heating supply**

• the New National Stadium Reykjavik will require a considerable amount of energy for heating

• the parts of the building that will be heated include (but are not limited to):
  • football field
  • air conditioning of spaces
  • showers, bathrooms, etc.

• the map shows the location of the stadium, just south of a major pumping station by a large swimming pool in Reykjavik

• this station produces 80°C hot water and can receive return water from users, at a temperature of 30°C

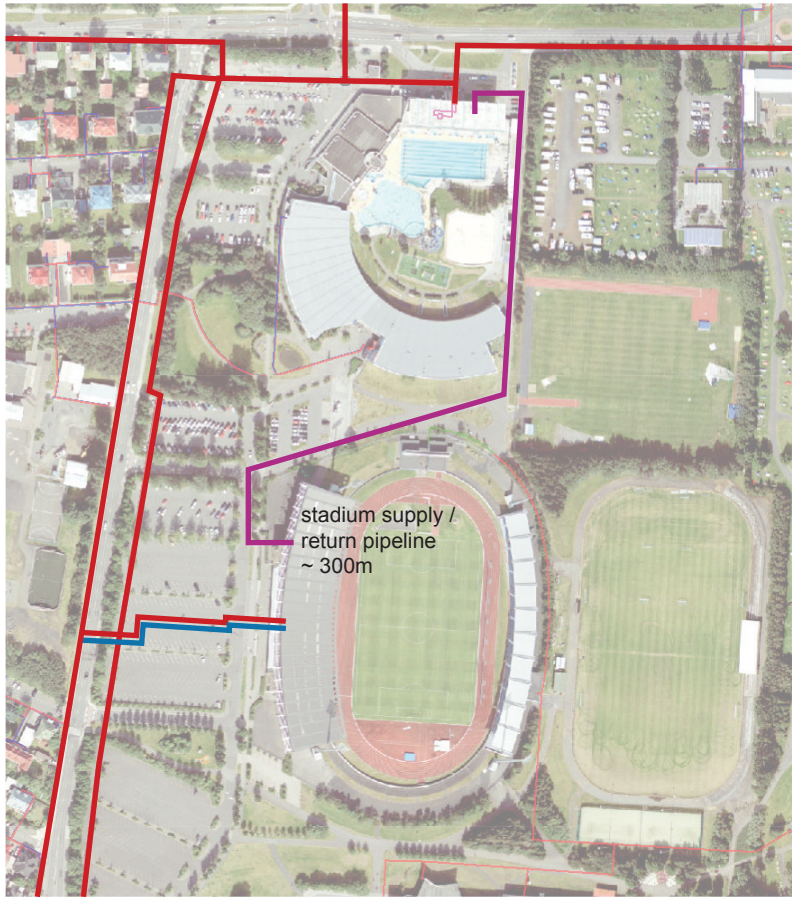
• the length of the pipeline is approximately 300m from the pumping station to the stadium

• currently, a DN 40 supply/return pipeline is connected to the complex

• the heating demand of the stadium is typically around 3MWt

• this amounts to 52m³/hr of 80°C hot water to the complex, where the installation can be heated directly with the hot water or through heat exchangers

1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | heating supply**

• this flow rate corresponds to a 2xDN 150 pipeline (supply/ return)

• the heating capacity from the pumping station is many times that of the foreseen demand at the stadium, so the stadium is very well located in that regard

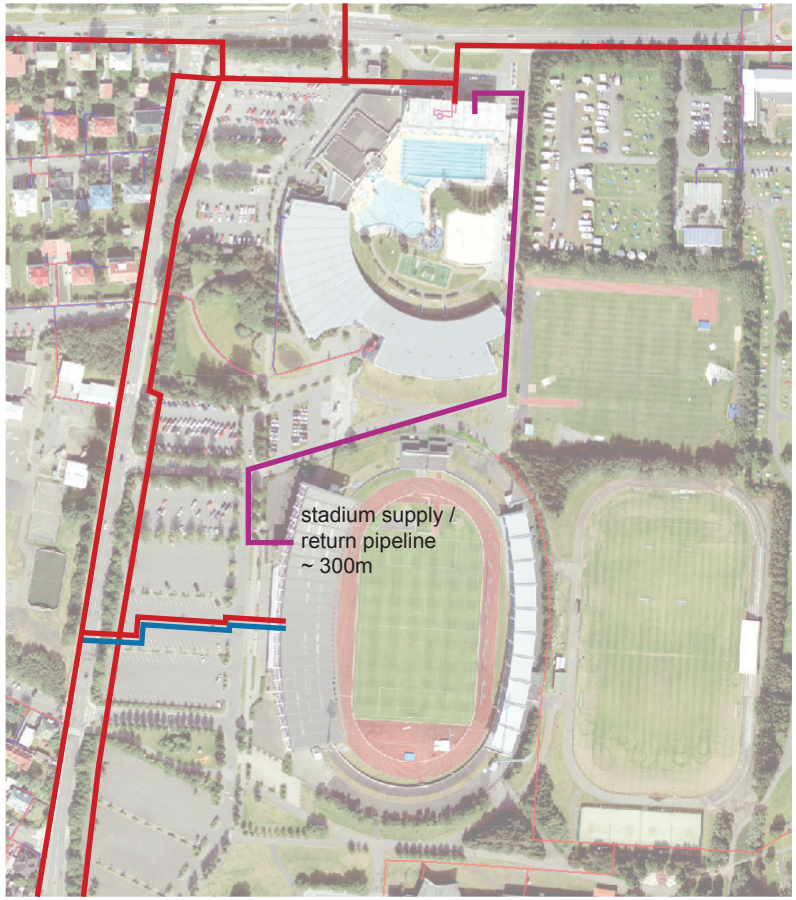
• the high supply temperature can be lowered by mixing and/or connection through a lower temperature closed circuit via heat exchangers

• district heating in Reykjavik is very simple, compared to installations in other countries

• the hot water is clean and potable and is either pumped straight from the ground (geothermal fluid) or cogenerated in flash steam turbine power plants (heated cold water used in the plant cold end)

• because of this, the 80°C hot water can be used directly in radiators and air conditioning heaters, without any need for heat exchangers

1 Design and Construction Concept



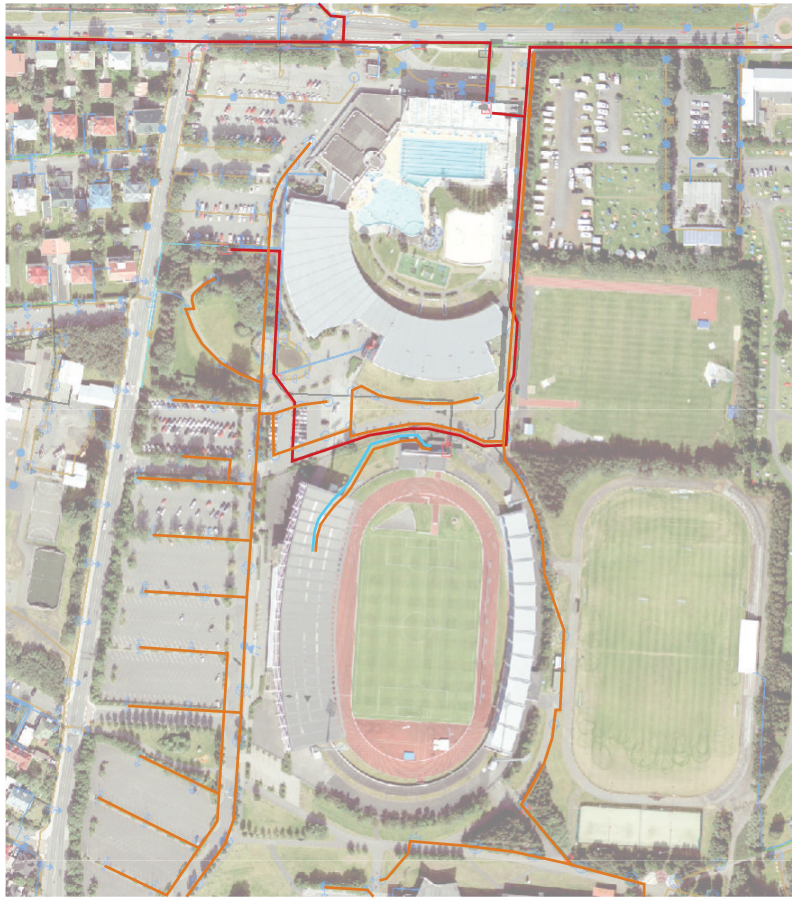
1.2 Site Access

> **Definition of site preparation/access functions | heating supply**

• only when there is risk of freezing – which may be possible in the football field heater piping – a water/glycol mixture may be used in a closed loop, connected via heat exchanger to the geothermal heat source

• all of the return water (30°C) is collected at the nearby pumping station by the swimming pool, where it is partly re-used for mixing with hot geothermal water (127°C) and partly discarded to the sewage system

1 Design and Construction Concept



1.2 Site Access

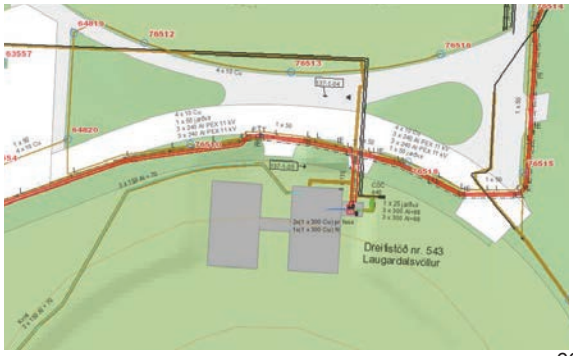
> **Definition of site preparation/access functions | power supply**

• two cables are situated in the area adjacent to a transformer station, 3x240q+screen and aluminum cable

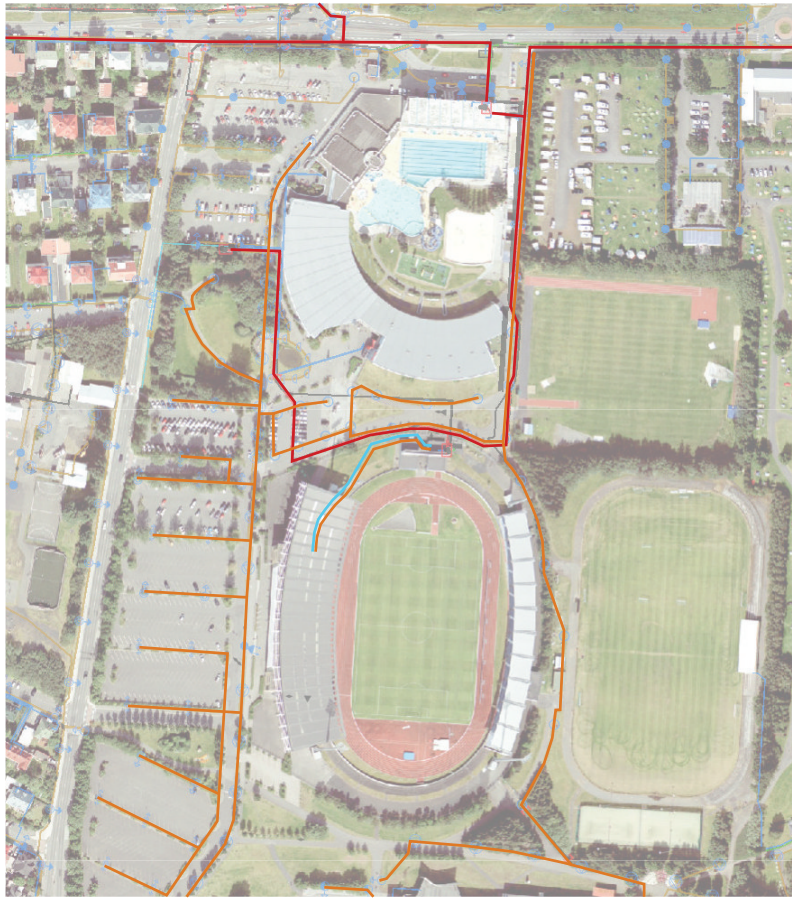
• the service entrance conductors are 1200A but the table is intended for 3000A; until the main table is built for 3000A there it is not enough space available and it is not guaranteed that it will be possible to add several switches without an operation to the main table

• there are two 3x240q+ screens from the service entrance conductors to the existing west stand

• cables to towers and to various equipment are situated along the existing west stand in the location of the stadium



1 Design and Construction Concept



1.2 Site Access

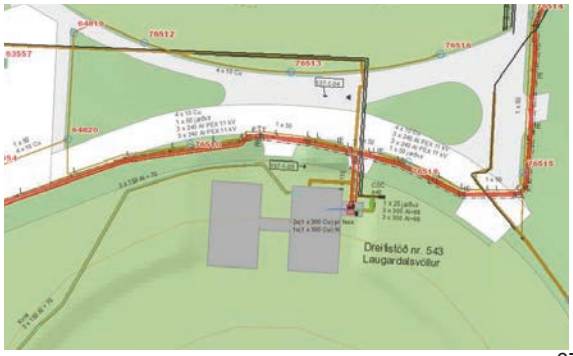
> **Definition of site preparation/access functions | power supply**

• various smaller installations are adjacent to manholes in fields, most often straight from the relevant stands but also over the field

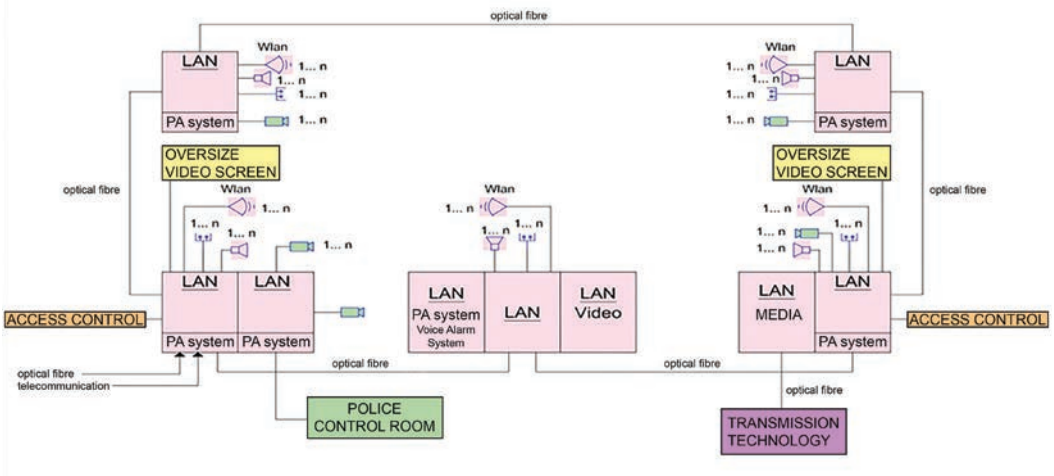
• outside the new east stand lies a cable between lamp posts

• east of the current construction are district heating pipes and water supply pipes along with a 400V low voltage cable

• north of the construction are stormwater pipes along with electrical systems



1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | telecommunication**

• data network:

• for the stadium a highly flexible, multifunctional and future-proofed communication network with voice, data and video transmission should be established

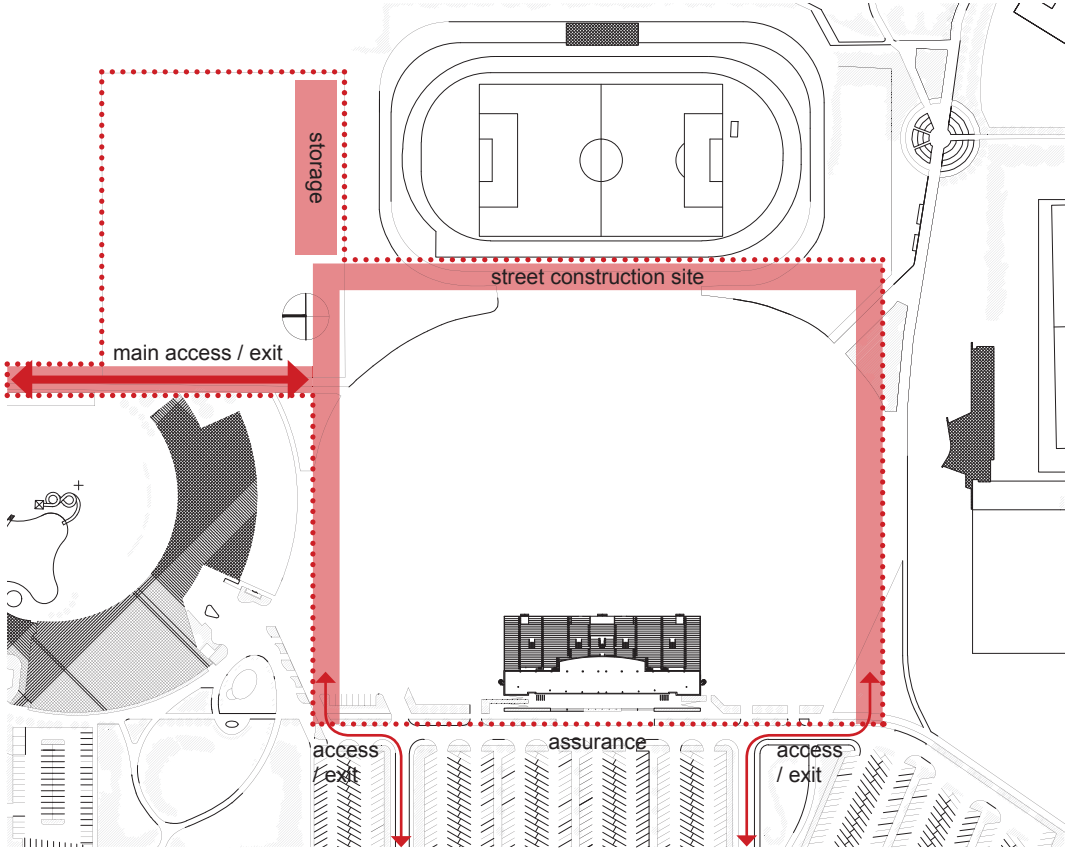
• therefore should be used a service independently wiring system, which allows single communications plus setup from LAN's appropriated to the established standards like Ethernet, Token-ring, FFDI and ATM

• for realization an LWL-ring within the stadium ring should be prepared to which the communication centres are connected

• within every communication centre there would be an access to all central installation engineerings of light-current engineerings

• the following installation engineerings are connected: LAN, media technology, video control, acoustic irradation, voice alarm system, admission control systems, video screens, facility management system, building control

1 Design and Construction Concept



1.2 Site Access

> **Definition of site preparation/access functions | transport infrastructure**

• circulation areas and transport routes to, from and on the construction site of the New National Stadium Reykjavik should be designed in due consideration of the local circumstances, plus requirements of the building project, that a controlled and clearly arranged traffic- and transport flow will be possible

• crossing of public routes should be avoided or equipped with a traffic light system

• damages and pollution of public traffic ways should be avoided through the arrangement of safeguards

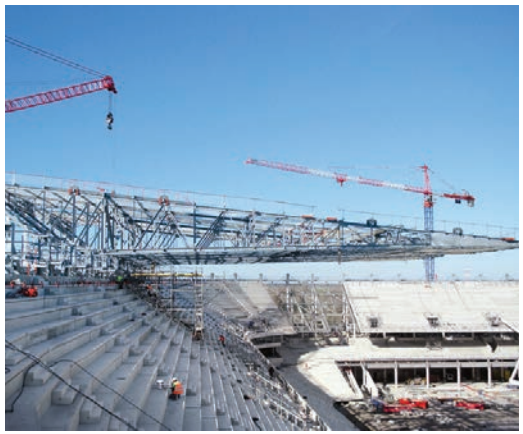
• in traffic and transport routes are included:

- access of the construction site
- construction routes and ways
- storage spaces

• on construction sites with large quantities of building materials and high circulation of transport vehicles should be arranged seperated access- and exit ways

• if the access to the construction site is not an existing access point on the property, it is important to get a permission from the local traffic authority

1 Design and Construction Concept



1.3 Building Structures

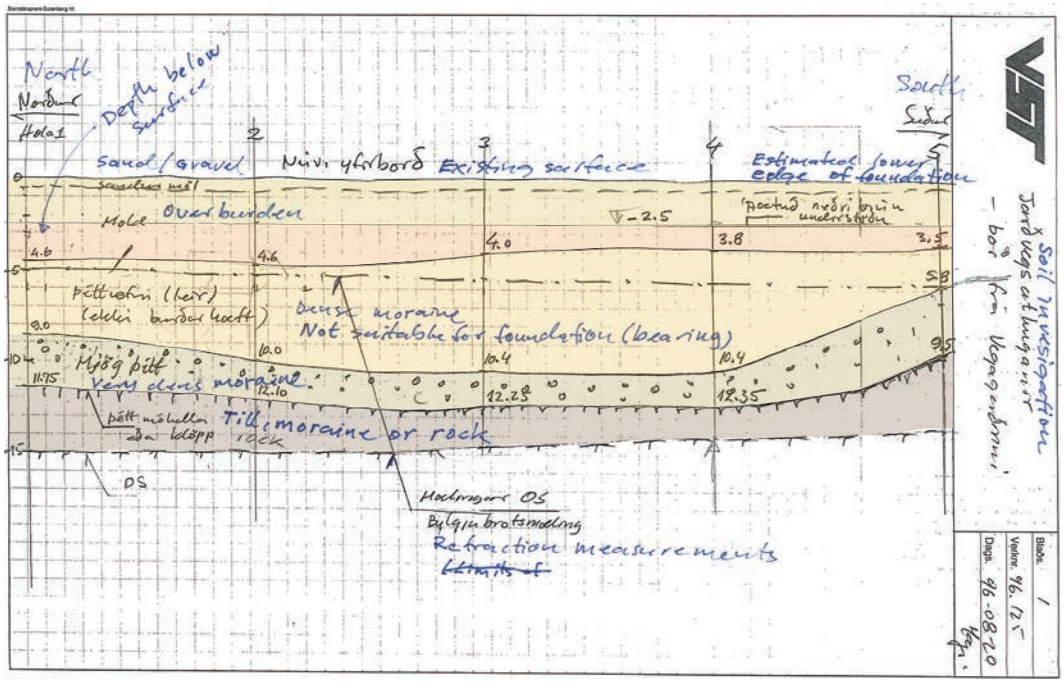
> **structural principles | structural engineering**

• all building measures have to be restricted to the direct stadium surrounding

• for cost reasons civil engineerings (underground workings) have to be reduced, overlayfunctions should be provided aboveground

• the roof construction should be separated from the building construction, foundations only absorb horizontal forces

1 Design and Construction Concept



soil investigation | east stand (1996)

1.3 Building Structures

> **ground works**

• the building site ground works do not currently involve any major earth excavation, the dig-up area is to be cleared of the upper soil layer as well as vegetation on top and stored away at a approved location

• furthermore all engineering utilities (sewage, water pipes, electrical, telecommunication cables etc.) or other possible collision points from the topographical report need to be identified on site and checked with the planning.
a soil expert is also to be consulted for the approval of the levels of construction pits, if necessary the soil has to be improved, based on the geotechnical report while regarding local requirements

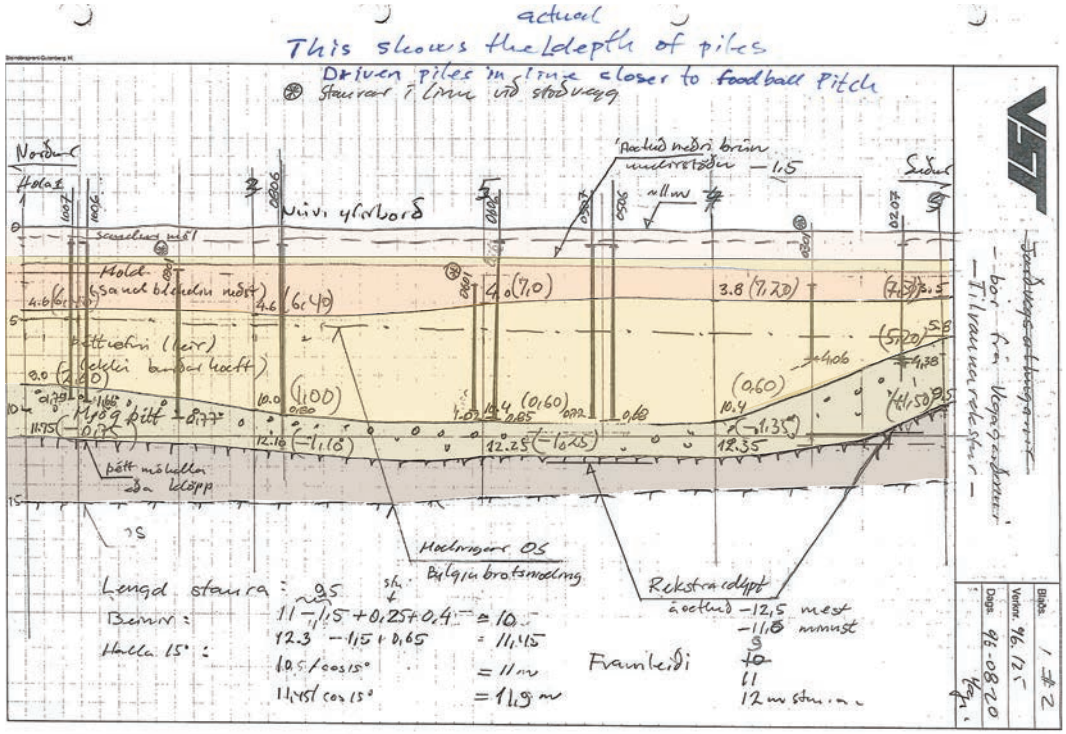
• the ground works are to be carried out according to the planning and the local codes

• although there is no basement in consideration, the design requirements can change in the future, requiring the excavation strategy to be adopted - like securing high slopes, introducing retainig walls or additional measures

• excavated material shall be stored separately either on site for further reuse as a fill material or if unsuitable for reuse, must be transported to a approved location for final storage

• all building measures have to be restricted to the direct stadium surrounding

1 Design and Construction Concept



actual depth of piles under east stand (1996)

1.3 Building Structures

> **foundation**

• where foundations are to be constructed, a site investigation should be undertaken to provide all the necessary information for the design and construction of the foundations

• for this purpose, a site investigation report should be prepared, giving details of the results of any documentary studies, site surveys and ground investigations, together with the appraisal of the surface and subsurface conditions of the site

• the foundations of a building shall be designed to carry the working load with adequate factor of safety, dead load, imposed load and wind load should be assessed in accordance with the building (construction) regulations and the relevant codes of practice.

• the imposed load should include buoyancy force and earth pressure

• earth pressure should be assessed by using recognized geotechnical engineering methods

• a pile system will be placed into the soil to provide the deep soil support for the foundations

• foundations will be poured onto the pile system to transfer the loads of the stadium from the columns through the foundations to the piles

1 Design and Construction Concept

1.3 Building Structures

> **foundation**

• the piles should be able to withstand the expected wear and deterioration throughout the intended design working life of the superstructure that they support

• the allowable load on pile foundations shall be determined by:

- acceptable foundation engineering principles; or
- tests on the foundations on site,

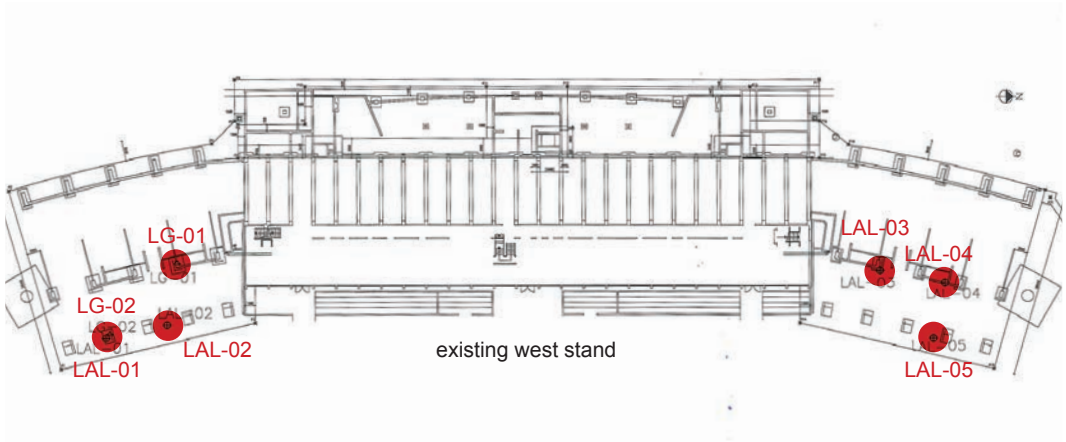
with an adequate factor of safety appropriate to the type of pile, taking into account the ground conditions, the method of installation, group effects and the allowable displacements of the structures supported by the foundation

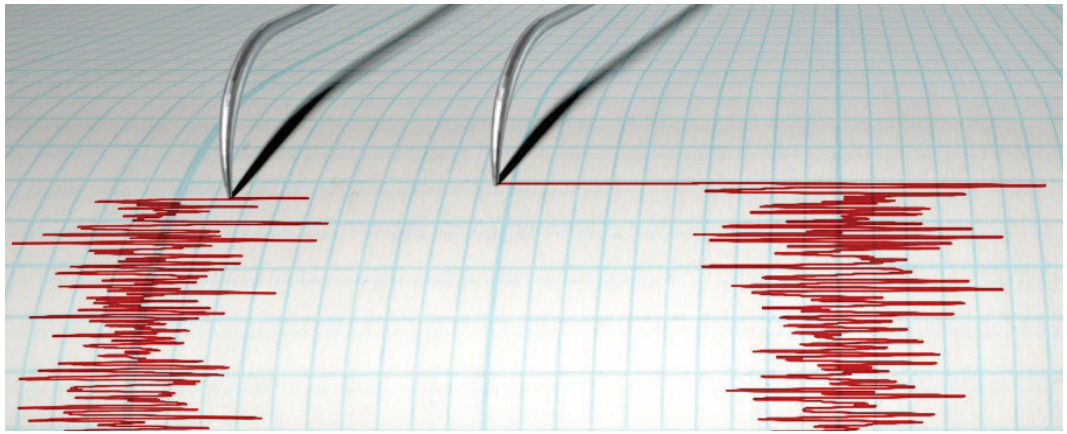
• currently no basement areas in the new building structures to be expected, deep earthworks should not occur

• the structural design of foundations should comply with the provisions of the building (construction) regulations

• the location of the existing sewer pipe, which is located below the pitch and the stand structures has to be taken into account and will be reorganized

1 Design and Construction Concept





1.3 Building Structures

> **foundation**

• soil situation existing west stand which shall remain (additions of 2006 to be discussed):

hole	depth rock	depth to solid moraine
LG-01	>3,8 m	1,2 m
LG-02	>0,8 m	0,8 m
LAL-01	4,0 m	1,0 m
LAL-02	4,0 m	1,0 m
LAL-03	0,0 m	-
LAL-04	0,0 m	-
LAL-05	0,3 m	-

• earthquake zone to be considered for foundations:

• the building structures shall be designed to resist seismic events in accordance with ÍST EN 1998 “Eurocode 8: Design of structures for earthquake resistance”

• reference is made to clauses 3.2.1 in ÍST EN 1998-1:2004/NA:2010 are agR = 0.15g

1 Design and Construction Concept

1.3 Building Structures

> **external walls**

• the stadium shell is dictated by the geometry of the stands and the structural concept

• the shell (external walls + roof), the geometry and the structure of the New National Stadium Reykjavik should be developed simultaneously

• the facade and roof generally display the vision determined in the previous activity

• of course, the facade is also dictated by the characteristics of the structure

• the facade structure itself could comprise of either steel, glass, concrete or composite materials, depending on the concept

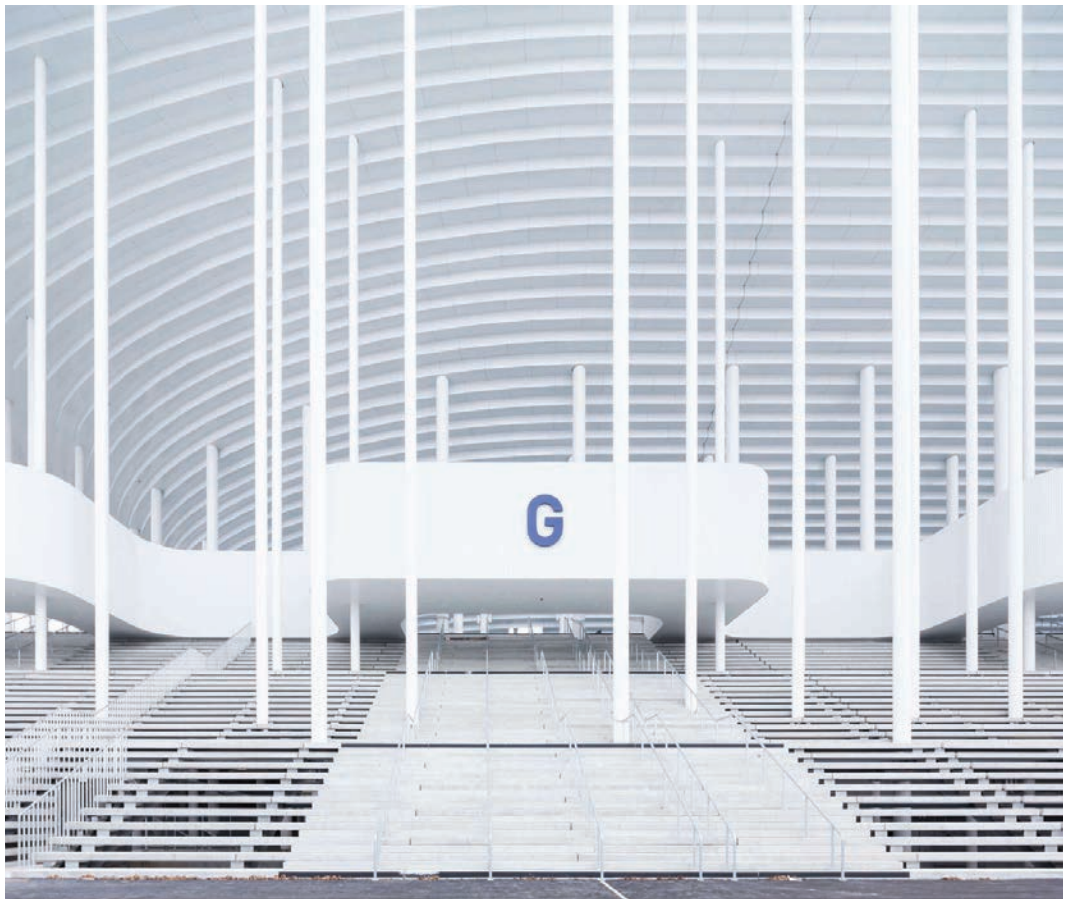
• roof and facade construction requires the construction of vertical supporting elements

• steel or concrete columns (in most cases) are used to support both, the facade and roof

• the roof elements, whether they be cables or steel truss elements, will be constructed on the vertical supports

• once the main parts of the structure are complete, the cladding elements for both the facade and roof can be applied

1 Design and Construction Concept



1.3 Building Structures

> **external walls**

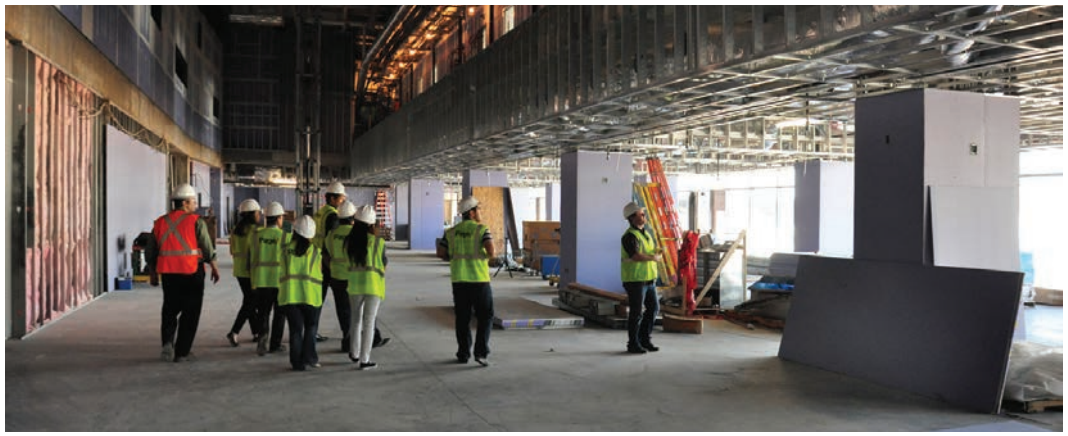
• the construction of external walls is highly complex, subjected to utilisation and design; there are different types of constructions:
  • post-and-beam constructions
  • curtain wall (preferred)
  • back-ventilated external walls

• building physics:
  • the consequent segregation of the thermal skin from insulation and supporting framework protects the stadium of climatic conditions
  • load-bearing walls and insulation will stay dry and functional
  • the facade should protect all components of heavy climatic influences

• temperature conditioned length variation:
  • the absorption of length variation of facing tiles is driven by a constructive apprenticing extended segregation
  • the subconstruction has to be separated in the range of movement joins for every facade field

• noise insulation:
  • a noise generation of cladding is avoided by a proper static arrangement

1 Design and Construction Concept



1.3 Building Structures

> **internal walls**

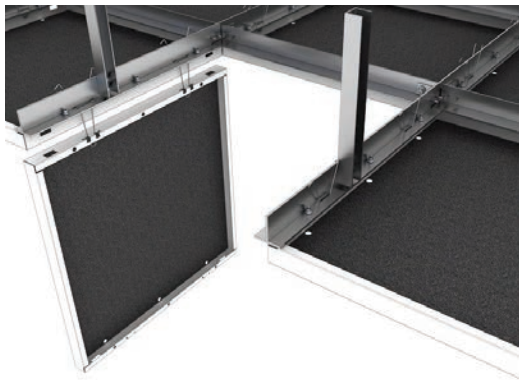
• load bearing internal walls
will be preferably cast insitu or made as prefabricated elements, to be transported to the building site and placed/ mounted together with the adjacent load-bearing structure. finishes or additional wall treatments must comply with the fire safety regulations as well as the requirements for acoustics in the building.

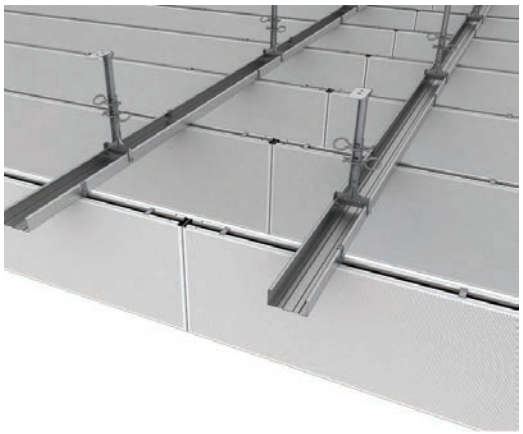
• non load-bearing internal walls
vary in construction, finish and function, considered can be lightweight concrete walls panels, blockwork walls and plasterboard stud partitions.
depending on the architectural concept and the interior design these walls/partitions will have specific needs for acoustics, fire safety and wall finishes and will be treated accordingly.

• wall finishes
are to be specified in the interior design concept.
general finishes include paint on concrete, paint on plaster/ plasterboard (in administration, hallways, storage rooms), washable paint (in concourse spaces, public areas, kitchen, changing rooms), tiles (in wet rooms, kitchen), other custom wall cladding (hospitality, media)

• internal doors
each door shall be specified in the door book: which can include standard door types, roller shutters, foldable doors, section doors etc. (specs. according to manufacturer)

1 Design and Construction Concept





1.3 Building Structures

> **floors | slabs | ceilings**

• shell and core of the building - foundations, columns, raker beams, floor slabs, elevator shafts and the stairs will make up much of the New National Stadium Reykjavik

• the concrete construction of the stadium is the core which gives the general shape of the stadium (rational axial distances between the columns to be considered)

• precast and in-situ concrete might be combined for rapid construction

• the largest of the many prefabricated elements in the stadium will be the tiers of the stand

• after the columns and raker beams are installed, the prefabricated tier elements are put in place

• simultaneously the structure of the stadium will continue to be built

• all floors and ceilings in consultation with architects, structural engineers and interior designers (wishes of operator to be implemented as soon as possible)

• dimensions according to local and officials requirements (FIFA / UEFA)

1 Design and Construction Concept

1.3 Building Structures

> **floors | slabs | ceilings**

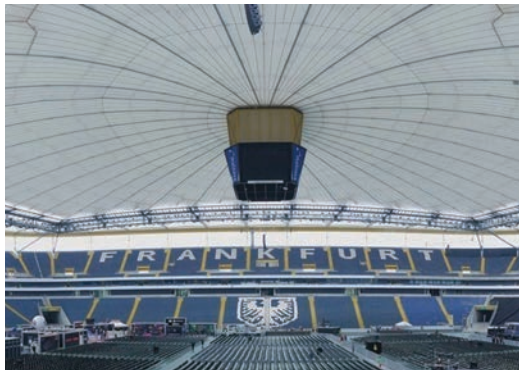
• design principles to be considered:

• all surfaces to be maintenance friendly
• attention to sealings in all wet areas
• in consultation with architects skirting boards should be considered
• consideration of slipping safety requirements
• implementation of tactile information
• flooring and coating qualities depending on application areas (PVC floors for higher demand, natural stone tiles in entrance/hospitality areas, coated concrete in concourse areas)
• ceilings according to required fire-resistance qualities
• acoustic measures according to usage of premises
(acoustic ceilings without joints if necessary)
• usage of flexible ceiling solutions recommended
• specific ceilings (pressure-resistant, hydrophobic,..) according to utilisation

1 Design and Construction Concept

Friends Arena Stockholm, Sweden

AT&T Stadium Arlington, Texas



Commerzbank Arena Frankfurt, Germany

Veltins Arena Gelsenkirchen, Germany

1.3 Building Structures

> **roofs and floodlight | roof concepts**

• the report documents the early developments during the design of the new roof over the bowl / revised bowl of the New National Stadium Reykjavik, Iceland

• several generally possible layouts for the roof structure are investigated and will form the basis for the next design steps

• the presented solutions show a work in progress (WIP)

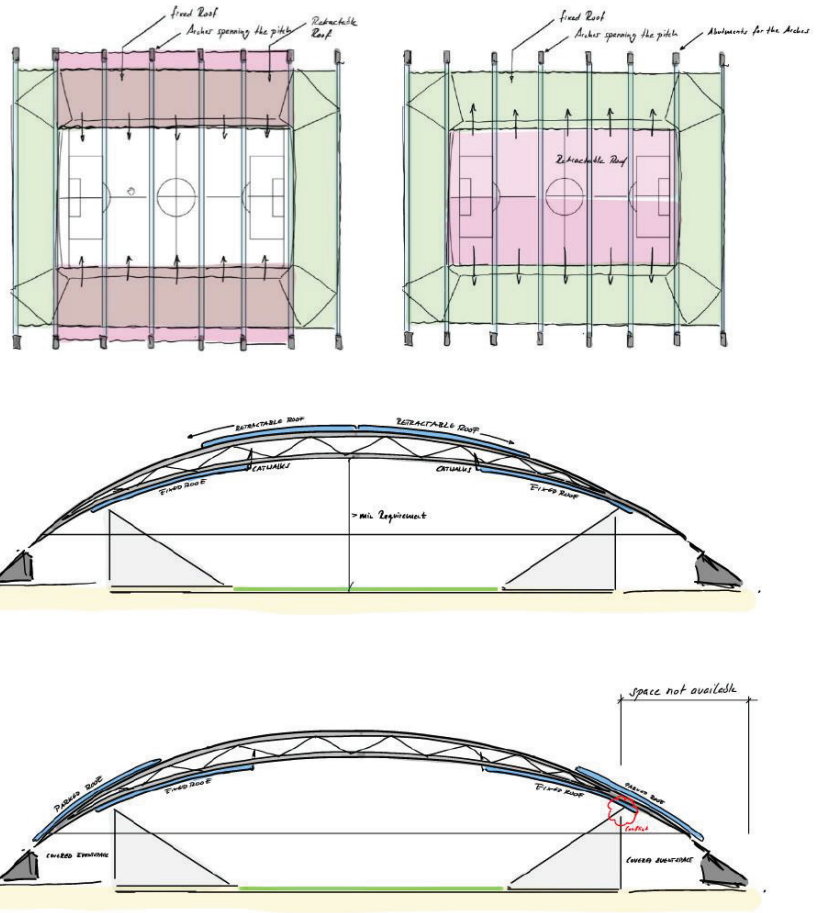
• aim is to develop the most appropriate and the most economical solution considering all known boundary conditions

• the controlling environmental conditions of the location have to be taken into consideration at such an early design phase

• robustness and redundancy have priority, to warrant future use and safety

• prevailing soil conditions and resulting foundation, bowl implications and adjacent properties require further consideration

1 Design and Construction Concept



1.3 Building Structures

> **roofs and floodlight | roof concepts | option 1**

• the first idea implicates to span the cross direction of the stadium with arches, which feature specific abutments outside the stadium buildings

• a fixed roof is situated along the lower chord of the trusses, while the retractable roof slides on top of the upper chord - (see section)

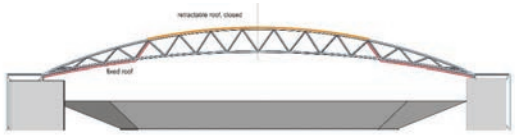
• the benefit of such an approach is a clear separation of fixed from movable components and an interesting result by creating such different layers

• the resulting span does not lead to the most economical solution, and the stadium buildings together with the steel arches result in certain conflicts

• but the governing constraint are the plot boundaries

• hence a slightly revised layout has to be developed, where the arch trusses are supported above the buildings

1 Design and Construction Concept



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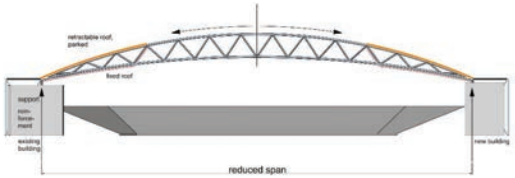
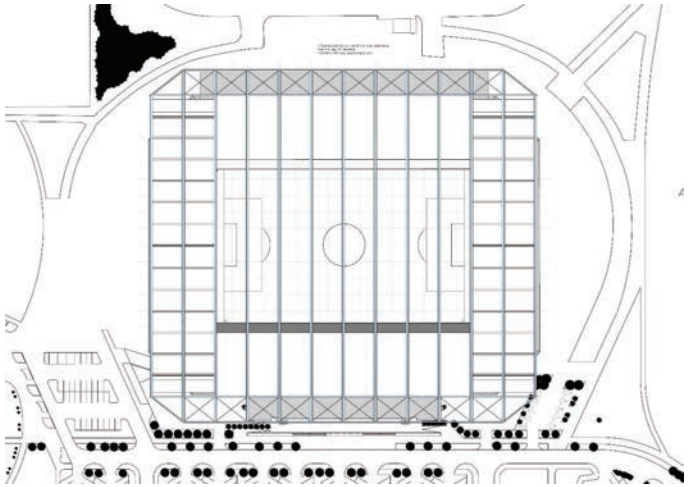


Short section, open

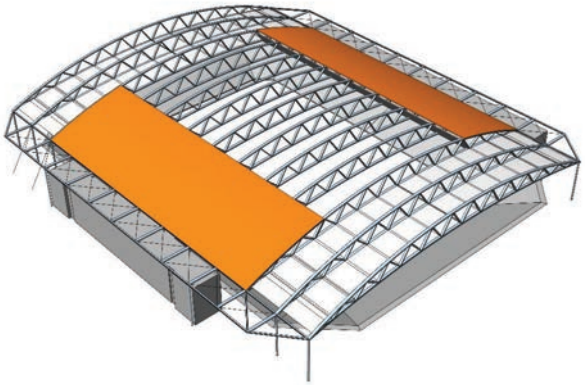


1.3 Building Structures

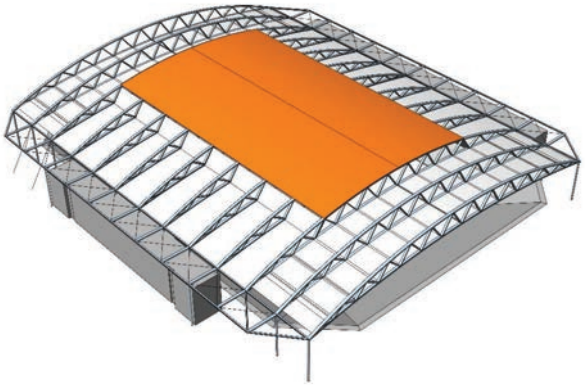
> **roofs and floodlight | roof concepts | option 1**

• this leads to a reduced span of the trusses result, resulting in a more economical solution

1 Design and Construction Concept



Roof opened



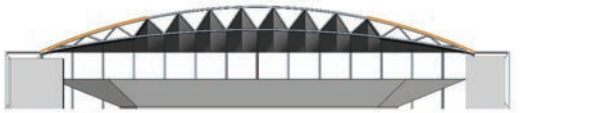
Roof closed

1.3 Building Structures

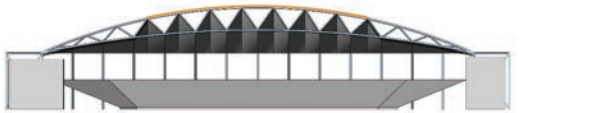
> **roofs and floodlight | roof concepts | option 1**

• the graphic shows the roof in opened and closed condition

1 Design and Construction Concept



Short section, open



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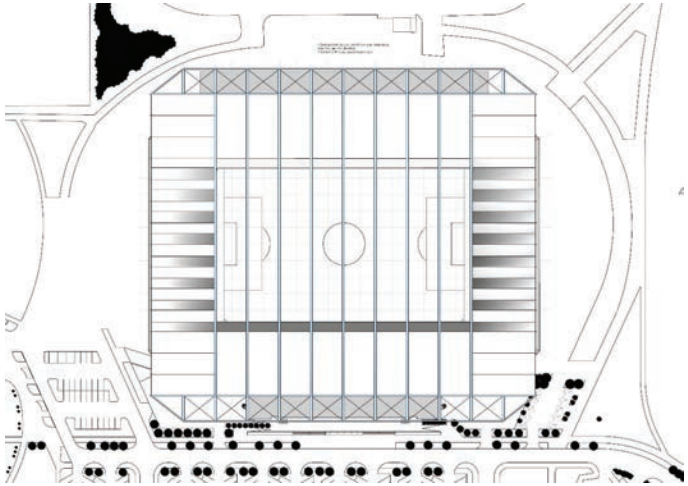


Plan

1.3 Building Structures

> **roofs and floodlight | roof concepts | option 2**

• at option 2 the arches above the side stands are replaced by secondary trusses spanning from a set of columns that follow the outer perimeter of the side stand / bowl to the first primary arch spanning the pitch in cross direction

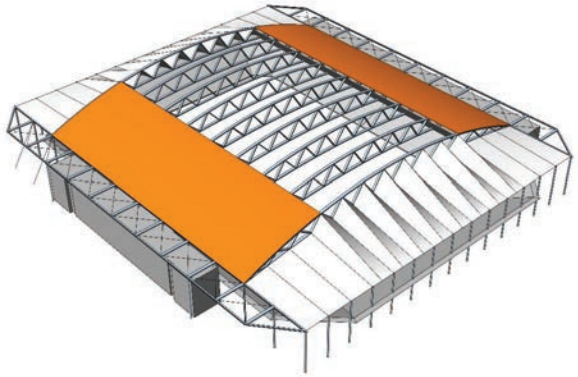
• the re-orientation of the end structure creates a horizontal façade line

1 Design and Construction Concept

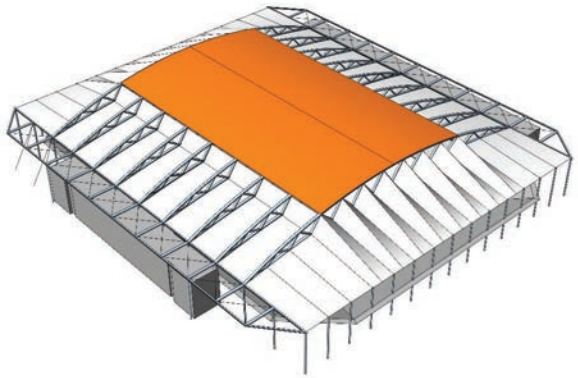
1.3 Building Structures

> **roofs and floodlight | roof concepts | option 2**

• the graphic shows the roof in opened and closed condition

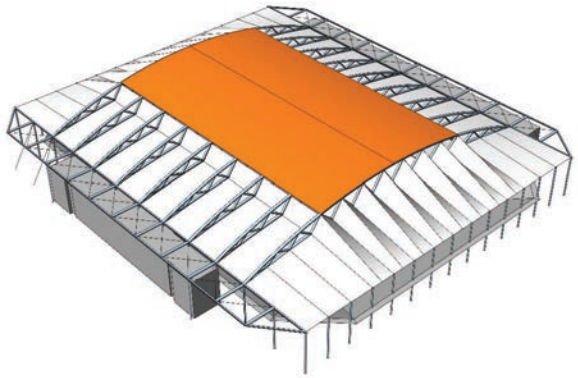


Roof opened

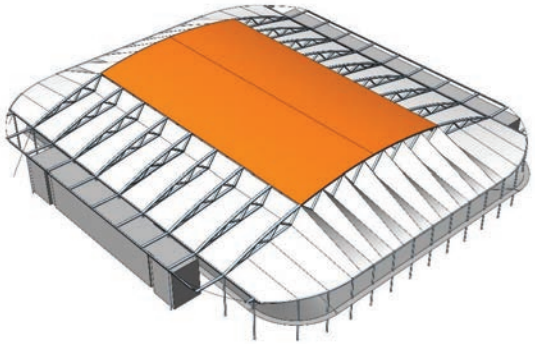


Roof closed

1 Design and Construction Concept



Option a: sharp corners



Option b: round corners

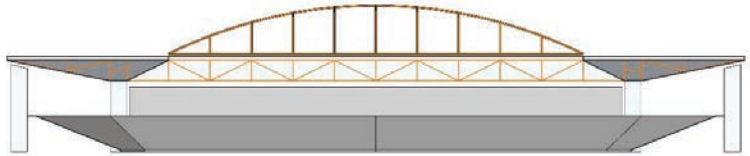
1.3 Building Structures

> **roofs and floodlight | roof concepts | option 2**

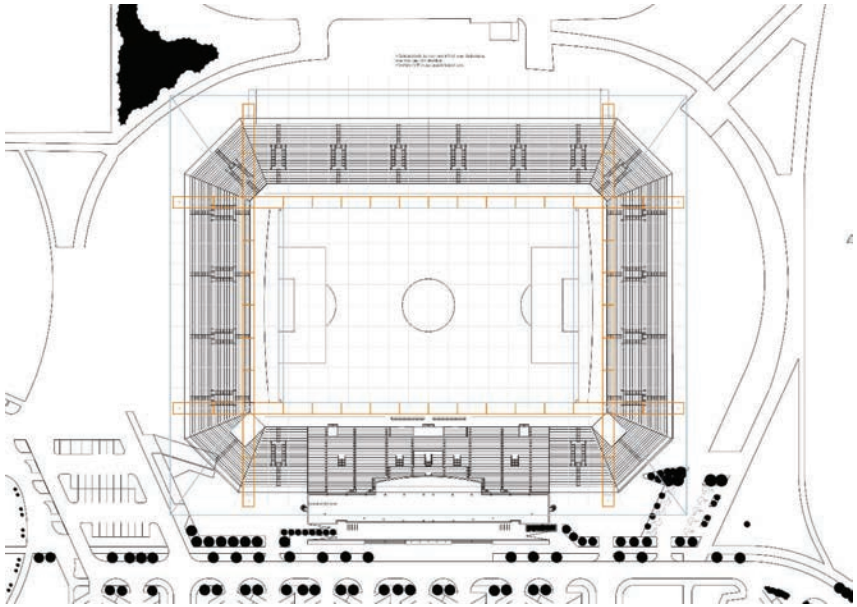
• the rotated structure on the sides offers the opportunity to round off the corners

• the roof perimeter can then follow the bowl plan shape very closely

1 Design and Construction Concept



Long Section



1.3 Building Structures

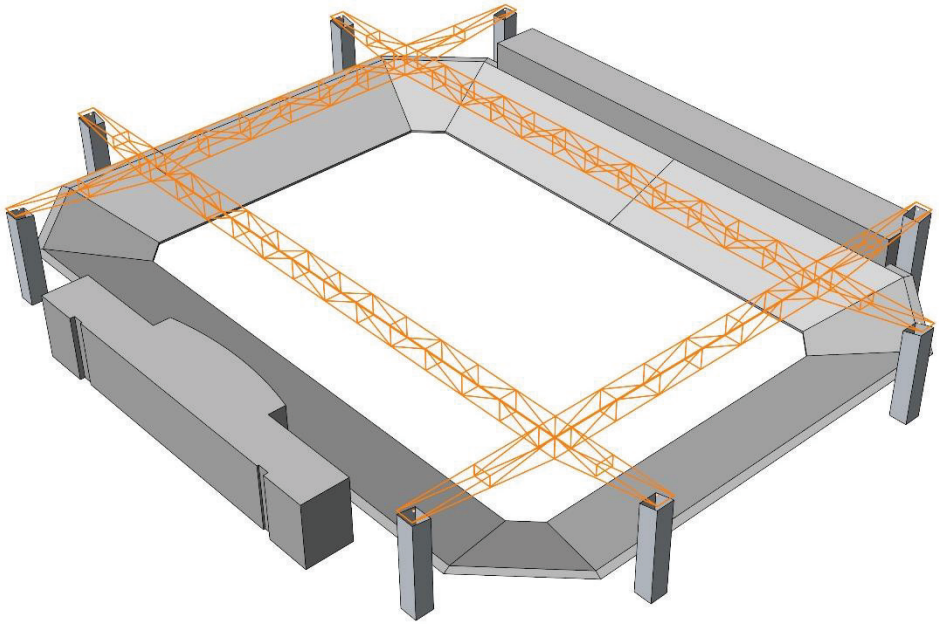
> **roofs and floodlight | roof concepts | option 3**

• option 3 works with 8 towers that carry a mega truss grid

• the truss grid supports secondary radial girders to form the fixed outer roof

• solid roof panels can be driven from the parking position above the fixed outer roof over the pitch, supported by longitudinally spanning arches

1 Design and Construction Concept



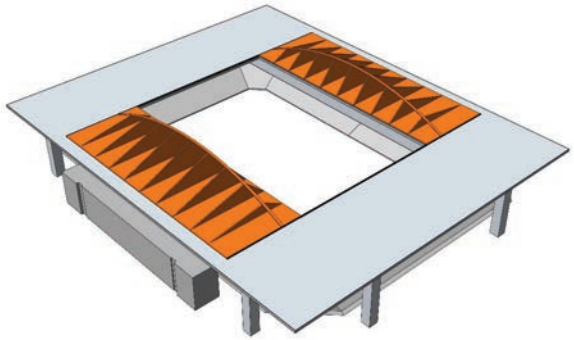
1.3 Building Structures

> **roofs and floodlight | roof concepts | option 3**

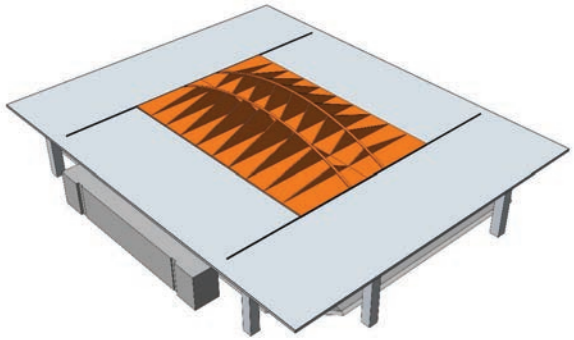
• primary structure

• the required support structure of the moveable plates opens up an opportunity to give expression to the exterior of the stadium

1 Design and Construction Concept



Full fins, Roof opened



Full fins, Roof closed

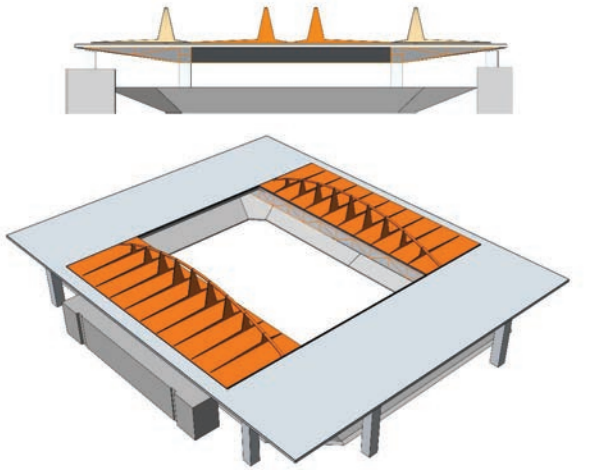
1.3 Building Structures

> **roofs and floodlight | roof concepts | option 3a**

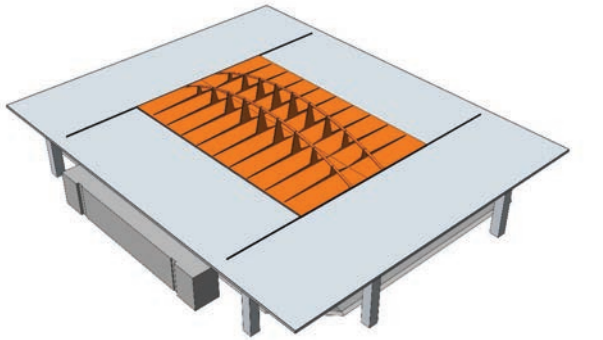
• arches and plates are connected by an array of steel sails

• whilst very distinct and expressive, this proposal is subject to high wind forces

1 Design and Construction Concept



Reduced fins, Roof opened



Reduced fins, Roof closed

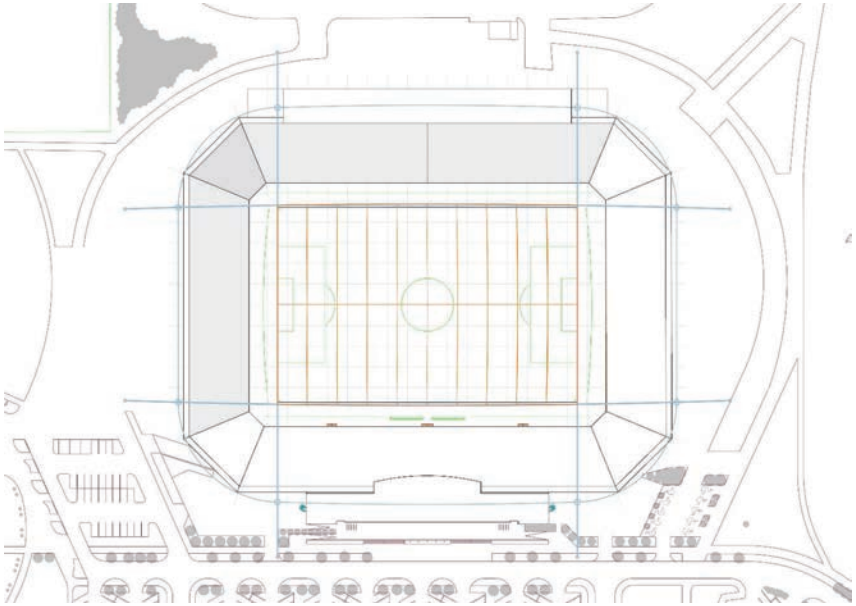
1.3 Building Structures

> **roofs and floodlight | roof concepts | option 3b**

• the fins are replaced by smaller, tapered connections which reach out to pick up tapered ribs of the plate

• this solution is more minimal

1 Design and Construction Concept



1.3 Building Structures

> **roofs and floodlight | roof concepts | option 4**

• option 4 adopts the 8 perimeter points to transfer the loads into the ground

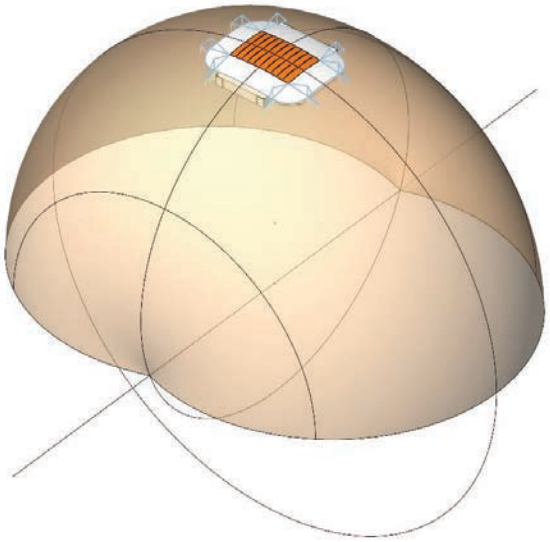
• however, the towers are replaced with much more filigree cable trusses

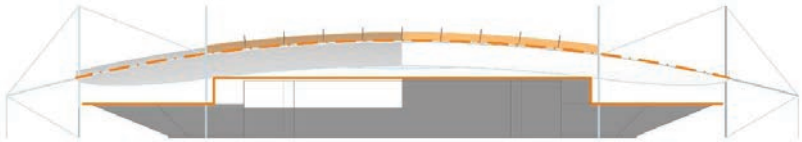
• the system starts to behave like a series of interlocking suspension bridges

• the cables need to be anchored to the ground further afield but suitable locations can be negotiated inside the site perimeter

• the intermediate trusses are executed as fish-bone cable trusses, giving additional lightness to the appearance

1 Design and Construction Concept





Curved roof follows varying height requirements closely

1.3 Building Structures

> **roofs and floodlight | roof concepts | option 4**

• the roof surface geometry lies on a torus

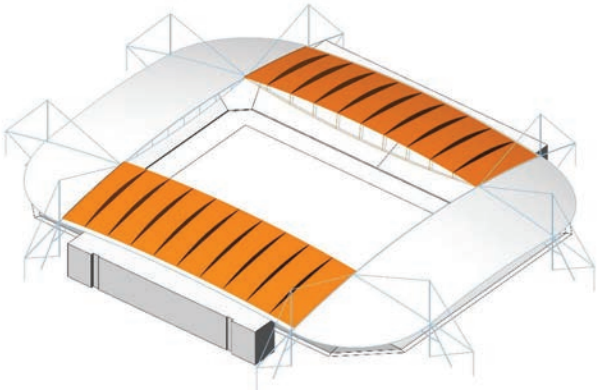
• as such, the roof approximates much more closely the varying heights of stands, buildings and height requirements above the pitch

• it is tall where needed but low elsewhere

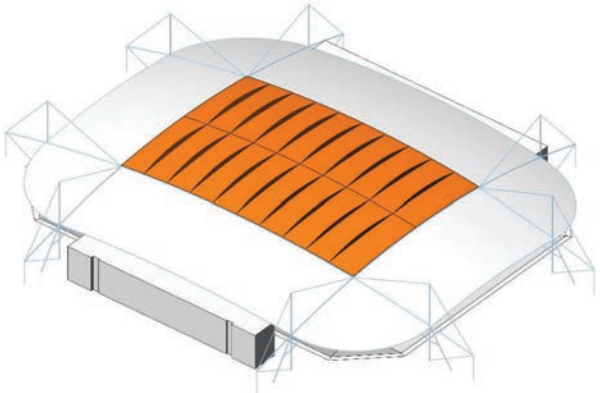
• the globally curved surface provides visual dynamic but thanks to the derivation from the torus, building elements will be highly repetitive

• a torus can be faceted into highly repetitive, flat quadrangular elements, providing high suitability for standardised and cost-effective sub structure and cladding

1 Design and Construction Concept



Roof open



Roof closed

1.3 Building Structures

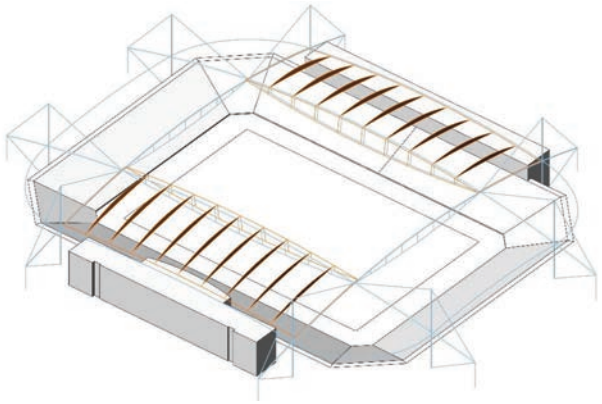
> **roofs and floodlight | roof concepts | option 4**

• the opening mechanism corresponds to that of option 3 in the way that two plates, a longitudinal half of the pitch each, slide over the long straight roof to open

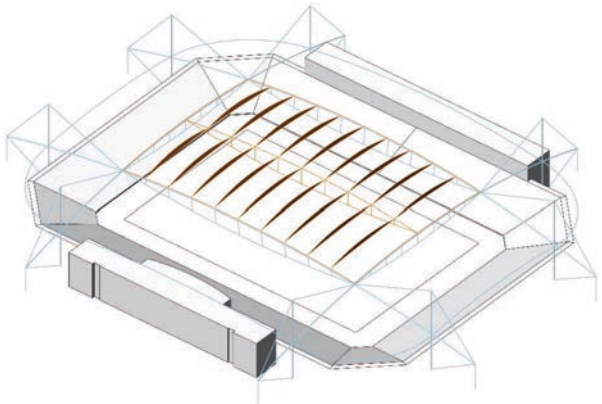
• the rails describe two parallel arcs

• that means that despite the curvature of the roof, the plate geometry does not need to change when sliding along, requiring no additional hinges, energy or maintenance effort

1 Design and Construction Concept



Roof open



Roof closed

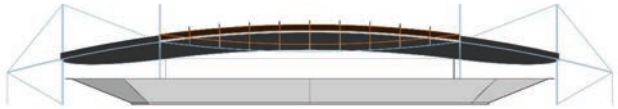
1.3 Building Structures

> **roofs and floodlight | roof concepts | option 4**

• when the torus exhibits enough curvature, the principal support structure of the movable plates can be on the inside of the stadium without inflicting on height requirements above the pitch

• alternatively, it can sit above the roof, analogous to the designs shown in option 3

1 Design and Construction Concept



Long section, closed and open

Short section, closed and open

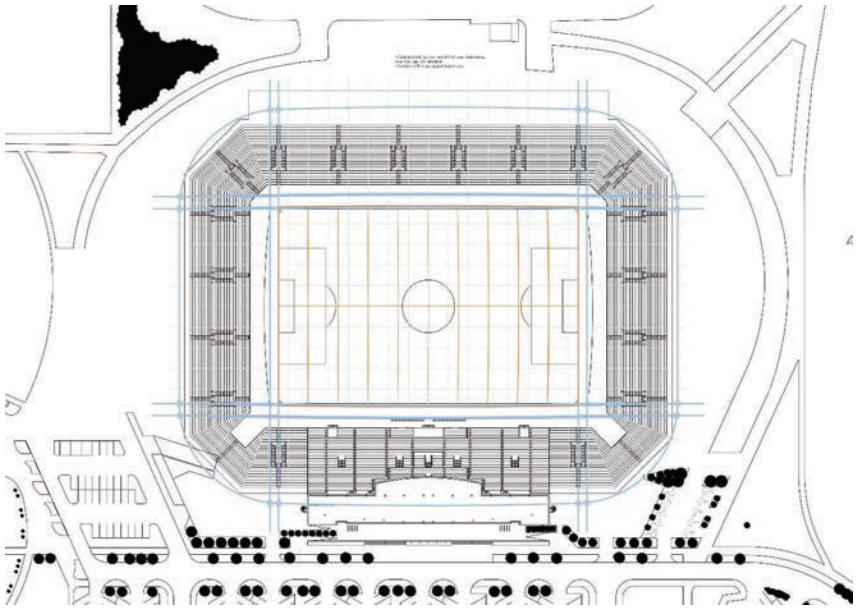
1.3 Building Structures

> **roofs and floodlight | roof concepts |** option 4

• the graphic shows the roof in long and short section, closed and open

1 Design and Construction Concept

Long section



1.3 Building Structures

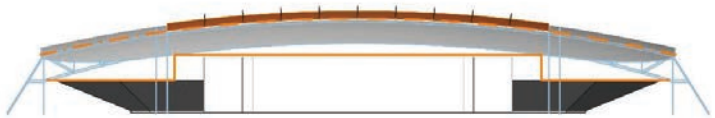
> **roofs and floodlight | roof concepts | option 5**

• as an alternative to suspending the structure using cables, an option can be studied where curved trusses resting on towers either side of the bowl assume the role of supporting the perimeter of the opening

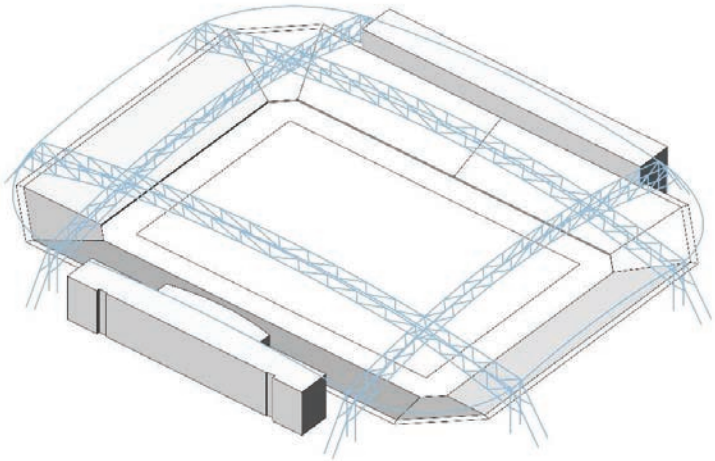
• in many ways, this is the union of options 3 and 4

• this combines the advantages of the curved surface and no visible structure above the roof surface - at the cost of more visible structure on the inside of the stadium

1 Design and Construction Concept



Curved roof follows varying height requirements closely



1.3 Building Structures

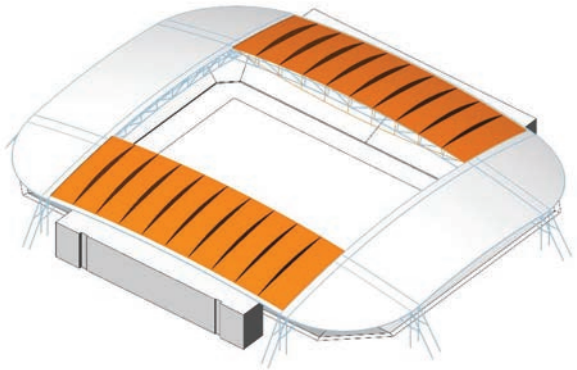
> **roofs and floodlight | roof concepts | option 5**

• primary structure: large span trusses cross the entire stadium in lateral and longitudinal direction

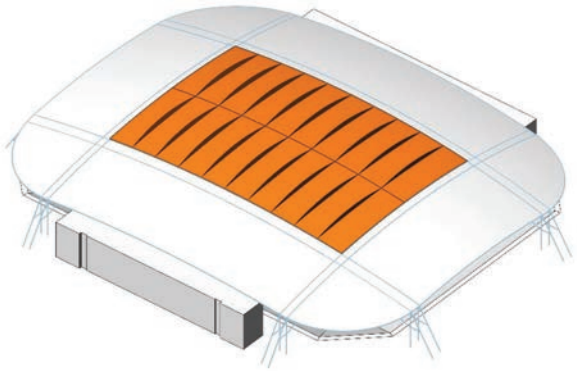
1 Design and Construction Concept

National Stadium Reykjavik

bergermann partner



Roof exterior without visible super-structure



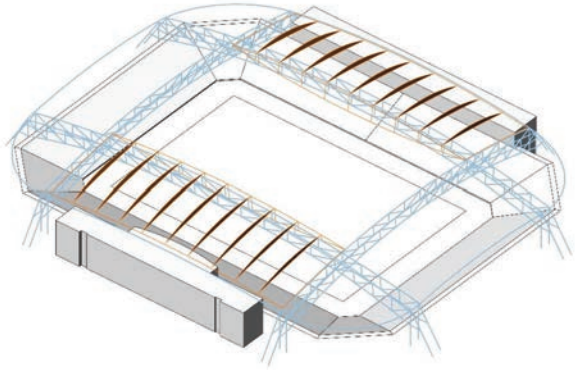
Roof, closed

1.3 Building Structures

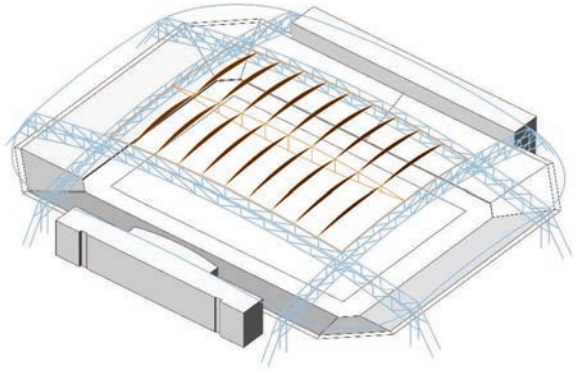
> **roofs and floodlight | roof concepts | option 5**

- the graphic shows the roof in opened and closed condition

1 Design and Construction Concept



Roof opened



Roof closed

1.3 Building Structures

> **roofs and floodlight | roof concepts | option 5**

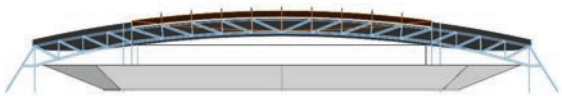
• the graphic shows the roof in opened and closed condition

1 Design and Construction Concept

1.3 Building Structures

> **roofs and floodlight | roof concepts | option 5**

• the graphic shows the roof in long and short section, closed and open



Long section, closed and open

Short section, closed and open

1 Design and Construction Concept

1.3 Building Structures

roofs and floodlight | roof structure

• local snow loads according to ÍST EN 1991-1-3:2003/ NA:2010 Sk =2,1 kN/m2 and local wind loads according to ÍST EN 1991-1-4:2005/NA:2010 are Vb,0 = 36 m/s

• the building structure shall be designed to resist seismic events in accordance with ÍST EN 1998 “Eurocode 8: Design of structures for earthquake resistance”

• reference is made to clauses 3.2.1 in ÍST EN 1998-1:2004/NA:2010 are agR = 0.15g

• a summary of the expected peak positive and negative wind pressures acting on the exterior envelope of the buildings, with the objective of determining design wind loads for cladding or curtain wall design, need to be provided robustness and redundancy have priority, to warrant future use and safety prevailing soil conditions and resulting foundation, bowl implications and adjacent properties require further consideration

roofs and floodlight | protection of steel surface

• the environmental conditions in Iceland are onerous due to the saline coastal location

• therefore the buildings will require high performance protective coatings and/or material specification

• accessible structural steelwork elements exposed in the finished work will be coated with an anti-corrosion protection system to provide a minimum life to first major maintenance, as defined in ISO12944, of not less than 15 years for a C5M exposure category (safety by design, which implies a minimized risk for working in heights)

• an annual visual inspection of all primary steelwork and connections is required as part of the building maintenance regime

• this may potentially be extended to every 3 years depending on the initial performance of protective coatings (difficult access to roof structure to be considered)

• cost intensive provisions for maintance work to be taken into account

roofs and floodlight | secondary steel works

• provision for secondary steelwork is to be made - refer also to architectural and MEP designs for details:

- steelwork for lighting and services gantries
- cold-rolled steelwork to parapets, eaves and verge details
- cladding rails to plant screen walls, including trimming to louvers and openings
- trimming to roof lights, vents and service penetrations
- secondary steel to support suspended services, lighting, sound systems, score boards, screens, rigging, access gantries and other equipment
- secondary steelwork to support lift shaft guide rails and lifting beams
- upstands for weathering and plant support
- handrails and man-safe access systems are to be provided in accordance with architect’s roof access strategy

1 Design and Construction Concept

1.3 Building Structures

roofs and floodlight | roof covering & drainage systems

• the material for the roof cladding shall have at least the same resistance against the environmental conditions in Island as the protective coating for the steel structure

• roof drainage gullies are detailed within the 'low points' of the roof and the primary gutter are located to the outside perimeter of the roof and to the perimeter of the moving roof opening in the center of the roof

• access shall be required to these locations for the routine cleaning

• direct access shall be provided to these locations either from the adjacent roof level location or directly into the perimeter gutter from the truss below

roofs and floodlight | skylights & sloped glazing

• sloped or horizontal application of a fenestration product in an out-of-reach application, which allows for natural daylighting shall be either fixed (non-operable) or venting (operating)

• skylights need not provide provisions for cleaning of exterior surfaces from the interior of the building

• the average sloped glazing typically shall be designed for three levels of water drainage:

- external
- internal
- condensate collection

roofs and floodlight | lighting protection

• a lightning protection system needs to be provided for the stadium to protect the structure against the effects of lightning strikes

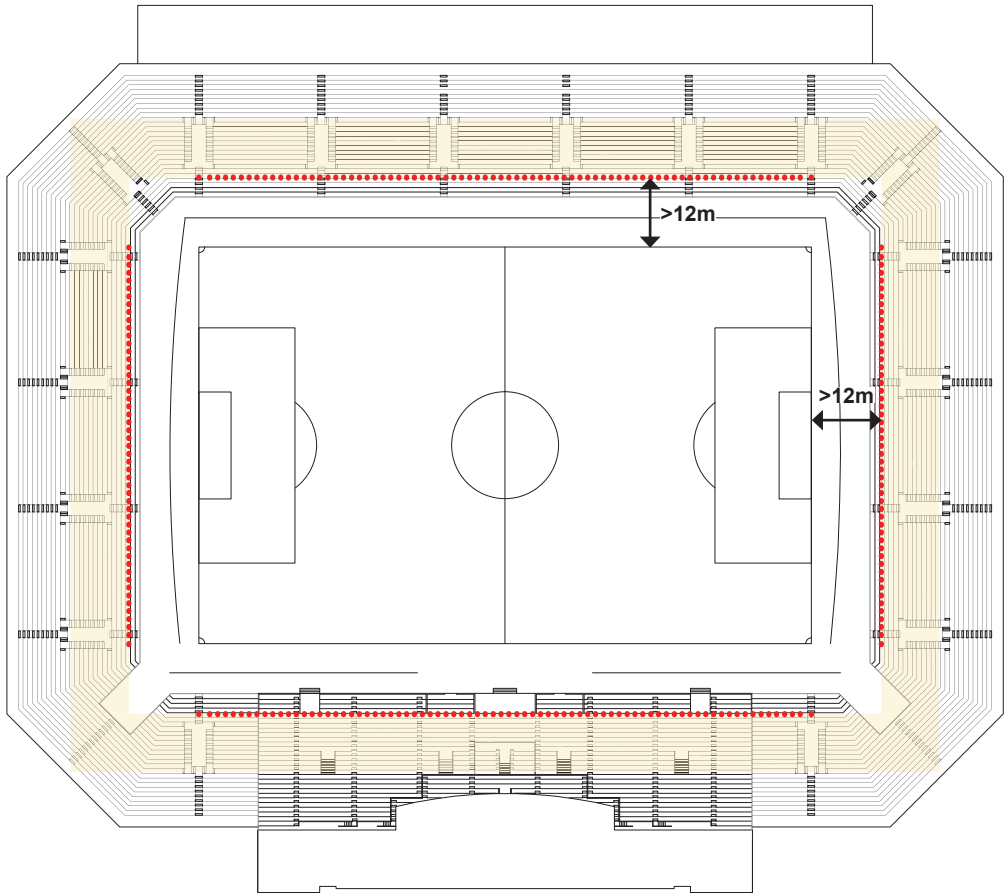
• this will require the following key components

- an air termination system composed of interconnected metal cladding panels, structural steel trusses, structure and the substructure

- down conductors located around the perimeter at maximum 20m spacing and composed of structural steel trusses, columns and metal cladding structure; these down conductors need to be bonded at the base of the building to the structural pile re-enforcement bars which shall be interconnected and act as the earth termination

- electrical continuity between the air termination components, down conductors and re-enforcement bars need to be ensured

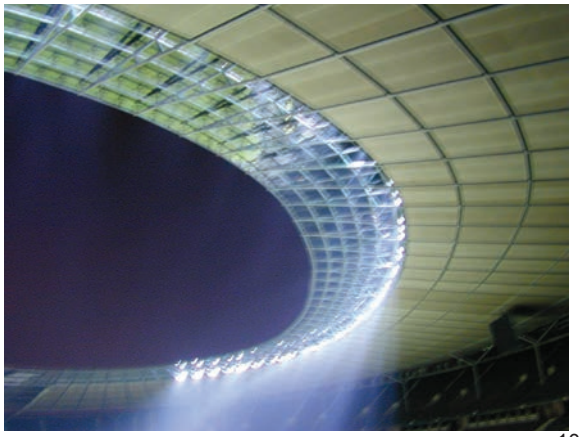
1 Design and Construction Concept



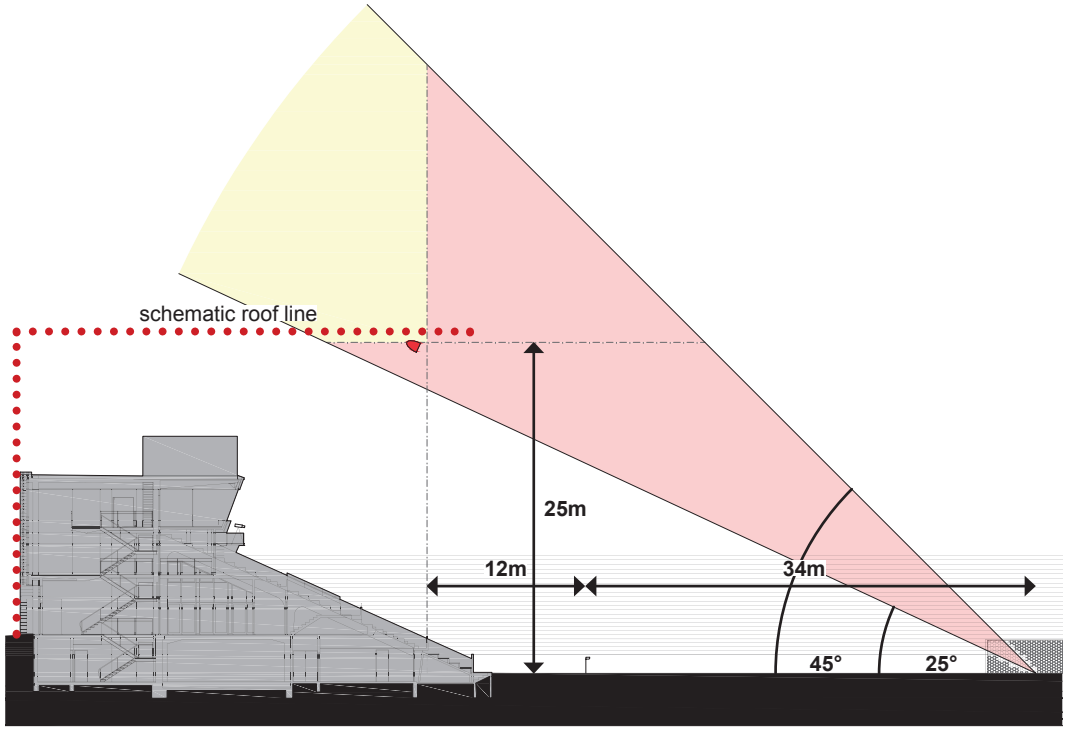
1.3 Building Structures

> **roofs and floodlight | floodlight - lateral distance**

• in order to achieve the required vertical illuminance around the perimeter of the pitch, the luminaires should have a mounting position with a minimum lateral distance from the pitch perimeter of greater than 12m



1 Design and Construction Concept



side line

1.3 Building Structures

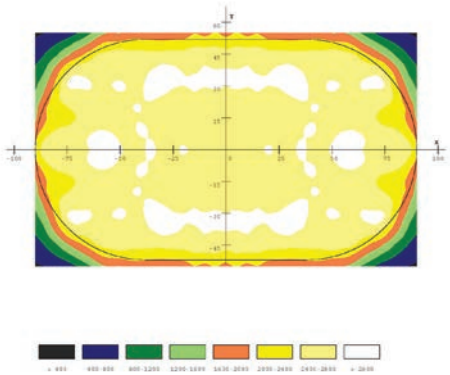
> **roofs and floodlight | floodlight - luminaire mounting zone**

• the luminaires should not be mounted less than 25° or more than 45° above the centre of the pitch

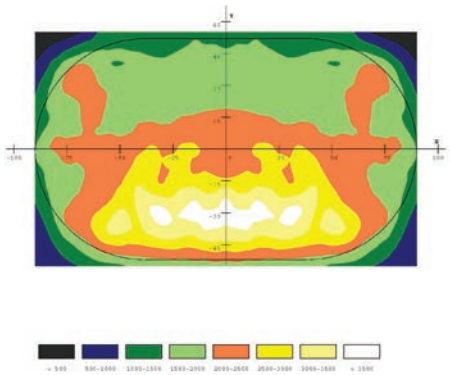
• this will generally ensure that illuminance conditions comply with UEFA's guidelines

• if possible, luminaires should be mounted at a height of 25m above the surface of the pitch, if this is not possible, it is important to develop a design solution that considers the implications of that reduced height and takes it into account

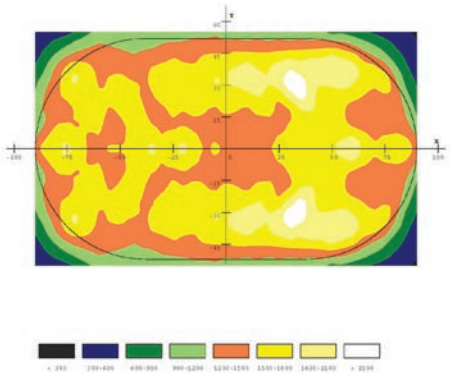
1 Design and Construction Concept

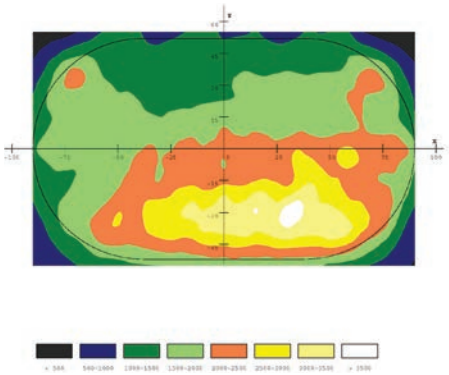


Intensity of Illumination
vertical 1,50 m - in the direction of cameras
camerasite (x,y,z): (150.00,0.00,40.00)



Intensity of Illumination
vertical 1,50 m - in the direction of cameras
camerasite (x,y,z): (80.00,115.00,40.00)





1.3 Building Structures

> **roofs and floodlight | floodlight - intensity of illumination**

• for the stadium, flood-lighting which fulfills the FIFA and UEFA illuminance level „Elite level A“ for TV-broadcasting is planned (according to UEFA Stadium Lighting Guide 2016)

• a flood-lighting with a vertical illuminance of 2000lx for the main camera is considered

• for optimum-uniformity illumination, the floodlights are mounted and evenly distributed on the maintenance bar

• special floodlights with different optics and specially-bundled 2000W metal halide lamps with color rendering RA> 90 and color temperature > 5000K will be used

1 Design and Construction Concept

1.3 Building Structures

> **fittings architectural**

• colours and materials can be used to represent a culture or a team. They also create an atmosphere unique to the venue, giving an identity that reflects on KSI, the fans, the city of Reykjavik or the Icelandic culture
• there are several factors which add to the importance of the choice of materials and fittings available in the local market:

  • cost - local material reduces shipping costs and potential import duties
  • local support - inclusion of local materials and products supports the Icelandic economy

fittings structural

• all balustrades and railings have to be in compliance with local and UEFA requirements, viewing obstructions onto pitch (sightlines) to be avoided
• any structure (glass or steel) to be probably fixed and resistant against horizontal forces caused by spectators
• usage of safety glass, galvanized metal and stainless steel recommended according to regulations
• temporary stands and seating to be avoided, fixed plastic bucket seats of same type with steel support structure should be used (exceptional press and hospitality areas)
• seat and row numbers according to seating plan to be installed
• structural dimensioning and coatings according to architectural concept and fire + life safety requirements

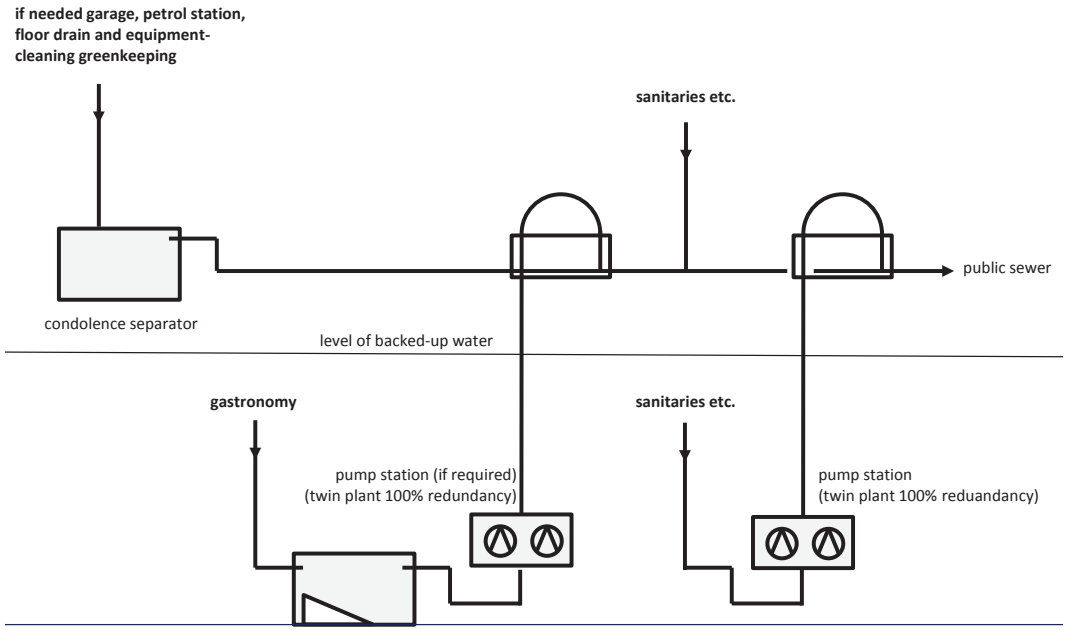
1 Design and Construction Concept

1.4 Technical Installations

> **dewatering**

- roof:
  - the incidental rainwater has to be collected through raising drainpipes and connected to the main drainage system
  - the storm water sewer has to be connected to the public network of Reykjavik storm water system
  - if required all drainage systems of the roof have to be equipped with heat tapes to protect spectator areas and routes
- pitch:
  - drainage systems of the exercise areas and circulation areas of the pitch are driven by a powerful drainage system and to be trickled away
  - if this is not possible, the drainage system has to be connected with the public drainage system of Reykjavik
  - due to the reason of the lightly lowered pitch (compared to the stadium surrounding), it could be necessary to install a rainwater pumping station

1 Design and Construction Concept



1.4 Technical Installations

> **dewatering | sewerage**

wastewater discharge:

• for wastewater different networks are provided:
homely wastewater (not aliphatic)
aliphatic sewage (catering)
shop floor level greenkeeping

• sewage will be discharged into public sewer

• rainwater will be discharged into public rainwater drainage

wastewater areas:

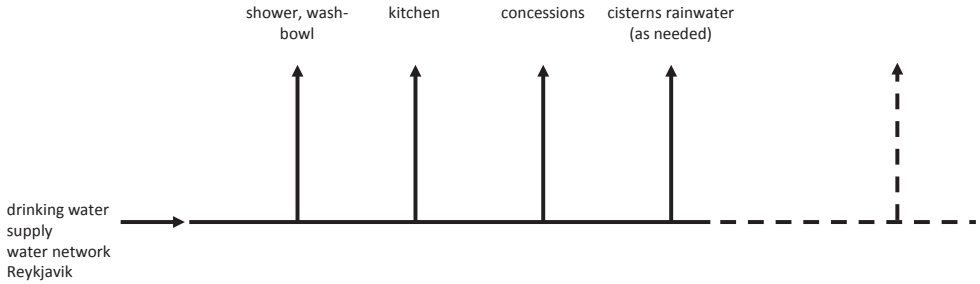
• areas under the level of backed-up water will be occupied with a pump station, twin plant 100% redundancy; pump stations are reduced to a minimum

• sewage will be seperated from aliphatic waste water of gastronomy and cleaned with a fat separator

• waste water out of shop floor level greenkeeping will be cleaned with a condolence separator

• for spectator areas and access paths all drainage systems should be equipped with heat tracing

1 Design and Construction Concept



1.4 Technical Installations

> **sanitary | water supply**

• all sanitary facilities considering to the hygiene regulations of Iceland with the target to design and accomplish an economic operation

• water supply:

  • water supply is provided through municipal network

  • irrigation of grass field plus supply of toilets and urinals should be done by rainwater cisterns

• water supply of the building:

  • the cisterns are reiciving a well water supply and in reserve a public water supply (use of rainwater)

• the use of rainwater is driven by an own supply network; used for soil irrigation, toilets and urinals

• for urinals stainless steel drains with a slightly flow of water during the operating time should be used

  + less cleaning
  + less problems of smell

1 Design and Construction Concept

1.4 Technical Installations

> **plumbing**

• server and IT-rooms should not have any crossing heating-, water- or waste water-pipes

• piplines out of steel appropriated to pressure stages and the temperature of media should be used

• all pipe systems are equipped with isolation valves, regulatory equipments, mudflaps, drain valves, bleed valves, thermometers, manometers and signages

• considering to economical aspects all piping networks are dimensioned for the different functional ranges

• the maximum preparing speed of water should be flexible projected for the different functional ranges to optimise economical goals

1 Design and Construction Concept

1.4 Technical Installations

> **cooling systems**

• based on low average annual temperature and maximum temperature in summer month of about 14°C, there is no reason for an overall cooling system

• however to maintain comfortable temperature levels in certain rooms, air cooling can to be provided by the air conditioning / mechanical ventilation system

• special rooms like IT, server, transformer and telecommunication rooms need a separated cooling system because of waste heat coming from the technical installations

• the cooling system has to be dimensioned and executed according the cooling load calculations

• utilized refrigerants are to be CFC free

• have to obey manufacturers recommendations

1 Design and Construction Concept

1.4 Technical Installations

> **ventilation systems**

• natural ventilation
the stadium design and facade have to prefer a natural ventilation system, provided by automated or manually controlled window/panel openings in the facade

• mechanical ventilation / air conditioning
is dimensioned on the basis of: functional areas within the building (including media, offices, business areas, changing rooms, fanshop, technical rooms, kitchen, etc.) and their needs for hot / cold / no air treatment, the required air volume quantity, the volumetric flows, the minimum air volume exchange and the outdoor air supply

• the mechanical ventilation includes the air units and the distribution ducts

• the need for smoke extraction in the building is partly provided by the mechanical ventilation, but also ensured by additional after-flow air windows in the facade.

1 Design and Construction Concept

1.4 Technical Installations

> **high voltage and medium voltage systems**

- medium voltage switch gears
  - the energy feeding for the two switch gears need to be provided from 2 separate and independent 10 kV power networks
  - the two switch gears need to be coupled with each other by means of ring lines and automatic changeover units
- transformers
  - 4 transformers each with min. 1000-1.600 kVA need to be considered
    the transformers shall be installed as dry-type transformer with reduced no-load losses
  - by means of radial-flow fans, a short-time overload shall be ensured

1.4 Technical Installations

high voltage and medium voltage systems | emergency lighting system

• the power supply for all rescue indication lights (including those of the tiers) as well as for the power supply for safety lights in the inner escape ways, in the rooms and in the parking lot, a central battery system needs to be used

• the power supply time for the lights needs to have a amount up to 3 hours

• a luminous efficacy of at least 1 lx for the purpose of a dangerous exiting of the stadium interior will be realized by means of lights that need to be connected to the referred batteries

high voltage and medium voltage systems | emergency power generators, diesel- driven UPS systems

• to safeguard the safety power supply in the stadium, the use of diesel-driven UPS systems should be considered

• the systems should be dimensioned to reach an uninterruptible power (UPS) of 1670 kVA and an emergency power of 1100 kVA

• in case of a power failure in the upstream supply network, the system shall be able by means of an energy store to supply 1670 kVA for about 15 s to the UPS bar and to power the connected consumers without any interruption

• to the safety power supply, all safety-relevant consumers such as sprinkler, de-smoking, compressed aeration, fire fighting, fire detector and evacuation systems, lifts, safety lighting for tower galleries and tiers, etc. need to be connected

• furthermore, power consumers that are required for undisturbed events (for example, flood light, stadium sounding system, LED video panels, LED advertising hoardings, consumers for data, press and TV transmission, etc.) need to be fed by the safety power supply, according the specifications of the UEFA guidelines

1.4 Technical Installations

> **low voltage systems | main distributions**

• for the power supply of the stadium, two pieces of low-voltage main distributions need to be considered

• each of the main switch gears needs to be subdivided into separately busbar sections for the general power supply and for the safety power supply

• in case of a possible bar section for the safety power supply, there is an option to feed the system by the diesel generators

1 Design and Construction Concept

1.4 Technical Installations

low voltage systems | sub-distributions

• to ensure the power supply for the individual consumers, sub-distributions need to be installed in all areas of the building

• the sub-distributions need to be installed in separate rooms at each level, according to the load centers and to the power supply areas

• the sub-distributions and control panels to feed the floodlight system need to be arranged circumferentially

• in these control panels the ballasts of the headlamps for the floodlights and the headlamps for the tier lighting need to be arranged in distribution cabinets

• the power supply of the sub-distributions for the kiosks and the control panels for the floodlights need to be ensured via circumferential installed conductor bar at the designated level of the building

• the concession stands and toilets as well as the hospitality lounges need to be planed with separat sub-distributions

low voltage systems | installation units

• installation units shall be used as follows:

  • standard switch and socket assortment in the entire stadium

  • for indoor areas switches and sockets shall be used in-wall, in floor tanks, in cavity walls or in trunking systems

  • sockets that need to be fed from the UPS network according to the use or according to the UEFA guidelines need to be marked with color (for example: red)

  • switches and sockets in the protected outdoor area or in the technical equipment areas need to be realized on-wall with moisture protection

  • commentator and press workplaces at the stands as well as camera locations need to be outfitted with the required number of sockets (on-wall with moisture protection)

low voltage systems | floodlight system

• the floodlight illumination of the playing field will be realized from the roof at a circumferential ring with floodlight lamps with an electrical connection power of 2 kW each

• half of the floodlights shall have the possibility for a hot restart mode

• according to the UEFA guidelines, the floodlight system shall be designed with a vertical luminous efficacy of 2.000 lux

1 Design and Construction Concept

1.4 Technical Installations

> **elevators**

• parameters used for the specification and speed of each lift shall be defined according to the UEFA and stadium operation requirements

• the area of smoke ventilation at top of lift shall not be less than 3.5% of the area of each elevator car in the hoist-way or not less than 0.028sqm, whichever is greater

• elevators in hospitality areas to be designed according to quality (flooring, stainless steel claddings,...)

• requirements for disabled people to be considered

conveying systems

• amount and position depending on architectural design
• to be connected with kitchens and event areas
• required clear opening of door: 1 m
• space for one europallet plus two persons to be provided
• skirting protection all round to be considered

1 Design and Construction Concept

1.4 Technical Installations

> **user specified devices**

• with the use of a communication center as communication platform for integrated voice and data solutions, a service-neutral network for the entire building has to be planned

• via the service-neutral communication network, video, data and voice signals can be transmitted

• for the communication network, main distribution rooms need to be established

• from these rooms, the cross-building redundant connection to the floor distribution locations with multiple twin conductors shall be realized

• the optical waveguide cables need to be planned as hybrid cable with 12 fibers / multimode (OM3) and 12 fibers / monomode

• from the data cabinets and from the data cabinets of the main distribution locations, the communication connection sockets are star-connected using category-7 copper cables

• due to the length restriction of up to 90 meters for copper cables, individual connection points shall get an optical waveguide connection
the entire cabling system has to be planned according to the channel link performance
for the transmission of 10 GB / ethernet / up to 500 MHz

1 Design and Construction Concept

1.4 Technical Installations

> **control systems | safety systems**

• the systems for fire, attack and burglary alarm, the controls for the emergency exit doors, the systems for evacuation announcements, access control, video surveillance and control of elevators are integrated into the alarm management system

• the visualization of the events in the control room enables immediate reaction by security personnel

• the control rooms will be equipped according to international standards and UEFA requirements, they will provide direct sight to the stands and the field

• the components of the access control allow individual access to buildings, functional areas, or rooms

video monitoring system:

• according to the UEFA regulations, a video monitoring system with a permanent monitoring function in the indoor area and the outdoor area of the stadium need to be considered camera systems with the possibility for day and night operation need to be considered

• over optical waveguide connections, the camera pictures can be transmitted to a digital video recording system,which shall be located in the technical equipment room inside the stadium

1 Design and Construction Concept

1.4 Technical Installations

> **control systems | safety systems**

public adress system:

• the public address system has to be installed doubled as public address system and alarm sounder

• the 100V alarm installation has to be planned according to the appropriate Icelandic regulations

• the alarm system shall be coupled via a priority circuit to the public address system for the grandstands, in order to guarantee that an alarm announcement reaches all areas of the venue

• the specification of the speakers shall correspond to the stadium requirements

• the public address system must reliably inform every person in the stadium

• all the loudspeakers shall powered by amplifiers in alternating intervals, so that a failure of the amplifier does not result in the failure of two adjacent loudspeakers

• additionally, an extra a/b cabling shall be envisaged for the 100 volt equipment

• this will effectuate that adjacent loudspeakers will not simultaneously shut-down in the event of supply cable failure

1 Design and Construction Concept

1.4 Technical Installations

> **control systems | safety systems**

television and antenna system:

• for the broadcasting and television reception, a combined antenna system shall be planned that consists of a satellite reception system and a broadband cable network
• for the satellite reception, 2 parabolic reflectors each having a reception system shall be installed
• on principle, the program distribution shall be realized over 75-Ohm coaxial cables but due to the relatively long distances it can be realized over optical waveguide cables instead
• a reverse-channel-suitable broadband cable system with a transmission range from 5 to 862 MHz (of that, reverse channel of 5 to 30 MHz) shall be considered
• in order to support the relevant task forces (police, fire brigade and emergency services) in the eventuality of an occurrence, a building radio system has to be installed in coordination with the fire fighters of the local authorities

turnstiles and access system:

• by the establishment of electronic access control via turnstiles at the inner security rings of the stadium, proper access for the audience within a short time is guaranteed

1 Design and Construction Concept

1.4 Technical Installations

> **control systems | fire alarm system**

• a fire detection system, with the ability to determine the origin of fire outbreak, has to be considered for the stadium
• the fire detection system shall monitor all closed rooms at all levels that are planned to subscribe to the category 1 or greater according to the recognized technical standards
• sanitary areas with smaller fire loads as well as the grand-stands and the official development areas will be excluded from the monitored areas
• a ring bus system shall be envisaged for the fire detection system
• various fire detectors need to be planned for smoke extraction
• each of all the detectors shall be triggered separately within the ring bus system
• in the concessions and other rooms with natural smoke content or vapor, heat differential detectors shall be implemented
• for reasons of security and access for maintenance of the detectors, the monitoring of transformer rooms as well as the middle and low voltage installation rooms shall be monitored by smoke detectors
• the alarm shall sound over the building speaker system (public address system) with the standard alarm tone as well as an automatic speech announcement
• additionally, vocal alarm announcements can be made via the announcement consoles by the security personnel
• the alarm system in the stadium shall be launched in each area consecutively

1 Design and Construction Concept

1.4 Technical Installations

> **green goals**

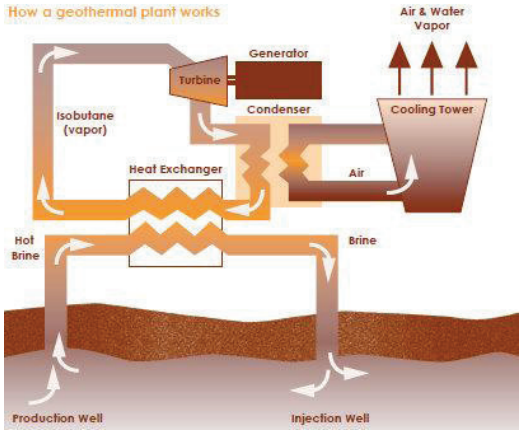
• since FIFA World Cup 2010 in South Africa, the governing bodies in football emphasise ecological compatibility to all building measures

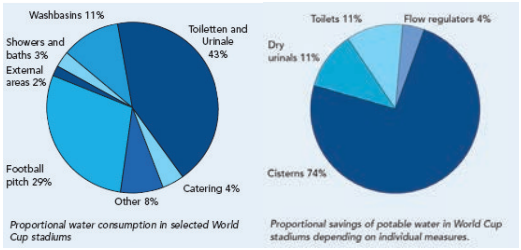
• already in first planning phases its important to define targets which consider the requirements

• the following technical issues are important:

- ecological conscious transport systems:
  - creation of a park and ride system for reducing the individual traffic
  - easily accessibility via public transportation, spectators arriving in low-emission and fuel-efficient vehicles will be entitled to discounted parking
- discourage waste:
  - consequent discourage waste and recycling during building and operating
- energy efficiency
- ecological usage of water

1 Design and Construction Concept





Proportional water consumption in selected World Cup stadiums

Proportional savings of potable water in World Cup stadiums depending on individual measures.

1.4 Technical Installations

> **green goals**

• the following measures are proposed:

- a sustainable site through the reuse of the previous (existing) stadium site
- energieefficiency
- utilisation of water-saving watertaps and toilets
- utilisation of rainwater
- infiltration of rainwater
- utilisation of daylight
- natural heating and cooling
- utilisation of geothermal energy
- utilisation of buildingmanagment systems
- utilisation of local materials and resources

1 Design and Construction Concept

1.5 External Facilities

> **exercise area**

• recommended playing field dimensions:
length: 105m, width: 68m / auxiliary area: 8.5m sides, 10m ends (max., for the circulation)

• playing field quality:
equipped with artificial turf or natural grass with efficient watering system, underground heating system to prevent it from freezing in winter, as well as and appropriate drainage

• access to the training area:
ensured for emergency, ambulance and fire engine vehicles

• substitutes', coach, team medical benches:
situated on either side, parallel to the touch line, at a distance of 5m from the playing field, while protected by transparent plexiglas shell against weather or thrown objects

• advertising boards (if proposed):
blind-side boards of 0.70m are typically erected 5m beyond the touch lines and goal lines of the training pitch

• illumination
is provided by columns at the corners and sides of the training field, 25m high, average luminance level of 350 lux (UEFA standard for non-boradcast matches)

• safety fences / ball nets:
shall be erected behind the goal gates as well between the car-park area and the training field as a safety measure

1.5 External Facilities

> **paved areas**

• main circulation routes:
insitu concrete slabs (5x5m slabs) or concrete blocks (0,2x0,2m) should be colour matched with material finishes of adjacent concourse paving.

• concourse areas under the bowl:
insitu cast concrete floor finishes allow for easy maintenance as well as aesthetic clean look.

• parking areas:
conventional non-permeable asphalt and concrete pavement offer low cost and maintenance solution.
permeable surface materials such as porous concrete, porous asphalt, interlocking concrete pavements or resin-bound paving (a mixture of aggregate stones and resin) should be considered to reduce runoff, effectively trap suspended solids and filters pollutants from the water.

• recommended surface slope for all paved areas is 2% to allow for smooth water drain into the drainage system, moreover the drainage needs to be designed according to the technical attributes of each paved area.

1 Design and Construction Concept

1.5 External Facilities

> **building structures**

• temporary ticket clearing points
portable modular steel containers (ticket booths) with electronic access control system (EACS), should be clearly sign-posted with directional signage and located in front or next to the entrance areas

• temporary concessions
18m^2 per concession, lightweight, modular-type structures (steel framing with prefabricated lightweight wall, roof and floor elements).
should comply with the food & beverage as well as merchandising distribution requirements of the stadium.

• storage for greenkeeping
a warehouse building meant for equipment storage of the stadium greenkeeper.
the structure is designed according to the greenkeepers requirements, while must comply with the standards for storing tools, machines and biological/chemical fertilizers.

• bicycle stands (sheltered or without coverage)
should be conveniently located, secure, easy to use, adequately lit, vandal-proof, well signed and preferably sheltered.
preferred system would be rail or guard rail, with stand ends secured to the ground, forming a ‘toast rack’.

1 Design and Construction Concept

1.5 External Facilities

> **technical installations**

• external lightning
facade lighting - uplight wall washers, inground floodlight
street / plaza lighting - street columns with adjustable number or projectors or single/double head road columns , light bollards.
incorporated LED lighting - in handrails and street furniture.
wall mounted lighting - projectors with flood optics

• external security turnstiles
the full height turnstiles are an ideal solution to control access through a specific entrance or exit and should be considered to securely separate the stadium visitors.
can be linked to any access control system - electronic access control system (EACS), token system, coin fee paid entry system or any other external operating device.

• light signage
brand logos - on the facade or ground signs, car park signs, directional signs - tickets, hospitality entrance etc.

• access barriers
to provide sufficient control of movement, access barriers to car parking, security, hospitality areas must be considered.
latch barriers - for pass cards, key fobs, long range readers or equipped with pin pads.
automatic bollards - impact resistant for maximum security, to allow road access to authorised vehicle only.
mobile fence installations - to ensure on-demand separation of specific areas.

1 Design and Construction Concept

1.5 External Facilities

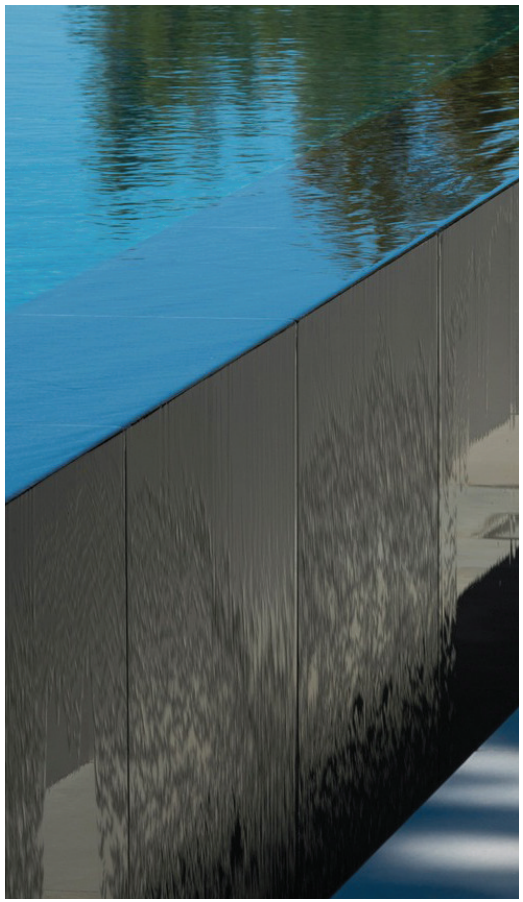
> **fittings**

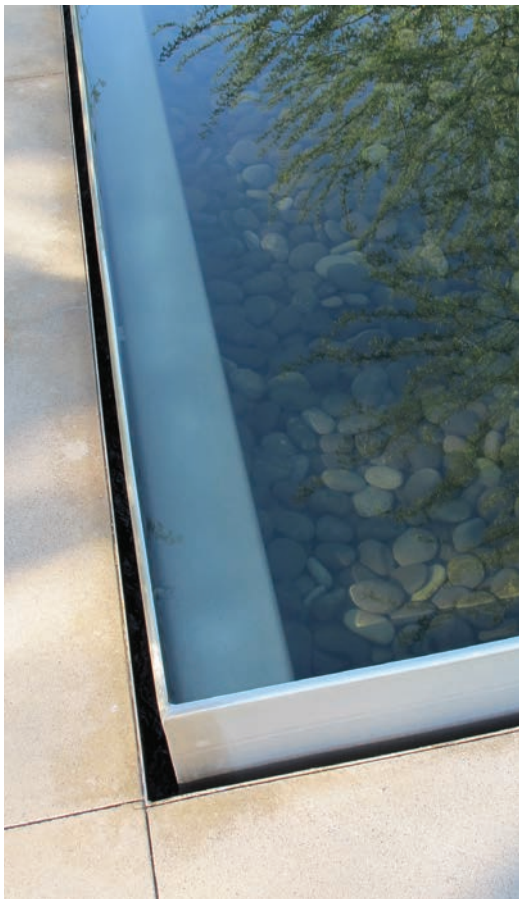
• street furniture such as benches, stools, picnic tables with seating, litter bins or seat-walls.
used materials can vary according to the landscape concept, however the preference should focus on weather resistant, durable options like reinforced cast stone with acid-etched and polished finishes or zinc plated steel with powder coated finishes

• static bollards and border-like elements can be incorporated to create separations within the landscaping/street design.
used materials according to the landscape concept.

• tree grilles and integrated tree pits
are to be integrated flush with the street paving.
material solution of the grilles could be zinc plated steel while the finish material of the integrated tree pits should match that of the street pavement.

1 Design and Construction Concept





1.5 External Facilities

> **water features**

• for more variety of the public space around the stadium different types of water features can be introduced, these can be:

• reflecting pools - often as formal, geometric shapes with walking surfaces that overhang their edges all around, this decorative water feature reflects the surroundings in the glassy surface of the water

• water gardens - living organic water features,full of aquatic plant life, vibrant colours and textures. local picked plants, inside / outside the perimeter create a lush natural setting

• fountains - available in almost limitless variety of shapes and sizes, should be considered in the design as the primary landscape connection element with the Iceland nature as it resembles the iconic water geysers

• waterfalls - made as a cascade or erected wall can be a visual and acoustic attention point

• streams - are flowing into ponds while ideal for meandering along paths or walkways, these streams are a natural filter helping to sustain the entire ecosystem of the overall water feature design

1.5 External Facilities

> **planting / crop areas**

• lawns and grasses
lawn grass type must be suitable for the local climate conditions as well as the design intended, like creating a larger recreational area or just a green strip/checker-board islands in the pavement

• ornamental grass
have great variety in height and colour which makes them suitable to be used as natural screens or ground cover. ornamental grass add flair and seasonality to the landscape, provide year-round interest, while keep low maintenance by being drought tolerant as well as easy and fast to grow

• native plants / crop plants
are better-adapted to tough conditions, such as tolerating extreme weather or thriving with less water, they evolve with the local fauna which makes them ideal to attract more life into the landscape, besides they flower / berry at the appropriate year season

• landscape trees
are an important part of landscaping, greatly improve the appearance, whether planted separately or in a group of certain variety
trees create shady spots perfect for benches or tables, they block winds and add privacy, while also other factors need to be considered carefully, like tree type (some drop debris), mature size (can block views) or proper tree placement (surface roots can destroy paving)

1 Design and Construction Concept

materials

1 ceiling
off-shutter concrete, primed, painted, colour according to later architectural colour concept

2 walls
2a columns and structure: off-shutter concrete or painted
2b walls: plastered, painted, colour: according to later architectural colour concept
2c glass: colourless
2d doors and frames: coated, colour: according to later architectural colour concept
2e counter: stainless steel, hairlined

3 floor
epoxy coated,
colour: according to later architectural colour concept

1.6 Furnishing and Art

> **general equipment | public concourses**

• the great public concourses are the primary interior space for regular spectators

• from here all regular spectators enter the stands of the bowl

• during half-time pauses and before and after an event the concourses will be the primary spaces of encounter and recreation

• they are equipped with concession stands and service facilties

1 Design and Construction Concept

materials

1 ceiling
off-shutter concrete, primed, painted, colour according to later architectural colour concept
2 walls
2a columns and structure: off-shutter concrete or painted
2b walls: plastered, painted, colour: according to later architectural colour concept
2c glass: colourless
2d doors and frames: coated, colour: according to later architectural colour concept
2e counter: stainless steel, hairlined

3 floor
epoxy coated,
colour: according to later architectural colour concept

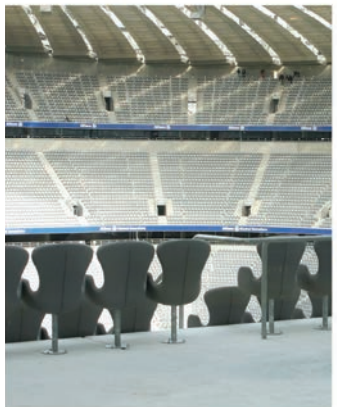
1.6 Furnishing and Art

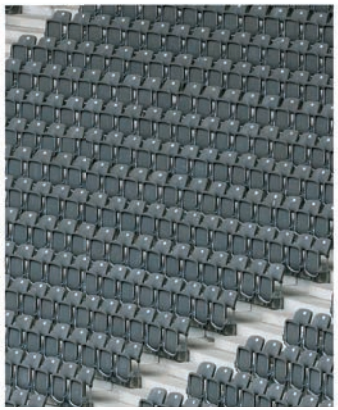
> **general equipment | concession stands**

• concession stands will be serving food and beverages to the general spectators in the grand encounter-areas of the public concourses

• they can be opened up on event days with a robust yet welcoming shop-counter and be closed to their integrity on non usage days with a rollershutter system that guarantees optimal protection against theft and vandalism for the facilities inside and for the people outside in the public concourses in case of fire

1 Design and Construction Concept





1.6 Furnishing and Art

> **general equipment | seats & bowl**

• the seats of the bowl will be of different character in use and convenience, derived from the varying needs of their future users, them being regular spectators, hospitality guests or members of the press

• this diversity will be interconnected by the use of colour which can either decidely stay in the back of perception with little saturated colours or bring energy into the space of the bowl by using bright, strongly saturated primary colours

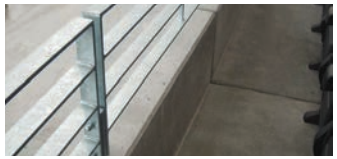
primary elements of the bowl:

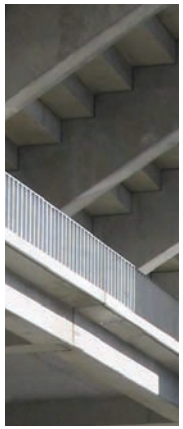
• all visible elements of the bowl construction - the balustrades, the sittung steps,the walking steps and the vomitories-will be fabricated out of off shutter

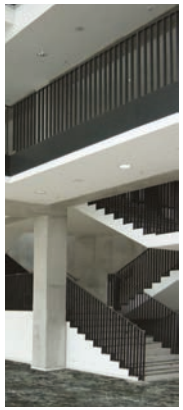
seats:

• equipped with seat and row number
• weatherproof
• fire resistant according to local regulations
• removable cover for weather protection
• all metal to be corrosion resistend

1 Design and Construction Concept








1.6 Furnishing and Art

> **general equipment | handrales & balustrades**

• all handrails and balustrades in the bowl should be as unobstractive to sightlines and perception as possible

• therefore all linear elements should not establish additional directions which would distract the eye

materials

1 ceiling
suspended plasterboard, painted,
colour: acc. to later architectural colour concept

2 walls
2a non-splashback walls: plastered, painted,
colour: acc. to later architectural colour concept
2b cubicle seperation system: colour: acc. to later architectural colour concept
2c splashback walls: tiled, acc. to later architectural materials concept, fullbody porcelain tile,
colour: acc. to later architectural colour concept
2d accessories: hairlined metall
2e all sanitary ware: ceramic, colour: acc. to later architectural colour concept

3 floor
tiled, acc. to later architectural materials concept,
fullbody porcelain tile,
colour: acc. to later architectural colour concept

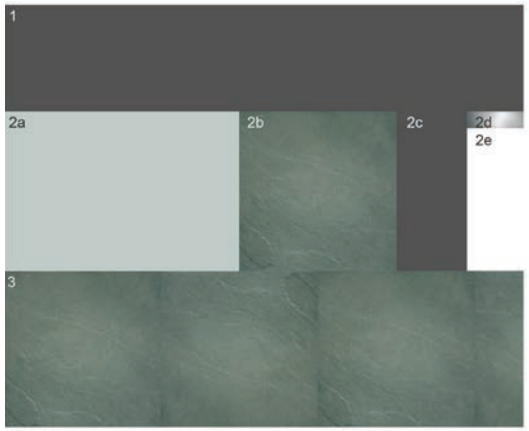
1.6 Furnishing and Art

> **general equipment | sanitary facilities**

• all concourse areas are furnished with international standard sanitary facilities pleasing to the eye, robust in use

• this includes an appropriate number of toilets for spectators (male, female, children, handicapped people, etc.)

1 Design and Construction Concept



materials

1 ceiling
suspended plasterboard, painted,
colour: according to later architectural colour concept

2 walls
2a non-splashback walls: plastered, painted,
colour: according to later architectural colour concept
2b splashback walls: equivalent to tiled,
colour: according to later architectural colour concept
2c doors and door frames: coated,
colour:according to later architectural colour concept
2d accessories: hairlined metall
2e all sanitary ware: ceramic

3 floor
tiled, acc. to later architectural materials concept,
fullbody porcelain tile,
colour: acc. to later architectural colour concept

1.6 Furnishing and Art

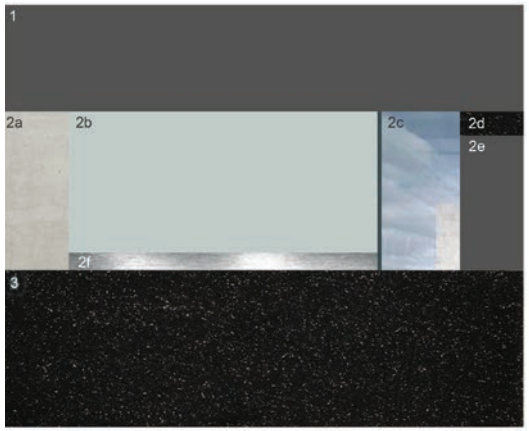
> **general equipment | athletes area**

• cloakrooms and sanitary areas for the players areas are located on both sides of the mixed zone

• they can be accessed via a dedicated separate entrance, so that the athletes are free to decide weather they want to meet with the press or not when entering or leaving the building

• all teams have their private showers, toilets and washing areas plus therapeutical massage and treatment zones

1 Design and Construction Concept



materials

1	ceiling suspended plasterboard, painted, colour: according to later architectural colour concept
2	walls
2a	columns: off shutter concrete or painted
2b	walls: equivalent to tinted plaster, polished, waxed, colour: according to later architectural colour concept
2c	frames: coated, colour: according to later architectural colour concept glass: colourless
2d	furniture, horizontal surfaces: equivalent to **natural stone**
2e	furniture, vertical surfaces: coated, colour: according to later architectural colour concept
2f	skirting: brushed satin stainless steel , shadow gap above 15mm
3	floor **natural stone tiles**, according to later architectutral materials concept

1.6 Furnishing and Art

> **event floors | foyers hospitality**

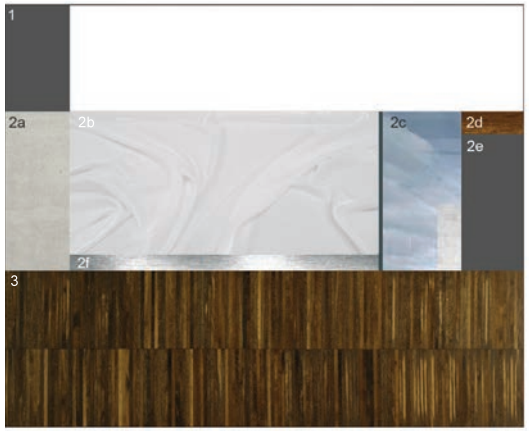
• Business Club visitors, Family & Friends and Skybox guests enter the building via their dedicated foyers

• the foyer areas are the first impression of the interior areas

• should be spaces of class and quality

• visitors welcomed by stewards, could be guided to their designated seats indivually if desired

1 Design and Construction Concept



materials

1 ceiling
suspended plasterboard, painted,
colour: according to later architectural colour concept

2 walls
2a columns: off-shutter concrete or painted
2b walls: equivalent to tinted plaster, polished, waxed,
colour: according to later architectural colour concept
or shimmering textile, colour: according to later architectural colour concept
2c frames: coated, colour: according to later architectural colour concept
glass: colourless
2d furniture, horizontal surfaces: equivalent to wooden parquet
2e furniture, vertical surfaces: coated, colour: according to later architectural colour concept
2f skirting: brushed satin stainless steel , shadow gap above 15mm

3 floor
wooden parquet

1.6 Furnishing and Art

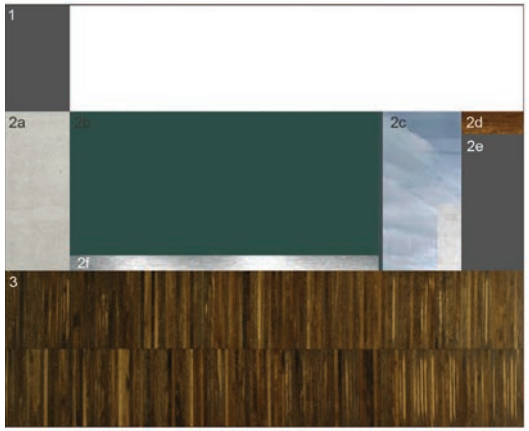
> **event floors | business club area**

• the Business Club and Family & Friends areas could be designed in a similar way, however, clearly differentiated in style, equipment and quality according to respective hospitality hierarchy level

• they differ in user groups so they intend to create a generous variety of festive spaces ranging from more intimate situations to wide open, rather public spaces thus reflecting the various forms of encouter and communication

• the chosen materials intend to create a timeless and prestigious atmosphere of international elegance

1 Design and Construction Concept



materials

1 ceiling
suspended plasterboard, painted,
colour: according to later architectural colour concept

2 walls
2a columns: off-shutter concrete or painted
2b walls: equivalent to tinted plaster, polished, waxed,
colour: according to later architectural colour concept
2c frames: coated, colour: according to later architectural colour concept
glass: colourless
2d furniture, horizontal surfaces: equivalent to wooden parquet
2e furniture, vertical surfaces: coated, colour: according to later
architectural colour concept
2f skirting: brushed satin stainless steel , shadow gap above 15mm

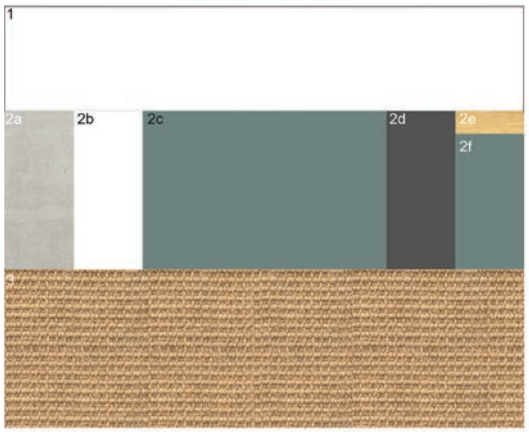
3 floor
wooden parquet

1.6 Furnishing and Art

> **event floors | Skyboxes**

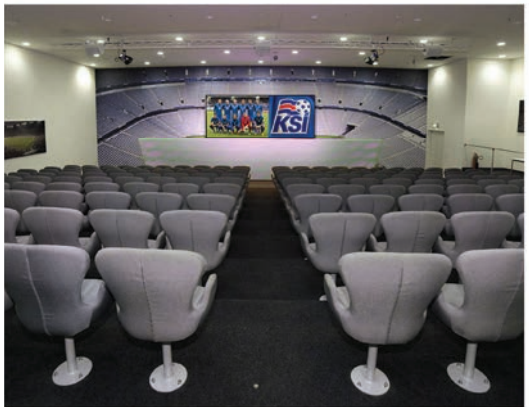
• all Skyboxes are furnished with adequat facilties to serve dinners or drinks only in a private, yet festive athmosphere, granting the optimal view onto the pitch in a central position of the stand

1 Design and Construction Concept



materials

1	ceiling suspended plasterboard, painted, colour: according to later architectural colour concept
2	walls
2a	columns: off shutter concrete or painted
2b	furniture: colour: according to later architectural colour concept
2c	walls: equivalent to tinted plaster, polished, waxed, colour: according to later architectural colour concept
2d	doors and door frames: coated, colour: according to later archilectural colour concept
2e	built-in furniture, horizontal surfaces: same colour as flooring
2f	build-in furniture, vertical surfaces: coated
3	floor sisal carpet or equivalent



1.6 Furnishing and Art

> **entertainment and special equipment | press conference**

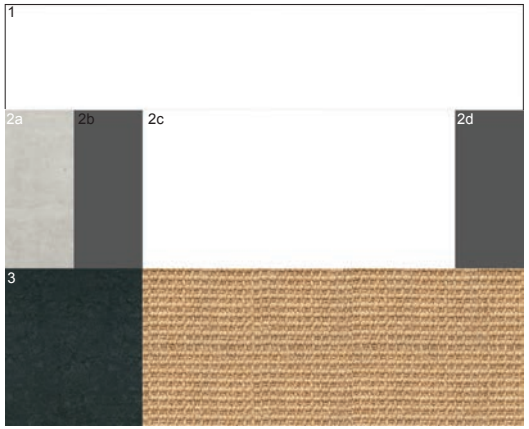
• the major ambition for the design of a press conference room should be the creation of a space that :

• is the least visible on a TV image

• leaves all focus on the faces of the staged participants

• grants optimal accoustics and a maximized visibilty for all attenting journalists

1 Design and Construction Concept

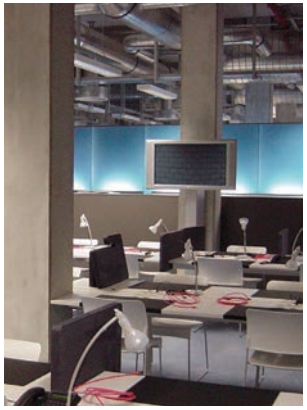


materials

1 ceiling
suspended plasterboard, painted,
colour: according to later architectural colour concept

2 walls
2a columns: off-shutter concrete or painted
2b doors and door frames: coated, colour: according to later architectural colour concept
2c walls: plastered, painted, colour: according to later architectural colour concept
2d furniture offices: coated, colour: according to later architectural colour concept

3 floor
circulation: equivalent to marmoleum, topshield, sheeted, colour "volcanic ash"
offices: equivalent to sisal carpet, wheat beige



1.6 Furnishing and Art

> **entertainment and special equipment | TV studios**

• working spaces such as TV studios, telecommunication zones etc. plus regular offices for the local and global press are provided adjacent to the press lounge and conference areas

• the choice of colour and material will be driven by the intention to grant a pleasant and harmonious athmosphere for concentrated work as well as dedicated KSI image




1.6 Furnishing and Art

> **art installations**

- playing with light and structures referring to local natural phenomena, such as northern lights
- position and size in consultation with the artist
- sustainability and feasibility have to be taken into account in an early design stage
- furnishing and art will normally be added towards the end of construction




1.6 Furnishing and Art

> **artistic features of the building and outdoor facilities**

• the unique qualities of the New National Stadium Reykjavik are contained within its identity. creating an identity is a careful design process in which the designers and stakeholders must communicate to find a design solution which accommodates the requirements of the parties involved. the key questions that the design team should be asking include:

- should the stadium become a landmark?
- how should the stadium represent the local culture?
- do the stakeholders have preliminary ideas with regard to the aesthetical qualities of the proposed stadium?
- who is the main tenant vs. neutral usage?

• several recent stadium projects have not only become landmarks, but have also become symbols through which their respective cities are identified

• the goal of the design stage is to produce drawings and visualisations which illustrate the character of the stadium; tuning a vision into a possible concept is not necessarily a difficult process; however, determing which concept fits best to the situation and solves specific problems can be challenging

• the character develops through the overall form and exterior appearance of the stadium and is generally based on aesthetical qualities and structural feasibility

1 Design and Construction Concept




1.6 Furnishing and Art

• in design, like all creative processes, laying all ideas “out on the table” is an important step. this can assist in ruling out certain schemes, leading to a clear design direction

• Think creative! to design means to create the stadium developed to individual situations and factors

• to develop a philosophy or an emotional image that is the basis for the New National Stadium Reykjavik design

• this signature will define the stadium to the fans, players, the local community and in the media

• Examples: already built projects in Beijing and Manaus

1 Design and Construction Concept

1.7 Appendix

UEFA evaluation of Laugardalsvöllur Stadium Reykjavík (current situation) | 15.11.2016

summary of requirements for an UEFA category 4 stadium	existing
rooms for players and officials	
• 1 dressing room for each team (minimum of 5 showers, 3 toilets, 25 seats, 1 massage table)	X
• 1 dressing room for referees (at least 20 m², minimum of 2 showers, 1 toilet, 6 seats, table)	X
• 1 UEFA delegate´s room (easy access to dressing rooms)	-
• 1 First aid room for players and officials	X
• 1 doping control station + waiting room (at least 20 m², next to dressing rooms)	X
rooms for stadium security	
• 1 stadium control room (good overview of the inside, communication facilities)	X
• 1 First aid station for spectators in each sector	-
rooms for media	
• 1 media working area (at least 200 m², for a minimum of 75 media representatives, dedicated	X
space for at least 25 photographers)	-
• 1 press conference room (minimum of 75 seats, camera platform, podium, desk,...)	X
• 1 mixed zone for at least 50 media representatives (roof covered)	X
• 2 TV studios (5 x 5 x 2,3m, at least one with pitch view)	X
• 4 flash interview positions (each 2,5 x 2,5m)	X
• 1 platform for main camera (on main stand, at least 10 m², middle of stand)	X
stands and spectator facilities	
• temporary stands prohibited	X
• standing accommodation prohibited	
• refreshment and catering facilities in every sector	-
• sanitary facilities: 80:20 ratio,1 toilet per 250 males, 1 urinal per 125 males, 1 toilet per 125 females	X
• 0,5 to 1 % of capacity required for disabled people (wheelchair, FIFA calculation)	-
• at least 5% of capacity required for visiting supporters (1000 seats, segregated area)	
• at least 500 VIP seats on grandstand (100 reserved for visiting team, roof covered)	-
• 1 hospitality area (at least 400 m², located close to VIP seats)	X
• 100 seats for media representatives (50 with desks, roof covered, middle of grandstand)	-

1 Design and Construction Concept

1.7 Appendix

UEFA evaluation of Laugardalsvöllur Stadium Reykjavík (current situation) | 15.11.2016

summary of requirements for an UEFA category 4 stadium	existing
• at least 25 TV and radio commentary positions (each 3 seats, roof covered, middle of	-
main stand)	
parking areas	
• minimum of 2 busses, 10 cars for teams and officials (located in a safe and secure area)	X
• minimum of 150 VIP parking spaces (located in a safe and secure area)	-
• about 3000 parking spaces (FIFA calculation)	-
• at least 1000 m² for broadcasting compound (van area, close to grand stand)	-
flagpoles	
• minimum of 5	X
substitutes benches	
• 2 covered benches at pitch level, each with at least 13 seats	X

1 Design and Construction Concept

	UEFA 4		lagardère sports recommendations				pde recommendations			existing main stand			proposal stadium Island		
subject	amount	room size / unit in sqm (net square footage)	people / room / area	number of rooms / units	room size / unit in sqm (net square footage)	total area in sqm	number of rooms / units	room size / unit in sqm (net square footage)	total area in sqm	number of rooms / units	room size / unit in sqm (net square footage)	total area in sqm	number of rooms / units	room size / unit in sqm (net square footage)	total area in sqm
floodlight	a minimum average illuminance of 1400 (lux) towards host camera positions, an independent backup power supply able to provide 800 (Lux) must be available														
pitch	1	105x68 / 125x85		1	105x68 / 125x85			105x68/ 125x85			105x68		105x68 / 125x85		
1. spectators area															
capacities															
spectators overall, Net capacities	8.000			20.000									20000		
seats	8.000			20.000									20000		
standing places	not allowed														
places for people with disabilities	0,5%			100			100			20			100		
guests	5%						1000						1000		
roofed places	ns	ns		20.000									20000		
sanitary facilities (20:80 uefa ratio)															
ladies															
ladies' toilet	32	ns					32	300	300	20	112	112	32	300	300
basins ladies	ns	ns					16						16		
men															
mens' toilet	64	ns					64	550	550	9	88	88	64	550	550
urinal	128	ns					128			20			128		
basins men	ns	ns					64						64		
people with disabilities															
toilets	ns	ns					7	50	50	2	14,3	14,3	7	50	50
basins	ns	ns					7			2			7		
medical facilities															
first-aid and rescue service	4	ns		4			4	20	80	1	9,59	9,59	4	20	80
overall spectators area												223,89			980

2. sports area															
team area general															
warm-up area	ns	ns		2	100	200							2	100	200
washroom kit manager	ns	ns					1	10	10				1	10	10
storage training material	ns	ns					1	20	20				1	20	20
storage kit manager - jerseys	ns	ns		1	ns	0	1	60	60	1	85,52	85,52	1	60	60
storage football boots	ns	ns		1	ns	0	1	10	10				1	10	10
storage balls	ns	ns		1	ns	0	1	15	15				1	15	15
storage beverages	ns	ns		1	ns	0	1	10	10				1	10	10
cleaning room	ns	ns					1	10	10				1	10	10
laundry	ns	ns		1	ns	0							1	25	25
overall team area general												85,52			360
home team															
dressing room	1	25 seats	25	1	80	80	1	60	60	2	21,3	42,6	1	60	60
sanitary facilities - toilets & showers	ns	5 showers, 3 toilets		1	50	50	1	40	40	1	24,5	24,5	1	40	40
massage area / physiotherapy room	1	1 table		1	40	40	1	20	20				1	20	20
trainer 1 - dressing room incl. sanitary facilities	ns	ns	1	1	30	30	1	20	20	1	20,86	20,86	1	20	20
revitalizing pool	ns	ns	1		ns								1	10	10
visiting team															
dressing room	1	25 seats	25	1	80	80	1	60	60	2	21,3	42,6	1	60	60
sanitary facilities - toilets & showers	ns	5 showers, 3 toilets		1	50	50	1	40	40	1	24,5	24,5	1	40	40
massage area / physiotherapy room	1	1 table		1	40	40	1	20	20				1	20	20
trainer 2 - dressing room incl. sanitary facilities	ns	ns	1	1	30	30	1	20	20				1	20	20
revitalizing pool	ns	ns	1		ns								1	10	10

1.7 Appendix

> **room book New National Stadium Reykjavik**

• including UEFA requirements as well as Lagadère Sports recommendations

overall area home + visiting team		ns										**155,06**				**300**
further areas teams & officials																
medical room players	ns	ns								1	12,19	12,19				
first aid players & officials	1	ns		1	50	50	1	30	30	1	12,27	12,27	1	30	30	
ball boy	ns	ns					2	25	50				2	25	50	
referee 1 incl. sanitary facilities	1	20	4	1	24	24	1	20	20	1	20,86	20,86	1	20	20	
UEFA delegate's room	1	ns					1	10	10				1	10	10	
greenkeeper (incl. sanitary facilities)	ns	ns					1	25	25	1	33	33	1	25	25	
overall further areas teams & officials												**78,32**				**135**
doping control																
treatment room	1	20		1	20	20	1	20	20	1	7,74	7,74	1	20	20	
waiting room	1	ns	8	1	8	8	1	8	8	1	5,75	5,75	1	8	8	
sanitary facilities	1	ns		1	8	8	1	5	5				1	5	5	
overall doping control												**13,49**				**33**
overall sports area												**332,39**				**828**

3. hospitality																
hospitality area	1	400								1	704	704				
storage	ns	ns								1	10,88	10,88				
vip seats	ns	500 seats														
vip entry area	ns	ns	1	ns	ns		1	50	50				1	50	50	
sky boxes	ns	ns	192	13	53	689							13	53	689	
sky boxes seats	ns	ns	192										192			
business club seats	ns	ns	150										150			
family & friends seats	ns	ns	300										300			
overall hospitality area												**714,88**				**739**

4. catering																
general areas																
main kitchen	ns	ns		1	150	150					133,27	133,27	1	150	150	
scullery	ns	ns		1	50	50							1	50	50	
main refrigerator area	ns	ns		1	100	100							1	100	100	
storerooms (food & beverages)	ns	ns		2	150	300							2	150	300	
central storage area	ns	ns		1	200	200				1	9,63	9,63	1	200	200	
storage temporary concessions	ns	ns		2	50	100							2	50	100	
uniform room staff	ns	ns		2	25	50							2	25	50	
money / security room staff	ns	ns		1	20	20							1	20	20	
staff / event accounting room	ns	ns		1	40	40							1	40	40	
office & administration space	ns	ns		1	40	40							1	40	40	
office delivery	ns	ns		3	20	60							3	20	60	
sanitary units delivery	ns	ns		2	30	60							2	30	60	
accreditation area	ns	ns		1	10	10							1	10	10	
waste (wet / dry)	ns	ns					1	75	75				1	75	75	
staffroom	ns	ns					1	100	100				1	100	100	
staff dressing room	ns	ns					2	30	60				2	30	60	
overall general catering area												**142,9**				**1415**
spectators catering																
permanent concessions	ns	ns	10m length	5	60	300				1	72,06	72,06	5	60	300	
mobile stands	ns	ns	2m length	20	4	80							20	4	80	
temporary concessions	ns	ns	4m length	26	18	468							26	18	468	
fan restaurant	ns	ns		1	300	300							1	300	300	
overall spectators catering												**72,06**				**1148**
hospitality catering																
serving counter food sky boxes	ns	ns		1/box	2,5m bar length											
serving counter beverages sky boxes	ns	ns														
serving area sky boxes	ns	ns														
live front cooking sky boxes	ns	ns		1 per 50 guests	3-4m cooking island											

1.7 Appendix

> **room book New National Stadium Reykjavik**

• including UEFA requirements as well as Lagadère Sports recommendations

1 Design and Construction Concept

serving counter food business club	ns	ns		1 per 150 guests	3-4m bar length											
serving counter beverages business club	ns	ns														
serving area business club	ns	ns														
live front cooking business club	ns	ns		1 per 50 guests	3-4m cooking island											
serving counter food family & friends	ns	ns		1 per 150 guests	3-4m bar length											
serving counter beverages family & friends	ns	ns														
serving area family & friends	ns	ns														
food stations / buffets / meet&greet bar family & friends	ns	ns		1 per 50 guests	3-4m length											
storage hospitality	ns	ns		15sqm per cooking station/serving area												
interior space sky boxes (in front)	ns	ns					1	200	200				1	200	200	
interior space business club	ns	ns		2	150	300							2	150	300	
interior space family & friends	ns	ns		1,5	300	450							1,5	300	450	
overall hospitality catering															950	
overall catering area												214,96			3513	

5. press & media																
accreditation							1	20	20	1	65,13	65,13	1	20	20	
press and media stand	100 seats	50 seats with desk	200 100 seats with desks	200	1 seat 60cm width, 90cm depth, 75cm height		100 50 seats with desk						100 50 seats with desk			
media conference	1	ns	100 seats	1	200	200				1	57,71	57,71	1	200	200	
media working area (press working)	75 seats	200	75 seats	1	150	150	1	200	200	2	63,09	126,18	1	200	200	
sanitary facilities media	ns	ns		1	ns		2	15	30	1	42,1	42,1	2	15	30	
storage media	ns	ns		1	ns		1	40	40	1	38,32	38,32	1	40	40	
TV studio	1	25		1	ns					2	12	24	1	25	25	
presenter TV studio (view to the pitch)	1	25		1	ns								1	25	25	
mask room	ns	ns		1	20	20							1	20	20	
main camera platform	1	10											1	10	10	
flash interview positions	4	6,25											4	6,25	25	
mixed-zone (incl. sanitary facilities)	50	ns		1	200	200	1	100	100	1	661,86	661,86	1	100	100	
commentary positions	25 (75 seats)	ns								4	10,77	43,08	25 (75 seats)		0	
overall press area												1058,38			695	

6. miscellaneous rooms																
agency ksi / operating company																
operating company	ns	ns		1	800											
offices presidium, directors	ns	ns								1	25,08	25,08	1	25,08	25,08	
single offices	ns	ns								8	14,5	116	8	14,5	116	
double offices	ns	ns								1	25,08	25,08	1	25,08	25,08	
further office areas	ns	ns								1	308	308	1	308	308	
meeting rooms	ns	ns								2	20,67	41,34	2	20,67	41,34	
kitchen	ns	ns								1	29,85	29,85	1	29,85	29,85	
copy and storage rooms	ns	ns								1	30,86	30,86	1	30,86	30,86	
sanitary facilities	ns	ns								1	11,4	11,4	1	11,4	11,4	
restaurant	ns	ns								1	64,67	64,67	1	64,67	64,67	
overall agency ksi		ns										652,28			652,28	
fan facilities																
fan shop	ns	ns		1	ns		1	100	100				1	100	100	
museum	ns	ns		1	300								1	300	300	
sanitary facilities	ns	ns					2	15					2	15	30	
ticket center	ns	ns					2	20	40	2	20,36	40,72	2	20	40	

1.7 Appendix

> **room book New National Stadium Reykjavik**

• including UEFA requirements as well as Lagadère Sports recommendations

overall fan facilities												40,72			470
overall miscellaneous rooms												693			1122,28
7. stadium operation / security															
stadium control room	1	ns		1	ns		1	45	45	1	11,43	11,43	1	45	45
meeting room stadium control	ns	ns		1	20	20							1	20	20
arrest rooms	ns	ns		3	ns		3	15	45				3	15	45
temporary staff assembly areas (security...)	ns	ns		1	ns		1	150	150				1	150	150
stadium announcer / central speaker	ns	ns		1	ns		1	10	10	1	10,06	10,06	1	10	10
overall stadium operation / security												21,49			270
8. parking & exteriors															
stadium parking areas															
coach parking	2	ns								1			2		
car parking teams & officials	10	ns											10		
car parking press	ns	ns		1 for 4 press staff											
car parking vip	150	ns													
car parking sky boxes	ns	ns		1 for 2 tickets (6 per 12 seater box)											
car parking business club	ns	ns		1 for 2 tickets											
car parking family & friends	ns	ns		1 for 2 tickets											
car parking for people with disabilities	ns	ns								10			20		
spectators parking (acc. to fifa calculations)	ns	ns					3000			950					
broadcasting compound	1	1000											1	1000	
exteriors															
training pitch	ns	ns					1								
fuel storage	ns	ns					1								
fertilizer storage	ns	ns					1								
delivery area (catering/hospitality)	ns	ns		1	300	300							1	300	
storage vehicles	ns	ns					1	100	100				1	100	100
storage technical equipment	ns	ns					1	200	200				1	200	200
overall parking & exteriors												0			300
9. MEP	ns	ns					2	300	600	1	346,5	346,5	2	300	600
10. rental spaces	ns	ns				600							1	600	600
11. circulation area	ns	ns					1	1600	1600	1	1628,1	1628,1	1	1600	1600
OVERALL											existing	5234		needed	11247

1.7 Appendix

> **room book New National Stadium Reykjavik**

• including UEFA requirements as well as Lagadère Sports recommendations

2 Project Organization and Management

The purpose of the following chapters is to guide the project owner with regards to project organization, potential procurement approach and programs (both design/construction as well as operations/commercialization) for the planned New National Stadium Reykjavik. The following three key topics are described and discussed:

SECTION 1

As a start the recommended potential development/implementation route and procurement strategy will be outlined (Design/Build and Operations/Commercialization Contract).

SECTION 2

This chapter outlines the overall project organization for the New National Stadium Reykjavik and will define roles and responsibilities as well as reporting channels.

SECTION 3

Finally, the impact on timing considering the explored development/implementation route as well as considering the integration of design/construction as well as operations/commercialization tasks into the overall development scheme is explored.

It must be emphasized that the project delivery and procurement strategy decision needs to be made at the earliest stage possible.

DESIGN/BUILD PROCUREMENT

Independent from the procurement direction, a list of potential bidders is required first. A comprehensive and lengthy pre-qualification process is in our opinion not required, however, the relevant contractor's capability, current workload, experience, capacity and future commitment to the project has to be established.

A list of 5 – 8 potential bidders should be determined, based on the working experience of the relevant stakeholders in Iceland together with local contractors and market-knowledge of the project team. The potential bidders must have design and construction know-how. The outcome shall result in a suitable tender short list of qualified companies best positioned to deliver the project requirements.

The enclosed report by Lagardère Sports, together with the context of previous project stages Pre-Feasibility and Planning, includes the main project specifications, and preliminary layout drawings. The document establishes the employer's requirements for the planned New National Stadium Reykjavik and forms the basis for the upcoming design development.

2.1 Procurement Strategy

It enables the pursue of the design – build delivery method (according to FIDIC yellow book), which reduces the overall project delivery time until completion, in comparison to the traditional Design – Bid – Build Approach.

Under the traditional Design – Bid – Build delivery method, design and construction services are split into separate entities, separate contracts and separate work packages. The employer has to manage at least two contractual relationships, most of the time even a large and confusing number of them, across three main sequential phases: the design phase, bidding (or tender) phase and construction phase. The employer's awarded architects/engineers will undertake the majority of the design work first and the later awarded contractor will become responsible for carrying out construction works (implementation). During the design phase the owner retains architects/engineers to design and produce bid documents, including construction drawings and technical specifications on which various general contractors will in turn bid to construct the project. The award of the contractor is based on comprehensive tender documentation. The traditional lump sum method/contract adopts a contract sum and a contractually agreed sum of building costs is determined prior to construction commencing.

2 Project Organization and Management

2.1 Procurement Strategy

The main disadvantages of using a traditional approach to procurement are as follows:

• can be a lengthy process to produce full contract documentation with late start on site. Tender documents from an incomplete design can be produced but can lead to less cost and time certainty, and may lead to disputes.

• overall project duration may be longer than other procurement methods as the strategy is sequential and construction cannot be commenced prior to the completion of the design; and the bidding process.

• no input into the design or planning of the project by the contractor as they are not appointed during the design stage.

With the **Design – Build Approach** (according to FIDIC yellow book), the employer takes on one contract with a single point of responsibility which ensures the employer does not have to manage more relationships with architects and/or engineers. Streamlining the project delivery through a single contract between the employer and Design – Build team transforms the relationship between designers and builders into one collective delivery team which encourages a collaborative working relationship.

The Design – Build method places the responsibility for design errors and omissions on the Design – Build entity, relieving the employer of any major legal responsibilities thus the burden of these costs and associated risks are transferred to the Design – Build team. Furthermore, the cost and schedule reduction as well as decreased litigation associated with Design – Build project delivery have been demonstrated by a number of official industry studies.

In summary, the benefits that the Design – Build approach can offer are as follows:

• construction can start earlier, reducing the overall project delivery time.

• the employer has only one contractor organization to deal with (one point of responsibility once the Design - Build contract is awarded).

• the employer and his representatives can engage with the contractor and their specialist sub-contractors and suppliers early in the design process to get a more practical and feasible solution.

• the possibility of reducing overall costs as contractors may be able to design specialist elements at a lower cost than professional consultants.

• a lump sum can be obtained before the design is completed, however, this requires full design clarity at the point of tendering.

• the ability to adopt a two-stage procurement approach.

2 Project Organization and Management

2.1 Procurement Strategy

The basic approach to procuring a Design – Build contractor is as follows:

• the employer tenders their Employer's Requirements (ERs) and the contractor offers a lump sum which includes a fee for completing the design. The Contractor may also respond to the ERs with their Contractor's Proposals (CPs) or alternatively confirm that their CPs are in registry with the ERs. The contractor may use his own in-house designers to design the building or he appoints consultant designers to complete the design.

• in case the contractor is appointed at the outset of the project or key design specifications concerning the building or plot are missing, he can be appointed through a two-stage process. In the first stage the contractor is selected on the basis of a fee, preliminaries, overheads and profit. The contractor works with his design team to develop the design on the basis of which a fixed price is negotiated for the second stage, construction.

• it must be noted that the employer's team have to closely monitor the Design – Build entity in order to avoid any compromises in design and quality or that lower grade specifications are proposed. There is a risk that the building's quality may be compromised if the employer is not ensuring that set specifications are adhered to by the Design – Build team. The employer's QS/contract management team must ensure that adequate pricing documents are prepared. In addition, a proper site supervision team must be established on the client's side.

OPERATIONS/COMMERCIALIZATION PROCUREMENT

Contrary to the design/construction procurement, this part of the working packages includes the specification of requirements for potential operations/commercialization bidders. The appointed operations/commercialization contractor(s) will cover all operations and commercialization services incl. programs, commercial activities, food & beverage, technical services, facility management, communications and administrative services.

However, it has to be especially stated that operational/commercialization expertise have a significant input on all design/construction tasks within the development and implementation phases. Therefore the specifications, requirements and bidding processes have to be carried out synchronously to the rather more elaborated design/construction procurement.

According to Lagardère Sport's holistic project approach, the project leader KSI is provided a comprehensive service package for the entire lifecycle of the project, ideally including the operation/commercialization of the new venue. Having only one principal point of contact for all operational/commercial matters next to the contractor, who is responsible for the design/construction of the building, is a huge benefit for the project owner. Based on the exemplary overall management organization as shown below, the details of this organization are described in detail within this chapter.

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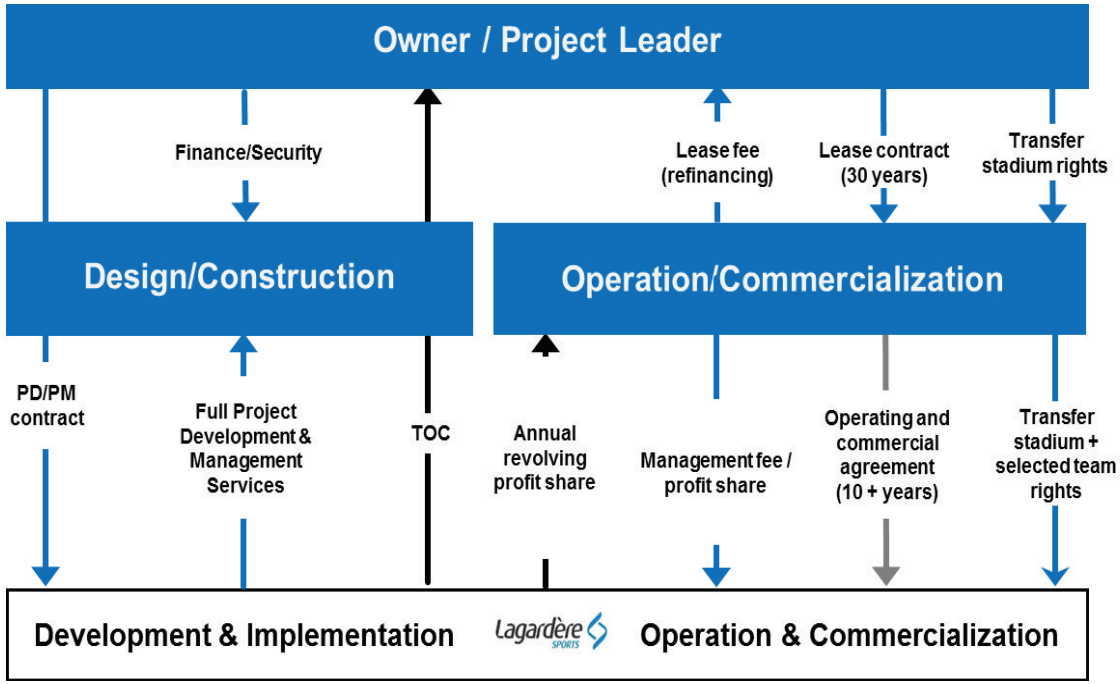
2 Project Organization and Management



2.2 Project Organization Functions

The described organizational model assumes that Lagardère Sports acts as the owner's/client's specialist for the project development/implementation covering:

- project management services (incl. QS/contract management if required) during design and construction phases,
- site supervision services during construction phase,
- Estidama/PQP during design and construction phases
- relevant operational/commercialization input for design/construction tasks and vice versa

This includes close monitoring and supervision of the awarded design/build as well as operations/commercialization contractor(s), ensuring that the works are meeting the

- client's and project requirements,
- client's design and operations intent as well as set project brief/specifications,
- relevant local and international rules and regulations.

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2 Project Organization and Management

2.2 Project Organization Functions

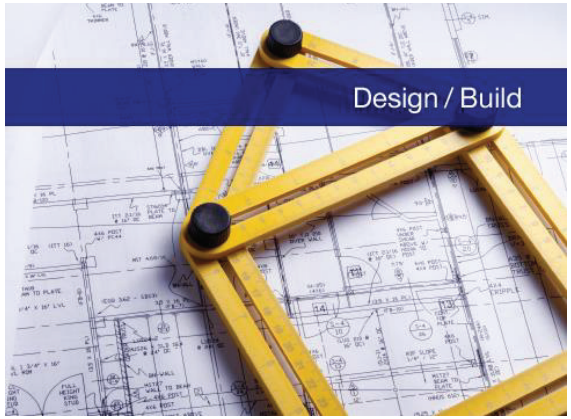
DESIGN/BUILD

On behalf of the project owner Lagardère Sports will manage all additionally required consultants and specialists, i.e. soil investigation contractor, Estidama/PQP, commissioning agent, QS/contract manager, if any.

Furthermore, the project team is able to implement its vast operational/commercialization experience from international stadium projects providing specialist operations/commercialization knowledge already during the design and construction stages, ensuring operator input and expectations are appropriately transferred to the design/construction team. This will result in a smoother handover from construction into operation. The Lagardère Sports team will operate under the supervision of and will report directly into the project leader.

The appointed Design – Build contractor will provide all necessary design services incl. architecture, structural, MEP (mechanical, electrical/electronics, plumping), fire & life safety, security, infrastructure, interior design, lighting, vertical transportation, way-finding, food & beverage/kitchen, landscaping: The local authorities and service providers have clearly established rules, procedures and requirements which have to be adhered to. Lagardère Sports will closely liaise with the Design – Build contractor and all statutory authorities on all necessary permit applications and approvals. The project team will supervise all official design approval processes and the building permit acquisition with local legislation and all other relevant authorities or service providers.

2 Project Organization and Management



2.3 Project Management

The following section explores the draft program for the project delivery and defining the early tasks of the employer. Thus, this will provide the client with a tangible understanding of the timing impact on the chosen development route as well as establish a base for the necessary discussions regarding the project's delivery program.

DESIGN & BUILD PROGRAM

The planned Design – Build approach assumes an earliest possible start date on-site three months after having completed the employer's requirements. A total pure construction period of minimum 18 months depending on final architectural layouts and building conditions in Iceland (including contractor's mobilization on-site and, testing & commissioning and overlapping FF&E works) represent a potential period of time to achieve a successful realization of the New National Stadium Reykjavik provided that the necessary tender, design and permission phases are successfully completed.

The following early tasks are important and have to be addressed by the employer beforehand:

- approval of Pre-Tender phase report including employer's requirements.
- approval of the project's budget (incl. design/construction costs, owner budget, contingency).
- determination of the plot location and surrounding areas available for utilization within the New National Stadium Reykjavik project (any additionally needed soil investigation works are possible to be carried out independently).
- liaising with the involved stakeholders' legal/contract department to outline the contractual framework for the Design – Build contract, contract conditions, RFP documents, tender short list etc.
- preparation of awards of the employer's PM, QS, site supervision engineer and operator.

The necessary authority/service providers approval and permit processes (design and construction) shall commence as soon as possible and must take the required design/construction documentation levels into account. The aforementioned sequence of works is detailed in the program (schedule) overleaf. It must be noted this is exclusively an indicative schedule for discussion, which does not account for the necessary approval periods (employer's approval as well as authorities permitting periods).

2 Project Organization and Management

2.3 Project Management

OPERATIONS PROGRAM

In order to achieve a multi-purpose national football venue it is vital to understand the diversified operations program and how both the mobilisation of operations/commercialization and design/construction tasks interface with each other. Both work streams share overlapping milestones and therefore it is integral that those tasks are well aligned in order to maximise the efficiency and long-term success of operational and commercial activities.

The importance of operational tasks are often grossly underestimated during the development and implementation (design/construction) phases. Consequently, all project stakeholders should ensure the focus on operations is emphasized likewise. The appointed operator will also have a vested interest in ensuring key operational/commercial tasks are fed into the design/construction program.

There are a number of key operational/commercial milestones which will have a bearing on the overall design/construction of the New National Stadium Reykjavik, for example the award of a suited and dedicated naming rights partner (NRP), catering partner and facility management (FM) company including technical maintenance.

The NRP should be awarded in-line with the main contractor(s) at an early stage in order to gain exposure and raise the profile of the project during a ground-breaking ceremony. Secondly a catering partner needs to be appointed towards the end of superstructure works in order to brief the planning and building companies on the procurement of kitchen (catering) related equipment.

Finally the award of the FM company prior to the commencement of testing and commissioning of the building will ensure full FM input. The presence of the FM company will enable them to gain a better understanding of the building and installed equipment. This will also permit the contractor(s) to undertake the required training with the relevant parties with special attention to specific items such as the operation of the Building Management System (BMS). Furthermore the FM company should be involved in the project's documentation process (e.g. as-built design documentation, test reports).

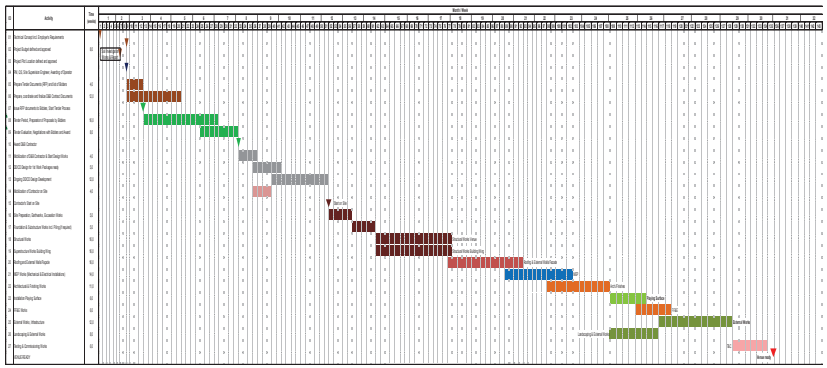
Worth noting is that the success of an efficient and timely program is down to a collaborative and holistic working approach and open relationships between the employer, operator, contractor and potential other experts/consultants.

2 Project Organization and Management

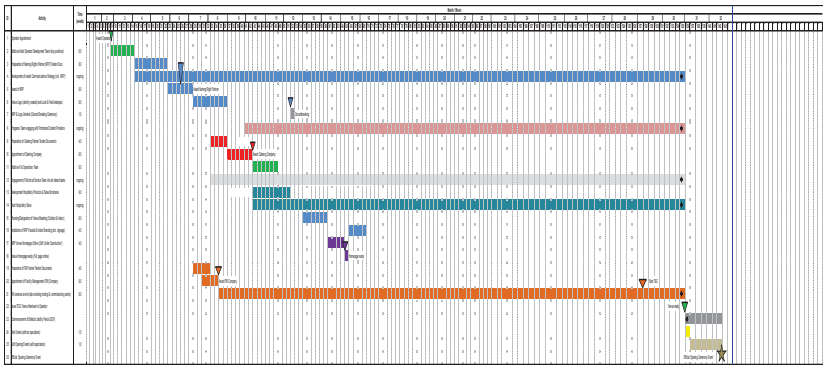
2.3 Project Management

Draft project schedules New National Stadium Reykjavik* :

Design & Build Contractor



Operator & Commercialization



* for detailed view please refer to separate document