

SKOVENS ARENA

NYT STADION I AARHUS



ZAHA HADID LTD // SWECO DANMARK A/S // TREDJE NATUR APS

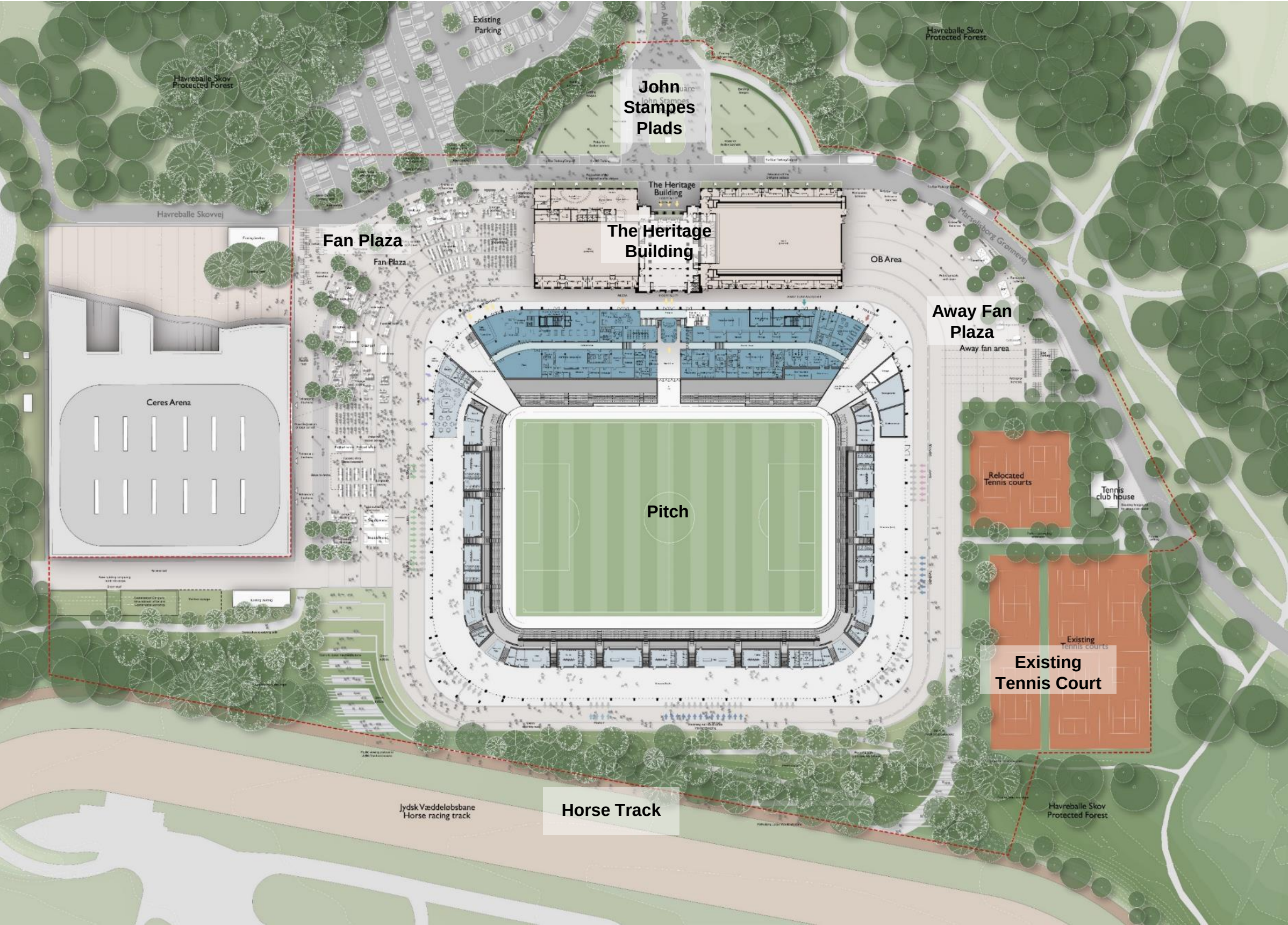
HISTORISK KONTEKST





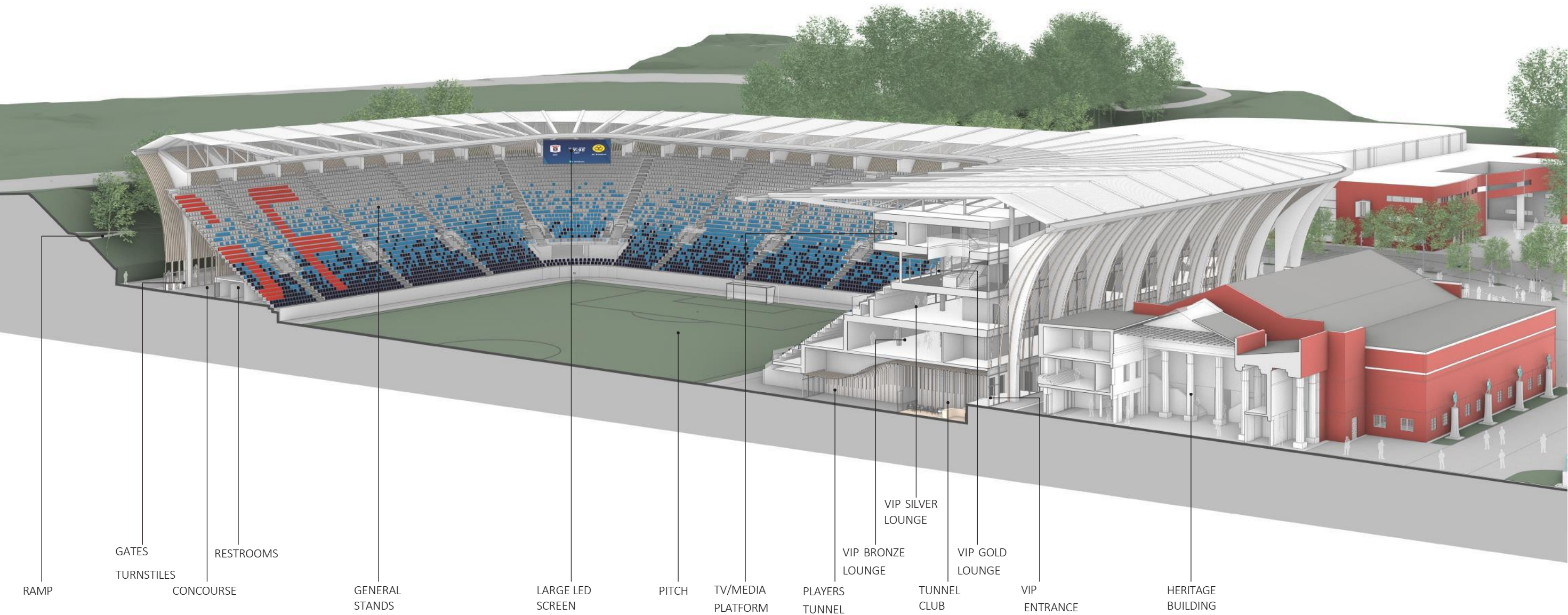


SITUATIONSPLAN

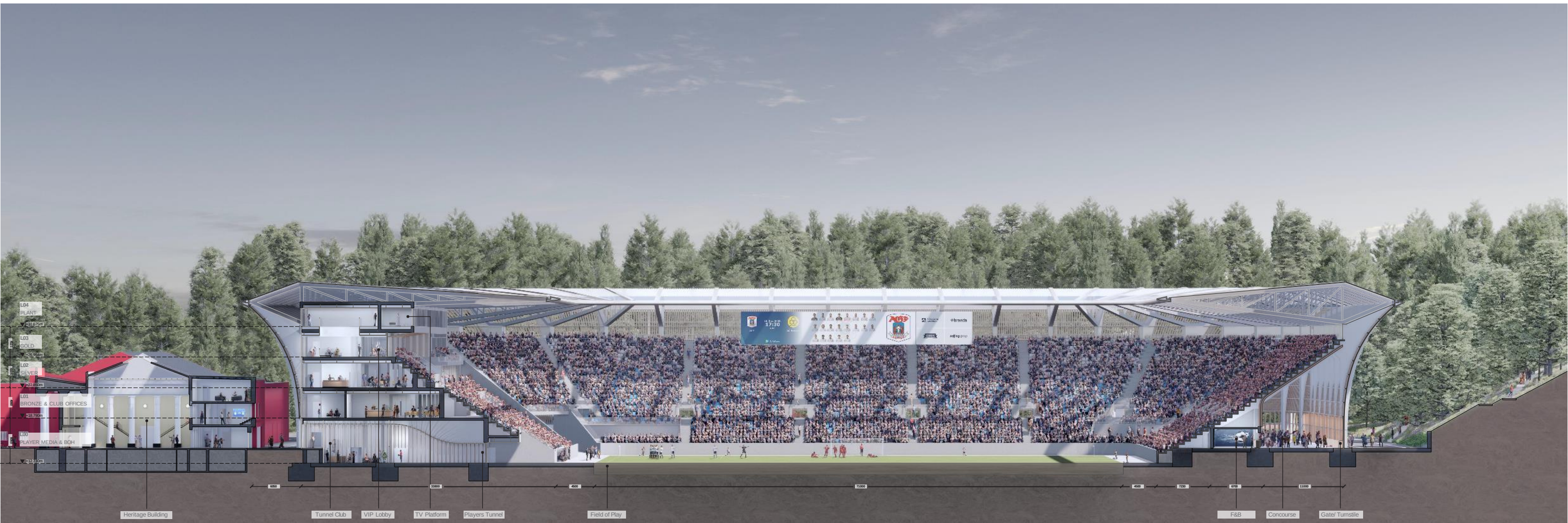


SITE PLAN

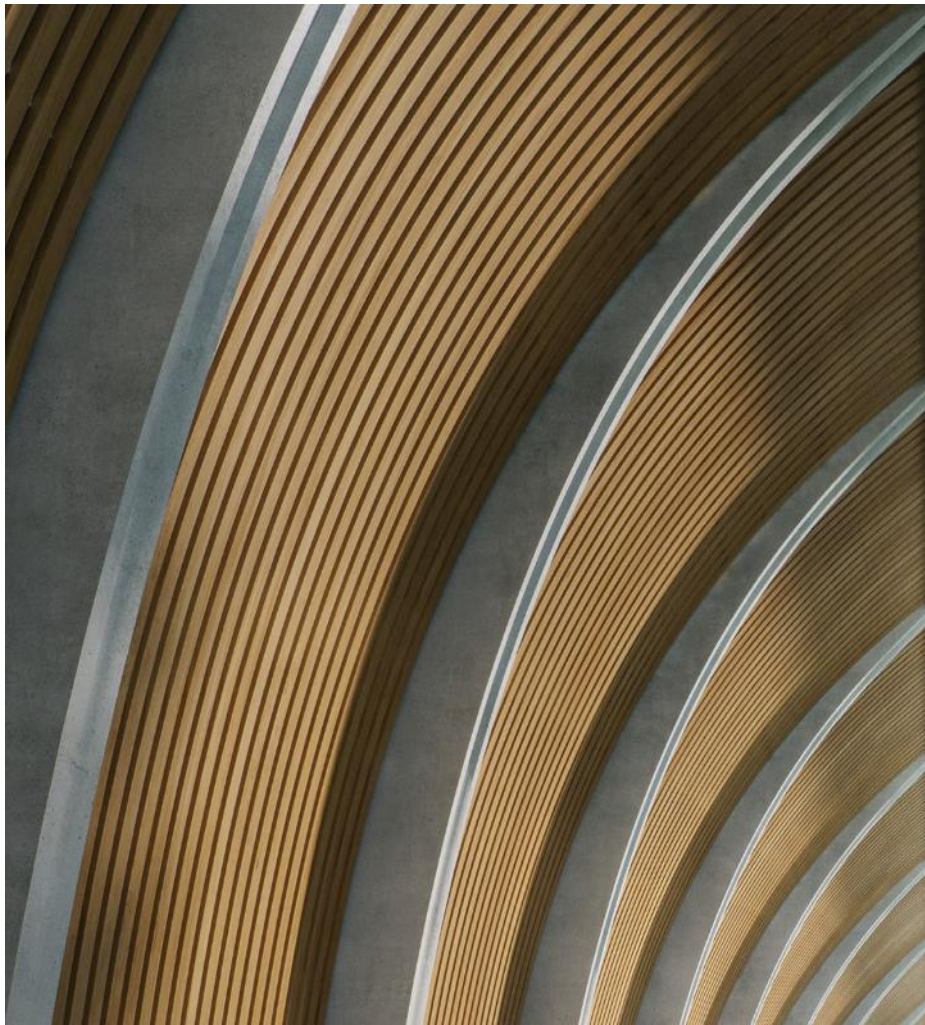
3D SNIT



NORD-SYD PRINCIPSNIT



MATERIALER MED MENING



WOOD

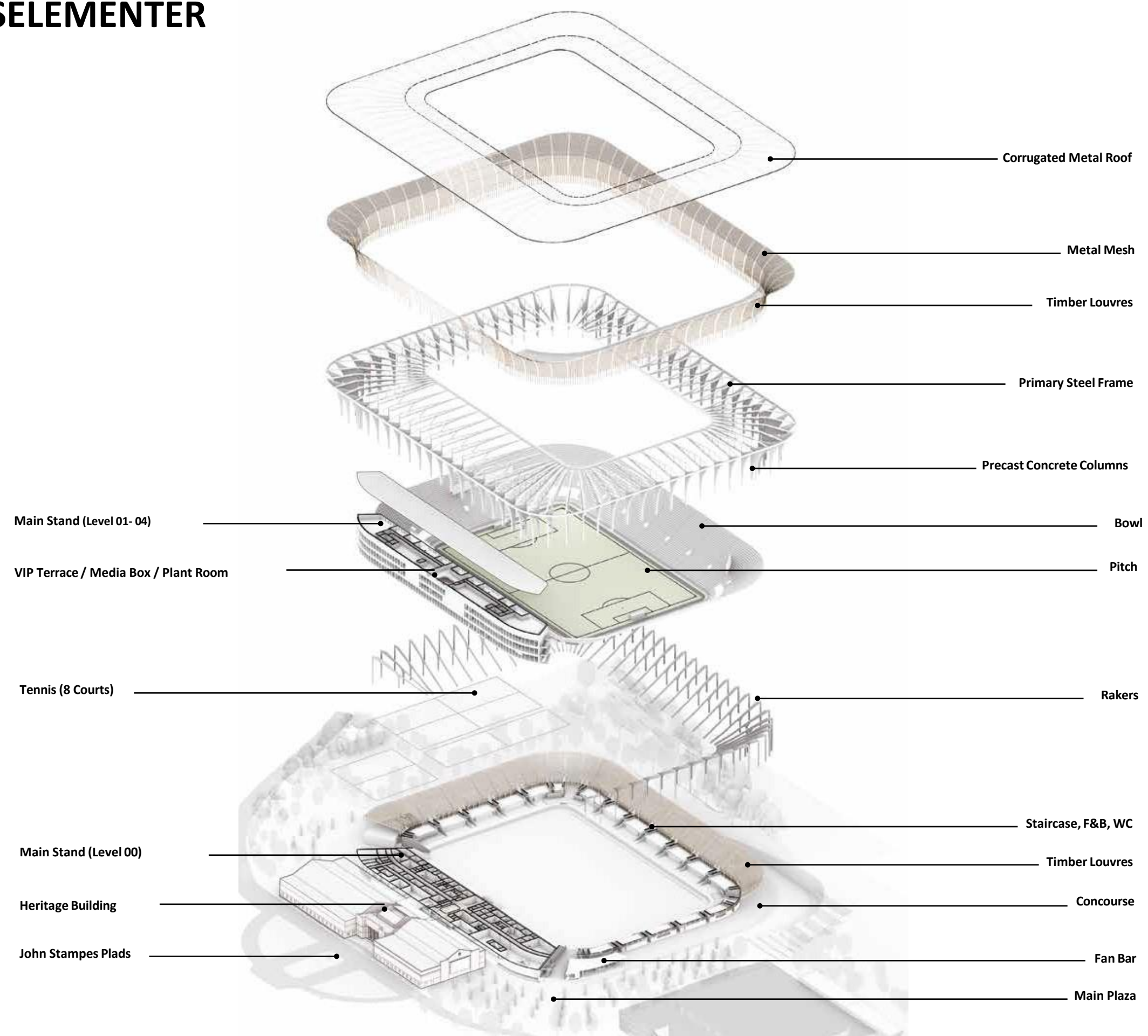


CONCRETE

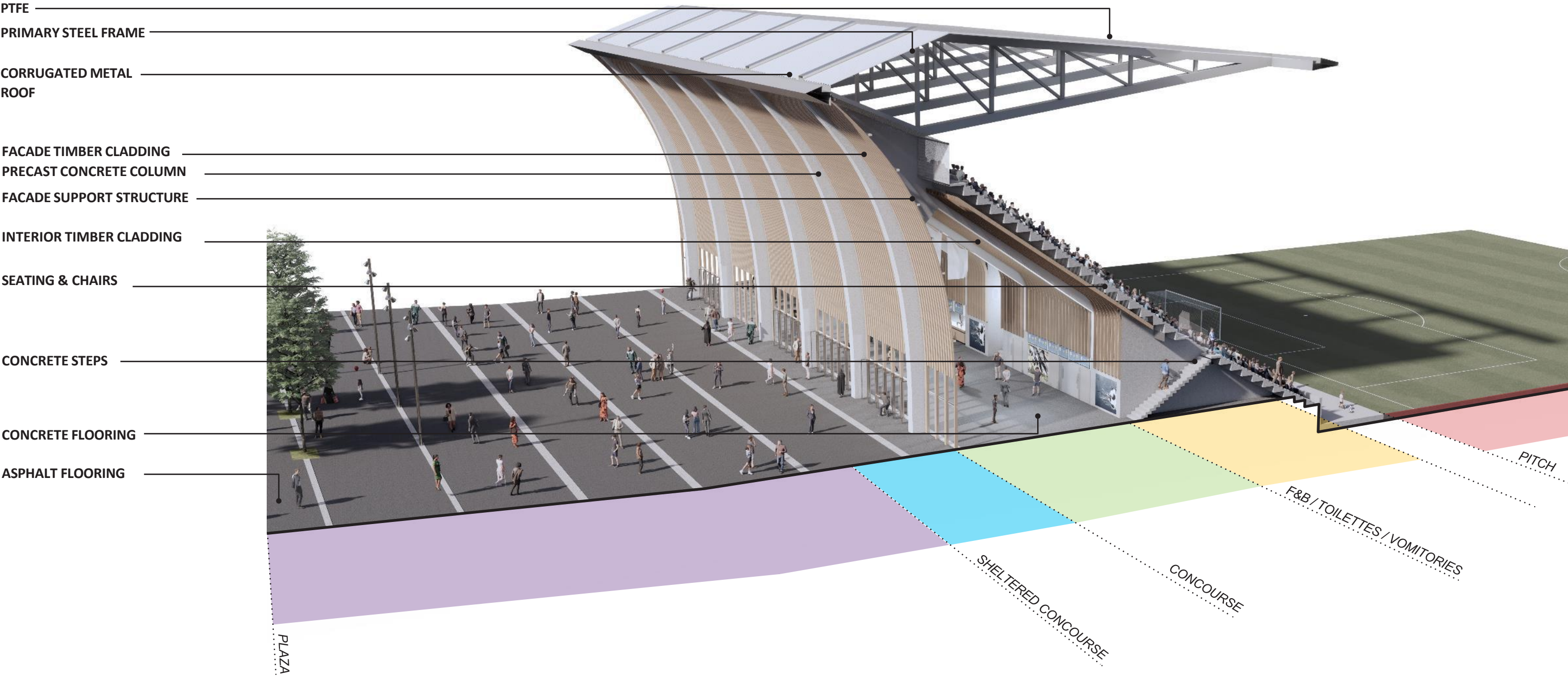


STEEL

BYGNINGSELEMENTER

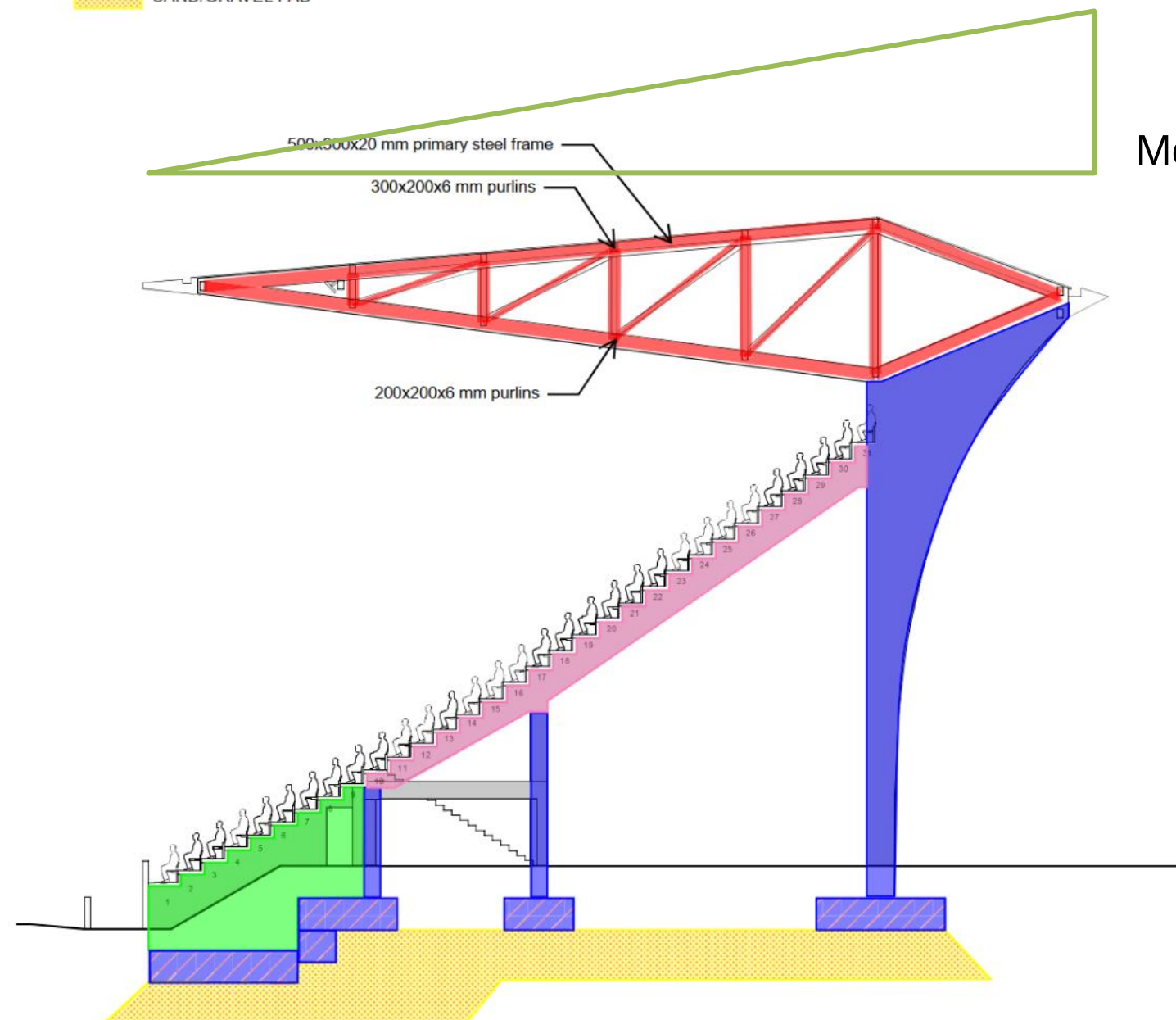


3D TRIBUNEUDSNIT



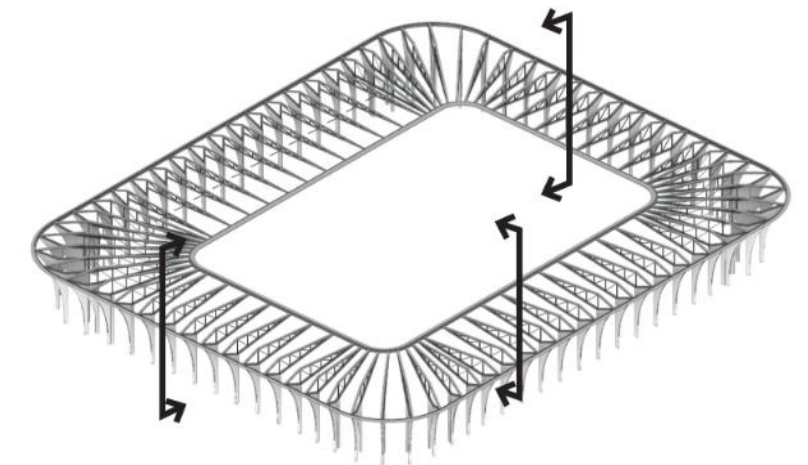
Konstruktioner

- STEEL ELEMENT
- PRECAST CONCRETE COLUMN
- PRECAST CONCRETE RAKER BEAM
- PRECAST CONCRETE WALL
- STEEL/CONCRETE COMPOSITE BEAM AND PRECAST HOLLOW-CORE CONCRETE PLATE
- CONCRETE FOUNDATION CAST ONSITE
- SAND/GRAVEL PAD

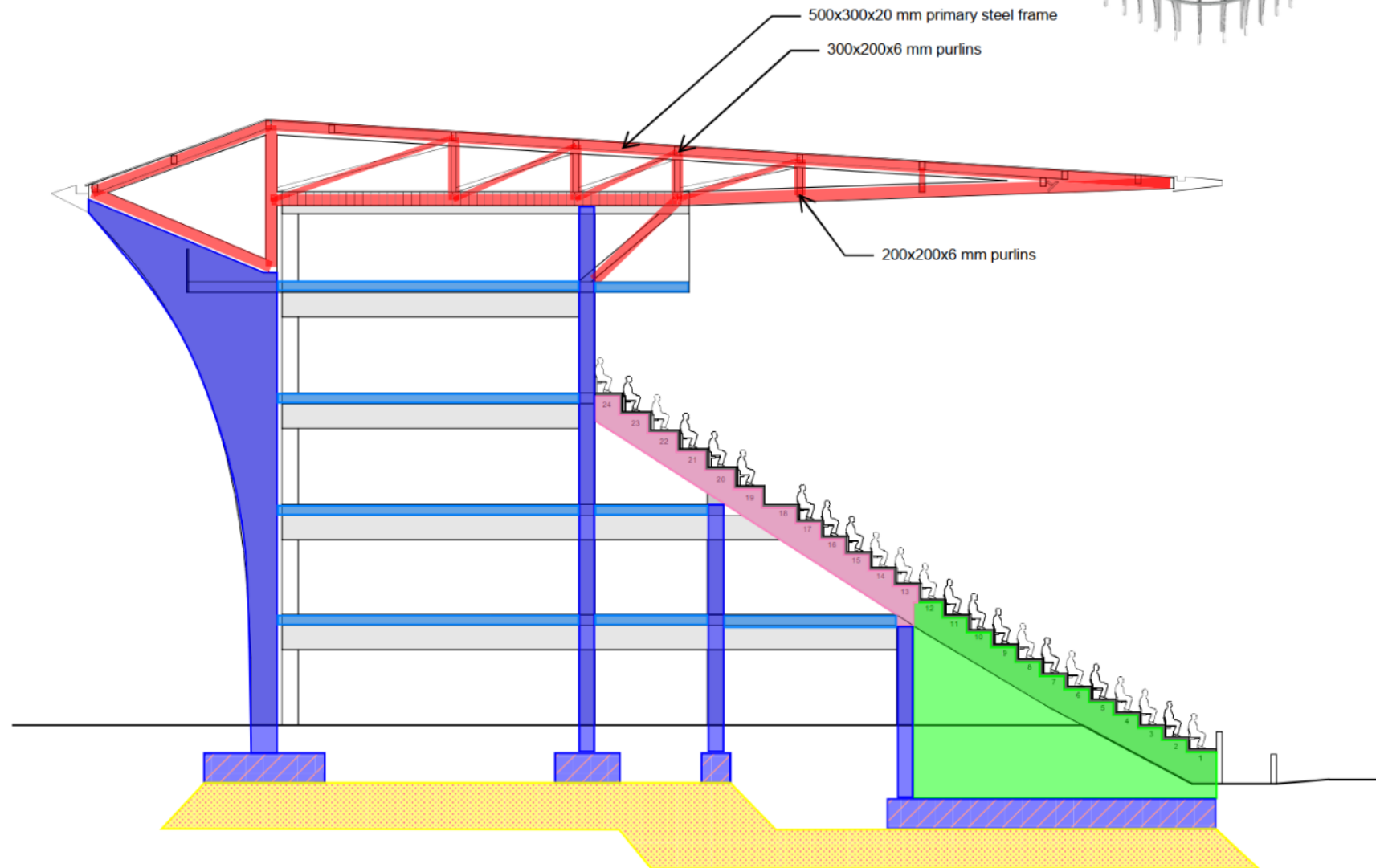
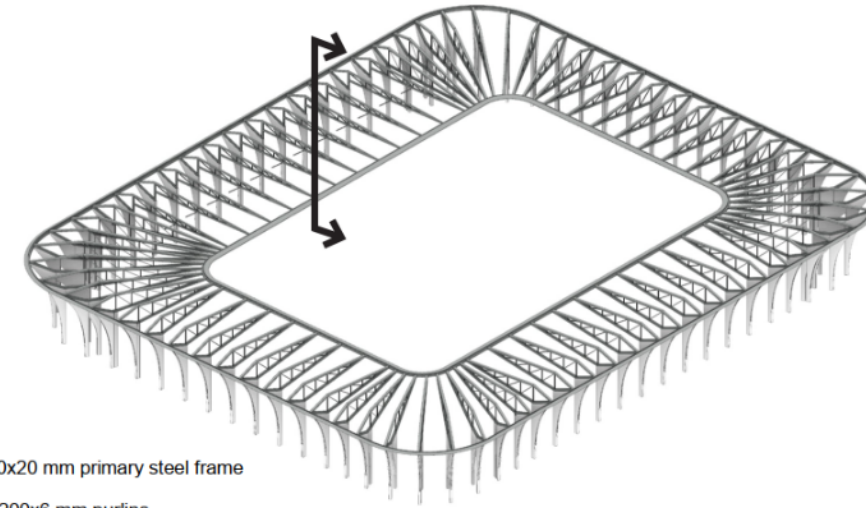


MAIN STRUCTURE - SECTION OF STANDS

Momentkurve

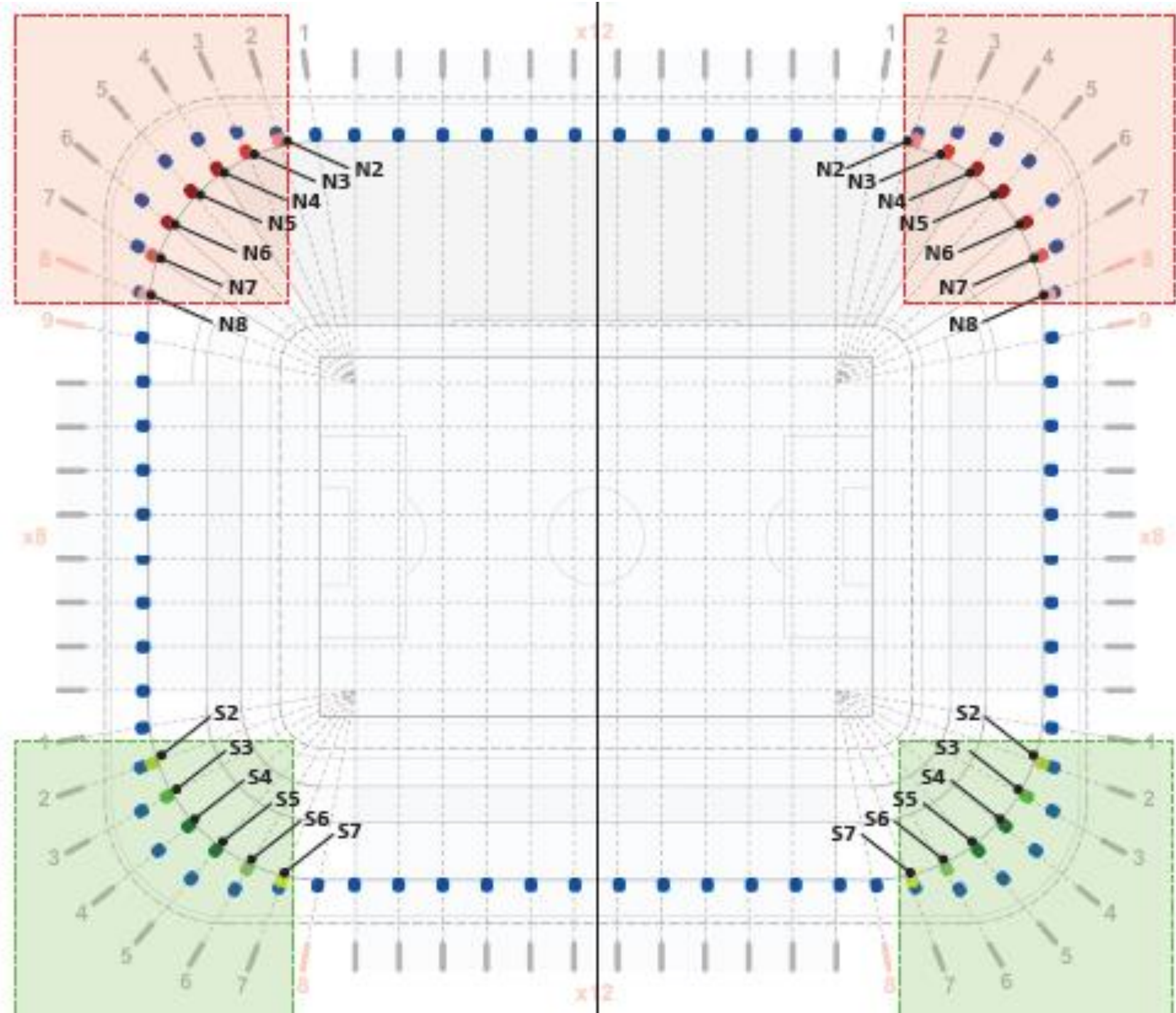


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- CONCRETE FOUNDATION CAST ONSITE
- SAND/GRAVEL PAD



MAIN STRUCTURE - SECTION OF MAIN STAND AND BUILDING

SØJLEKONCEPT



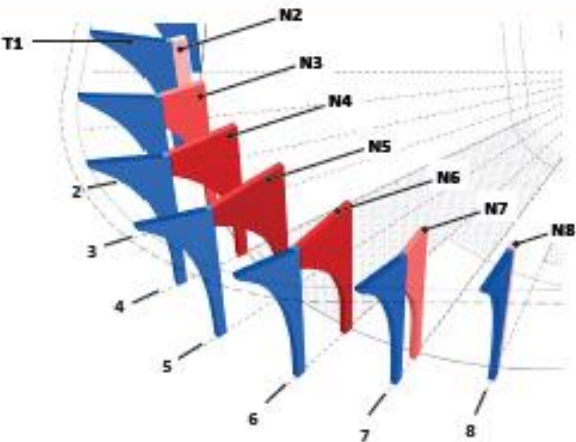
REPETITION

Primary Columns		x74	Secondary Columns (Type N+S)		x26
	Concrete Columns	x74	Type N x14	Concrete Columns	x26
			Type S x12		
TOTAL COLUMNS		100			

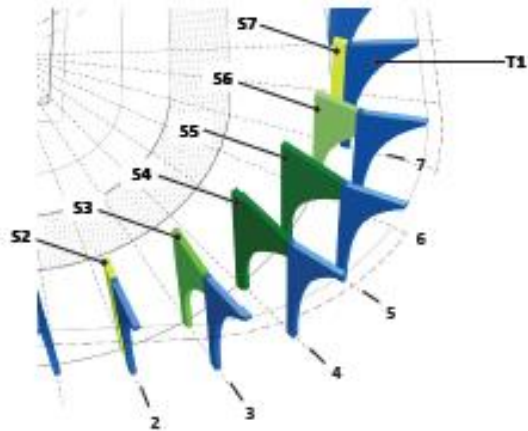
Type T (Typical)	
Type	N2
Quantity	74
Total	74

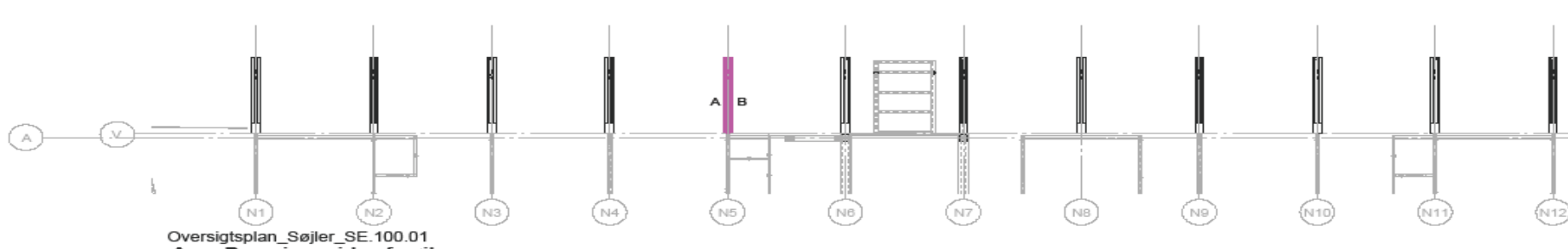
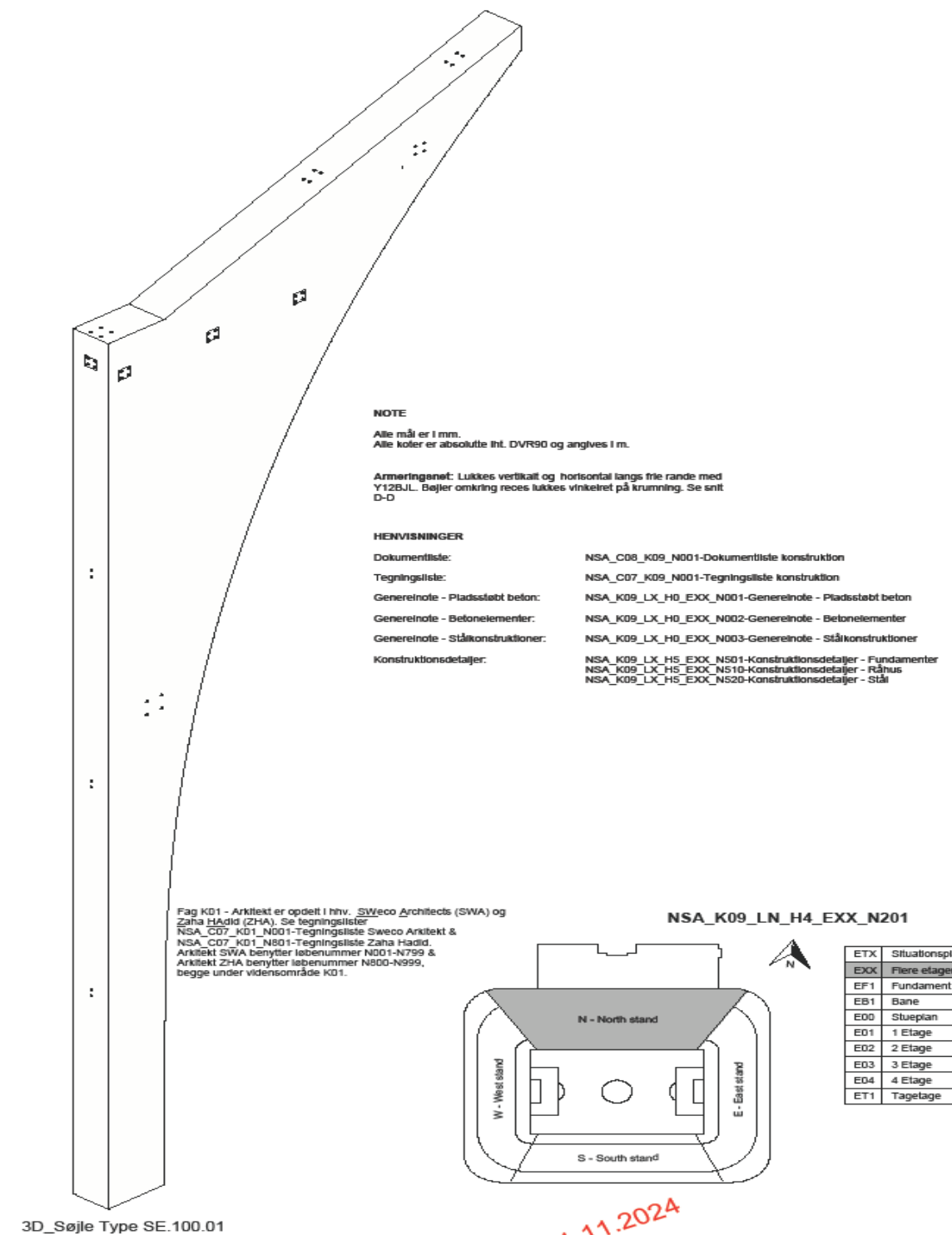
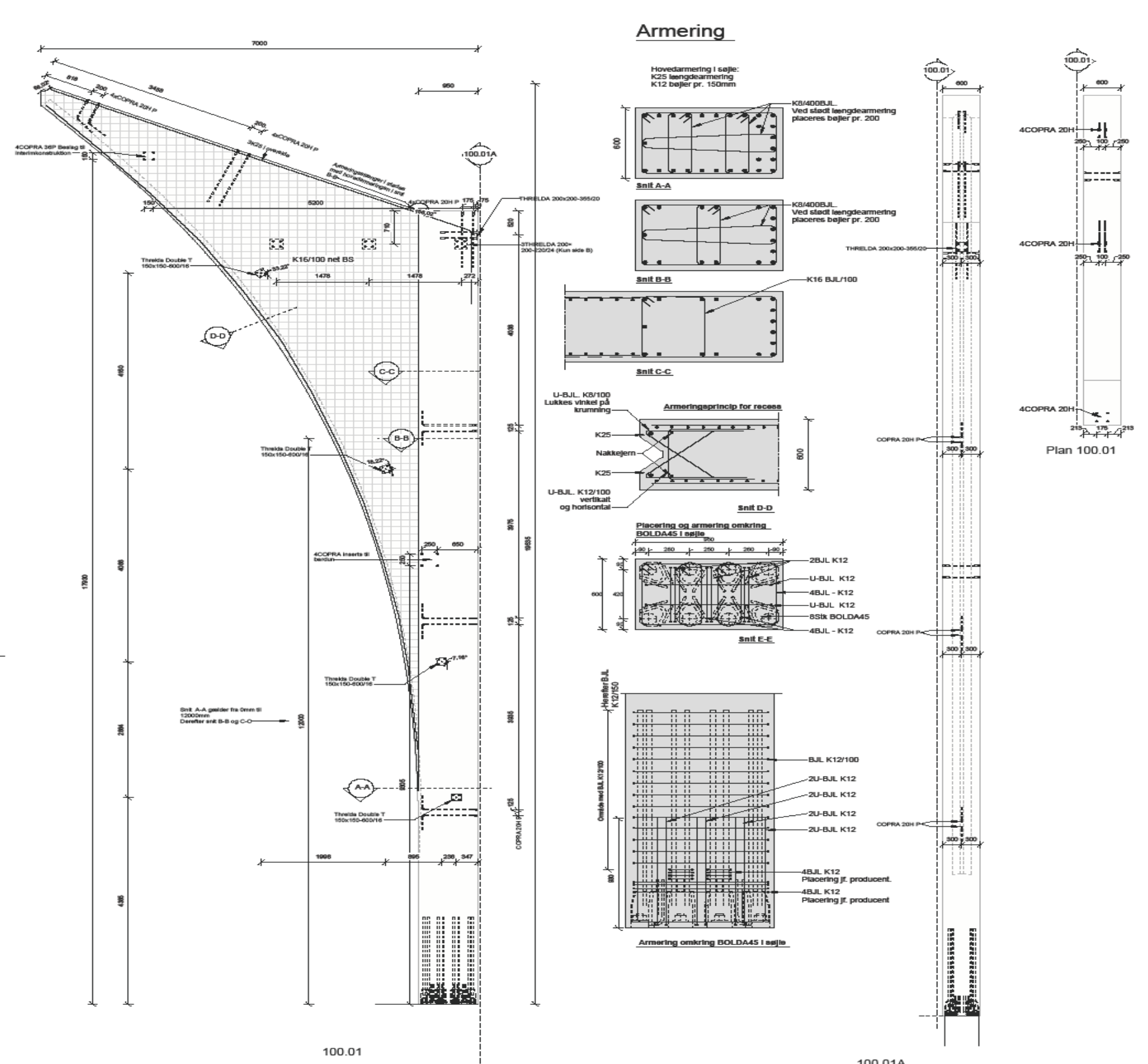


Type N (North)							
Type	N2	N3	N4	N5	N6	N7	N8
Quantity	2	2	2	2	2	2	2
Total	14						



Type S (South)							
Type	S2	S3	S4	S5	S6	S7	-
Quantity	2	2	2	2	2	2	-
Total	12						





ENGELUNDEN

Århus Kommune, Kongelundens sekretariat Rådhuspladsen 2, 8000 Aarhus C T: 6192 3437 kongelunden.aarhus.dk

A. Enggaard A/S

Hovedentreprenør A. Enggaard A/S Århus-øst, Ceresbyen 64 8000 Aarhus C T: 8620 3380 www.enggaard.dk

Nyt stadion Aarhus

Emne: Hovedsøjle SE.100.01 Sag nr: 41008066

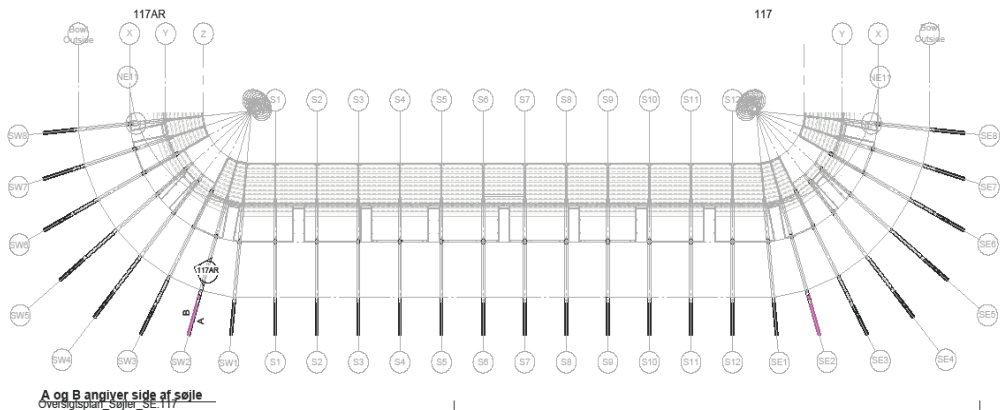
Fase: Udførelsesprojekt Mål: As Indicated Sign: CHDR NSA_K09_LN_H4_EXX_N201

□ Totalrådgiver og arkitekt: ZAHA HADID ARCHITECTS 101 Goswell Road London EC1V 7EZ, UK T: +44 20 7253 5147 zaha-hadid.com

□ Arkitekturrådgiver: SWECO ARCHITECTS Willemoesgade 13 8200 Aarhus N T: 7024 1000 swecoarchitects.dk

■ Ingeniørrådgiver: SWECO Willemoesgade 13 8200 Aarhus N T: 7220 7207 sweco.dk

□ Landskabsarkitekturrådgiver: TREDJE NATUR Heimdalsvej 35, Baghuset 4, sal 2200 København N T: 4223 9915 tredjenatur.dk



Samlingsprincip 1

Føringsrørgængsforhold til de indvendige Y20er

Indvendig afstand på 400 mm mellem U-BL'er

OK, sælge

2x vægsko SUMO 39H, udstøbt med øget højde på kasse grundforstærkt

Y1232 stades med SUMO 39H

2 Y12 U-BL, bander
Runddiameter = 108mm

Y16 rallekøber, Afbrydes omkring vægsko

Refleks P55 Double 12 med pløvnegl Y12 stang i enderne for renere montage

Fuge udstøbes med svindnet mættet, $\tau_{ca} = 0,04 \text{ MPa}$

2 K12 U-BL

Y16/100 ref. B.S. Net afbrydes ved SUMO 39H

U-BL Y16/100

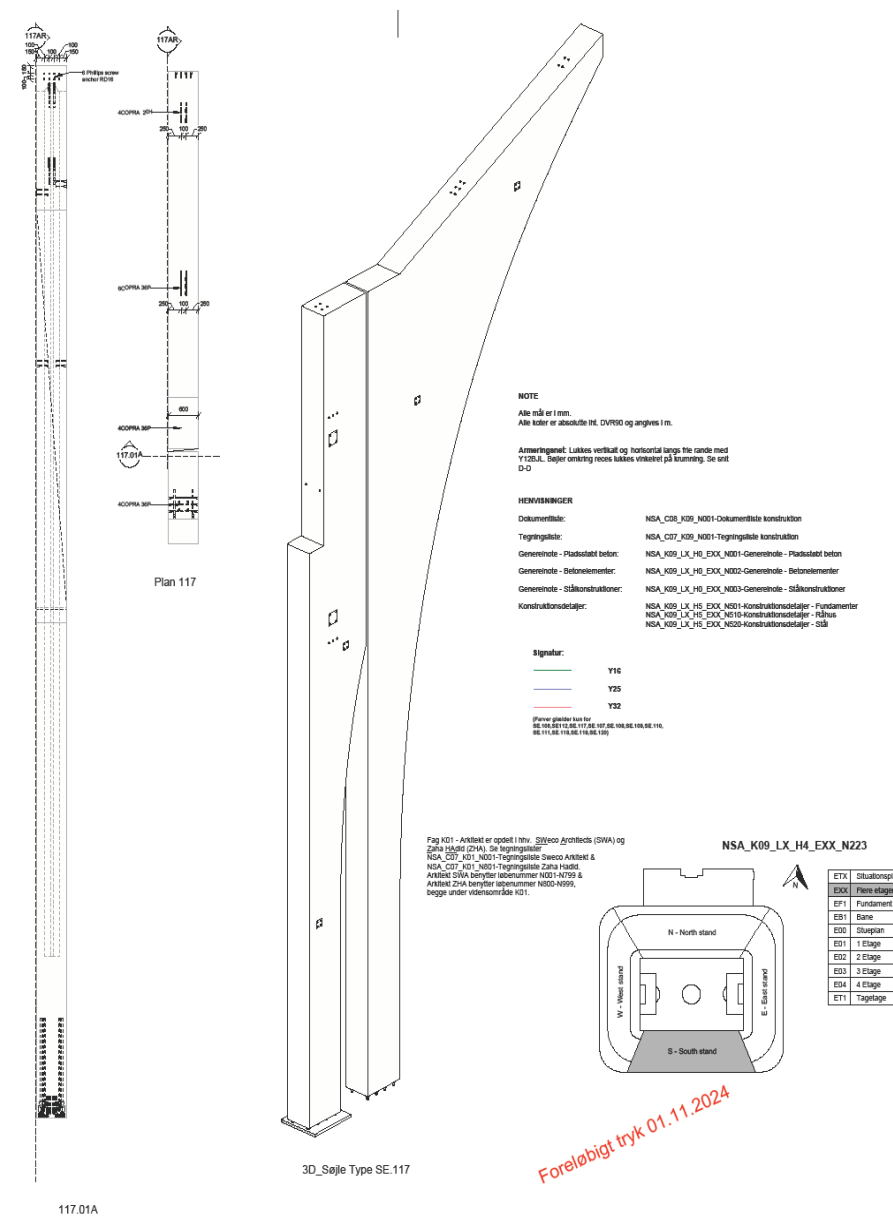
U-BL Y12/200

Fortringsrørgængs geometri er variabel. Ved udlægningen begynder pr. 400 placeringer rum udlægningen begynder for hver anden land

Øst 2-2

Armeringsprincip for samling af søjler

Øst 1-1

[illegible]

STATUS

SØJLEPRODUKTION



STATUS

DE FØRSTE SØJLER ER KLAR

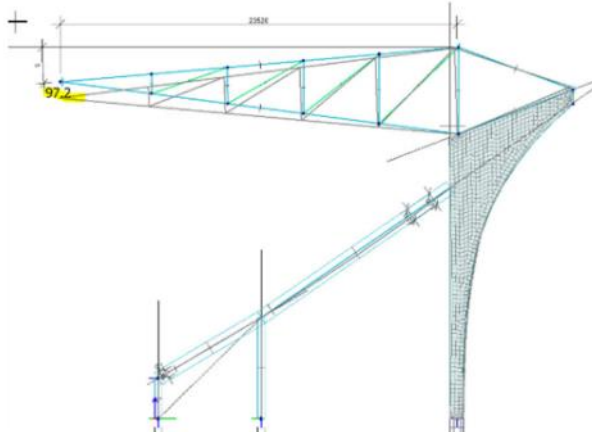
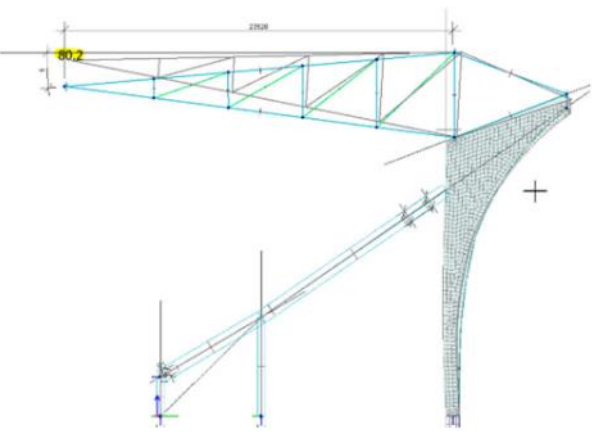


STATUS

RECES I SØJLER

CALCULATION OF ROOF STRUCTURE

The scope specifies a maximum deflection of cantilever roof construction of $l/200$ equal 117 mm. Calculations show a maximum deflection of 97 mm downwards and 80 mm upwards meeting the scope specifications.



Steelclass S355

	Count	Lenght	Total
Mainframe, west/east	18	81 m	1458 m
Backframe, west/east	18	19 m	342 m
Mainframe, corner	25	91 m	2275 m
Backframe, corner	25	20 m	500 m
Mainframe, north	15	85 m	1275 m
Backframe, north	15	17 m	255 m
Mainframe, south	15	67 m	1005 m
Backframe, south	15	19 m	285 m
Purlins	10	350 m	3500 m
Mainframe, total			6013 m
Backframe, total			1382 m

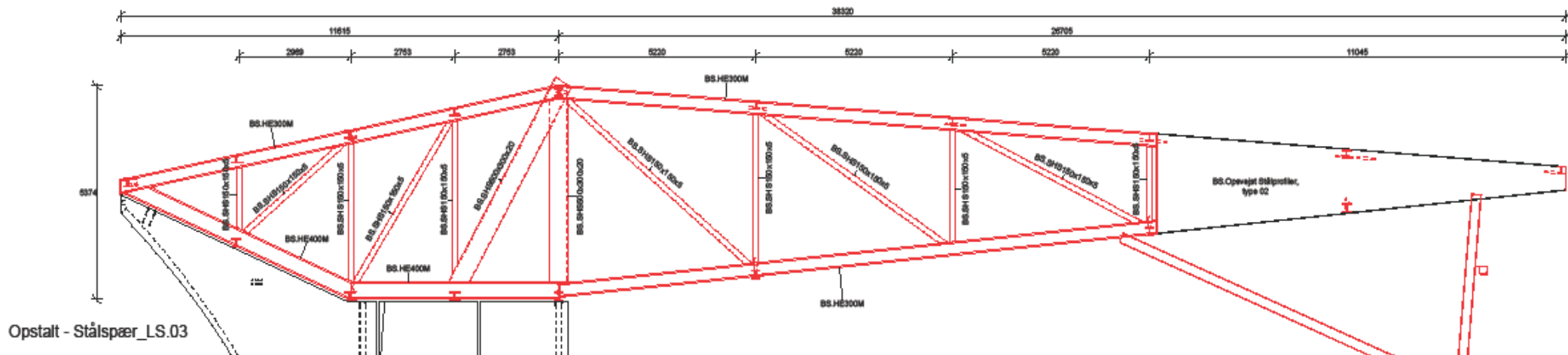
Part	Profile type	Square area mm2	Kg/m
Main frame	IPE 600	15600	122
Back frame	IPE 600	15600	122
Purlins	RHS 200x200x12	11500	72
Steelcolumn, south, lower part (10 m)	600x1200x70	225000	1755
Steelcolumn, south, higher part (11 m)	diff.	365000	2847
Diaphragme, roof			

Part	Profile type	Square area mm2	Kg/m
Main frame	HEB 800	33400	262
Back frame	IPE 600	15600	122
Purlins	RHS 300x200x6,3	11500	48
Steelcolumn, south, lower part (10 m)	600x1200x70	225000	1755
Steelcolumn, south, higher part (11 m)	diff.	365000	2847
Diaphragme, roof			

Part	Profile type	Square area mm2	Kg/m
Main frame	RHS 400x400x20	30000	235
Back frame	RHS 400x400x20	30000	235
Purlins	RHS 300x200x6,3	11500	48
Steelcolumn, south, lower part (10 m)	600x1200x70	225000	1755
Steelcolumn, south, higher part (11 m)	diff.	365000	2847
Diaphragme, roof			

Part	Profile type	Square area mm2	Kg/m
Main frame	RHS 500x300x20	30000	235
Back frame	RHS 500x300x20	30000	235
Purlins	RHS 300x200x6,3	11500	48
Steelcolumn, south, lower part (10 m)	600x1200x70	225000	1755
Steelcolumn, south, higher part (11 m)	diff.	365000	2847
Diaphragme, roof			

Part	Profile type	Square area mm2	Kg/m
Main frame	RHS 600x600x50	120000	936
Back frame	RHS 600x600x50	120000	936
Purlins	RHS 300x200x6,3	11500	48
Steelcolumn, south, lower part (10 m)	600x1200x70	225000	1755
Steelcolumn, south, higher part (11 m)	diff.	365000	2847
Diaphragme, roof			



NOTE

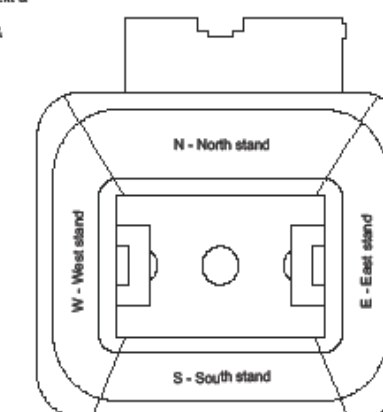
Alle mål er i mm.
Alle koter er absolutte og angives i m.
Koter er iht. DVR90.

HENVISNINGER

Dokumentliste:	NSA_C08_K09_N001-Dokumentliste konstruktion
Tegningsliste:	NSA_C07_K09_N001-Tegningsliste konstruktion
Generelnote - Pladsstøbt beton:	NSA_K09_LX_H0_EXX_N001-Generelnote - Pladsstøbt beton
Generelnote - Betonelementer:	NSA_K09_LX_H0_EXX_N002-Generelnote - Betonelementer
Generelnote - Stålkonstruktioner:	NSA_K09_LX_H0_EXX_N003-Generelnote - Stålkonstruktioner
Konstruktionsdetaljer:	NSA_K09_LX_H5_EXX_N510-Konstruktionsdetaljer - Råhus
Konstruktionsdetaljer - Stål:	NSA_K09_LX_H5_FXX_N520-Konstruktionsdetaljer - Stål

Fag K01 - Arkitekt er opdelt i hhv. SWeco Architects (SWA) og Zaha Hadid (ZHA). Se tegningslister NSA_C07_K01_N001-Tegningsliste Sweco Arkitekt & NSA_C07_K01_N801-Tegningsliste Zaha Hadid. Arkitekt SWA benytter løbenummer N001-N799 & Arkitekt ZHA benytter løbenummer N800-N999, begge under vidensområde K01.

NSA_K09_LS_H4_ET1_N433



ETX	Situationsplan
EXX	Flere etager
EF1	Fundament 1
EB1	Bane
ED0	Stueplan
ED1	1 Etage
ED2	2 Etage
ED3	3 Etage
ED4	4 Etage
ET1	Tagetage

Foreløbigt tryk 01.11.2024

Stålspær_LS.03



Århus Kommune, Kongelundens sekretariat Rådhuspladsen 2, 8000 Aarhus C T: 6192 3437 kongelunden.aarhus.dk



Hovedentreprenør A. Enggaard A/S Århus-ald, Ceresbyen 64, 8000 Aarhus C T: 8620 3380 www.enggaard.dk

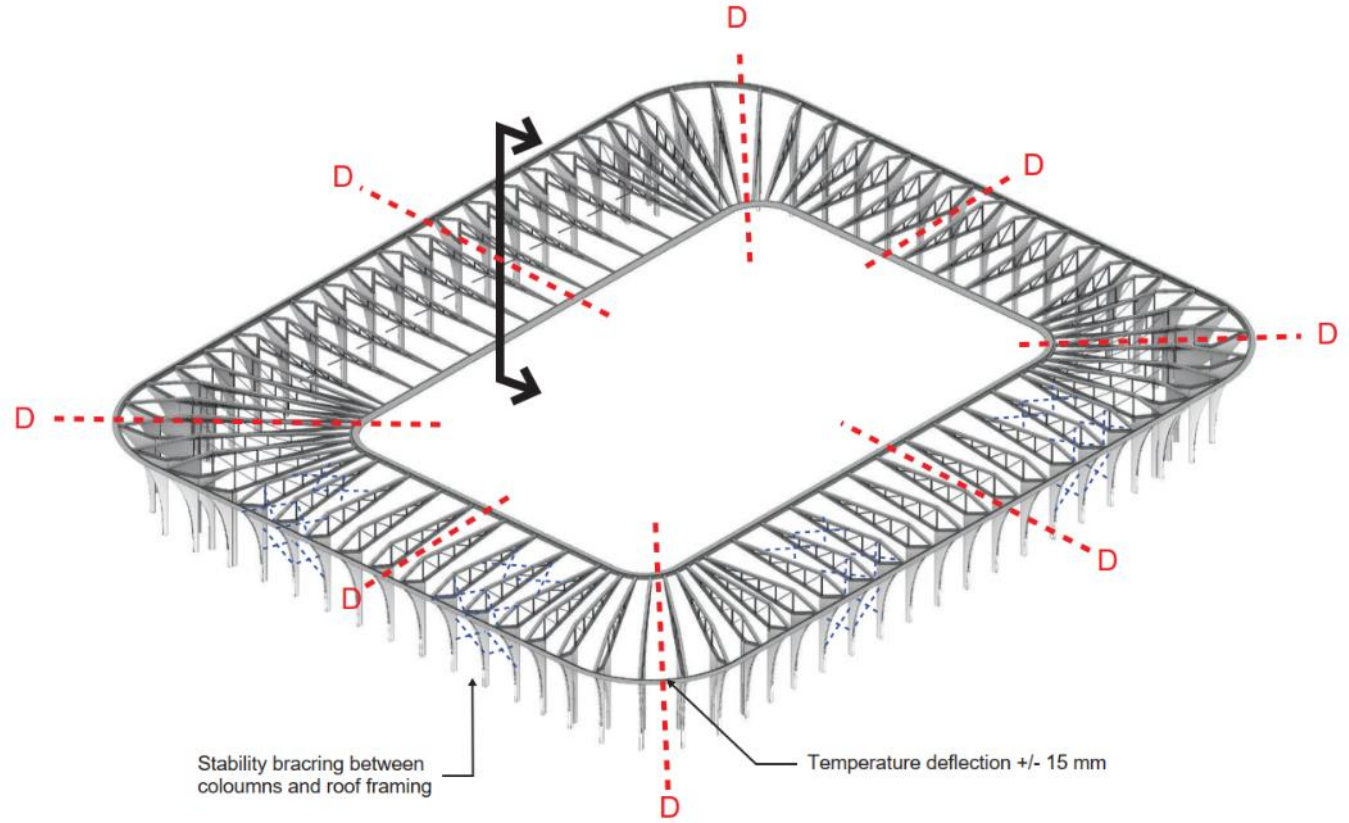
Nyt stadion Aarhus

Udarbejdet af: MAHA/JOPN

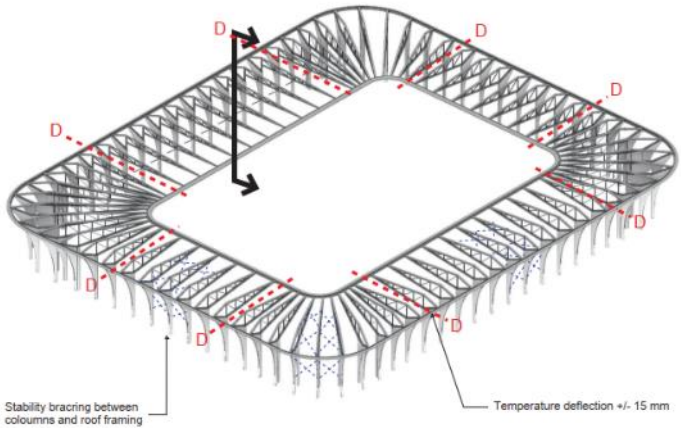
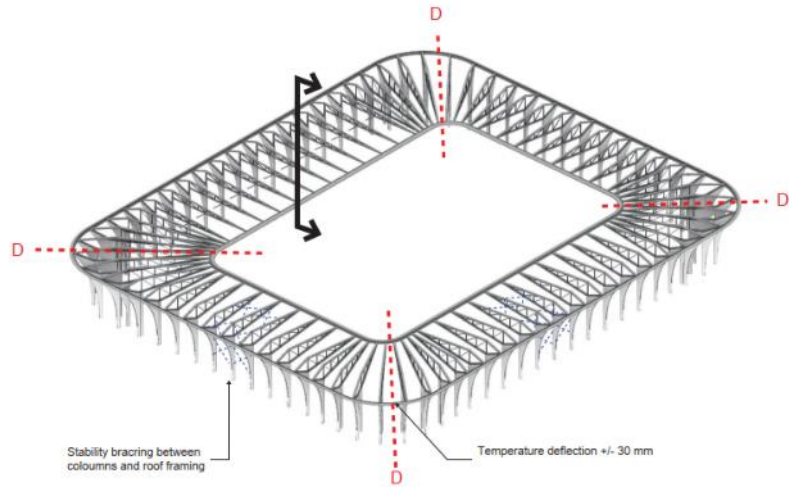
Kontrolleret af: MOLL Dato: 04.12.2024

Emne: Stålgitter LS.03	Sag nr: 41008066	NSA_K09_LS_H4_ET1_N433
Fase: Udførelsesprojekt	Mål: 1 : 100 Sign: CHDR	
☐ Totalrådgiver og arkitekt:	ZAHA HADID ARCHITECTS 101 Goswell Road London EC1V 7EZ, UK	T: +44 20 7253 5147 zaha-hadid.com
☐ Arkitektrådgiver:	SWECO ARCHITECTS Willemoesgade 13 8200 Aarhus N	T: 7024 1000 swecoarchitects.dk
☒ Ingeniørrådgiver:	SWECO Willemoesgade 13 8200 Aarhus N	T: 7220 7207 sweco.dk
☐ Landskabsarkitektrådgiver:	TREDJE NATUR Helmdalsvej 35, Baghuset 4. sal 2200 København N	T: 4223 9915 tredjenatur.dk

Stabilitet



PROPOSED OPTION

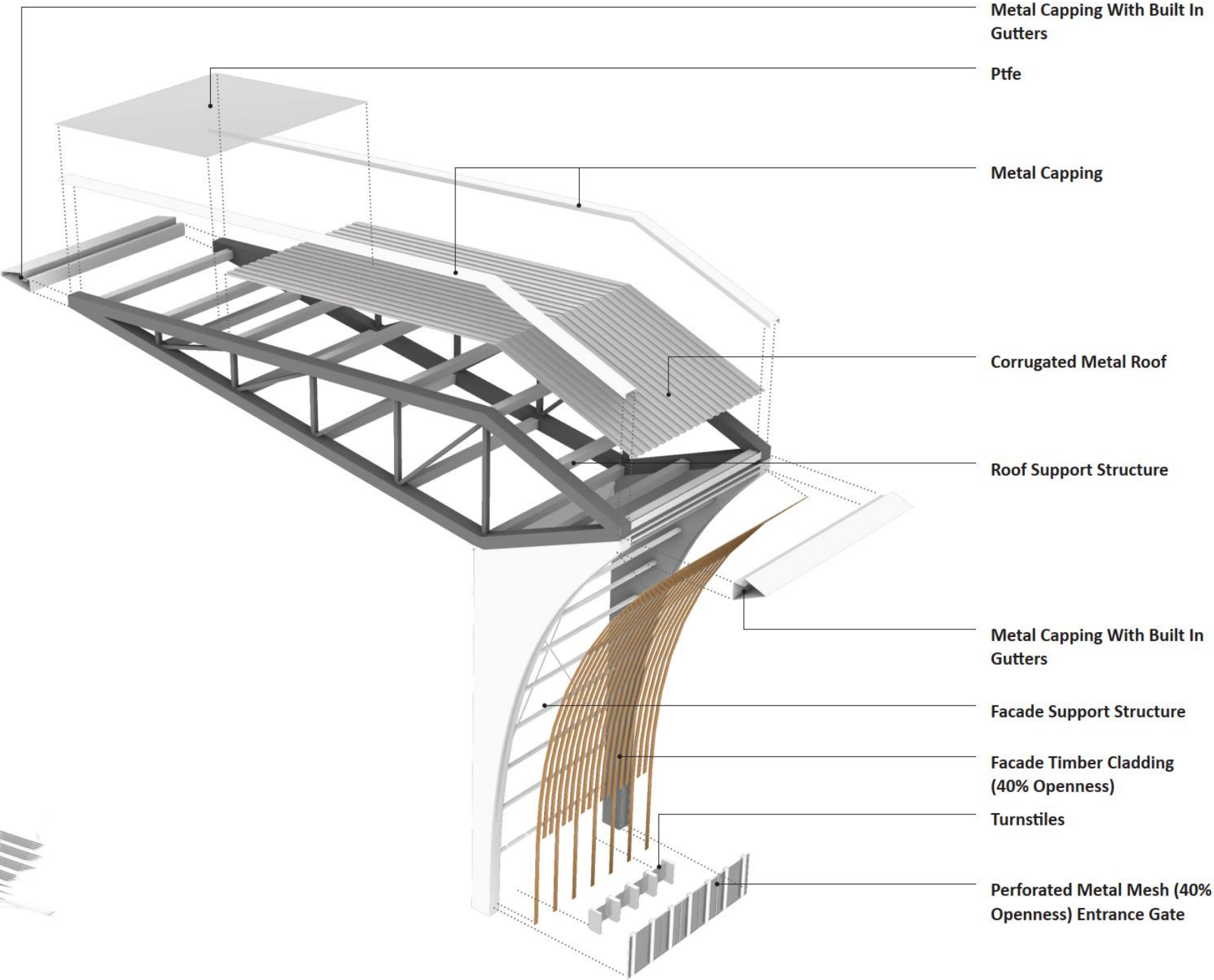
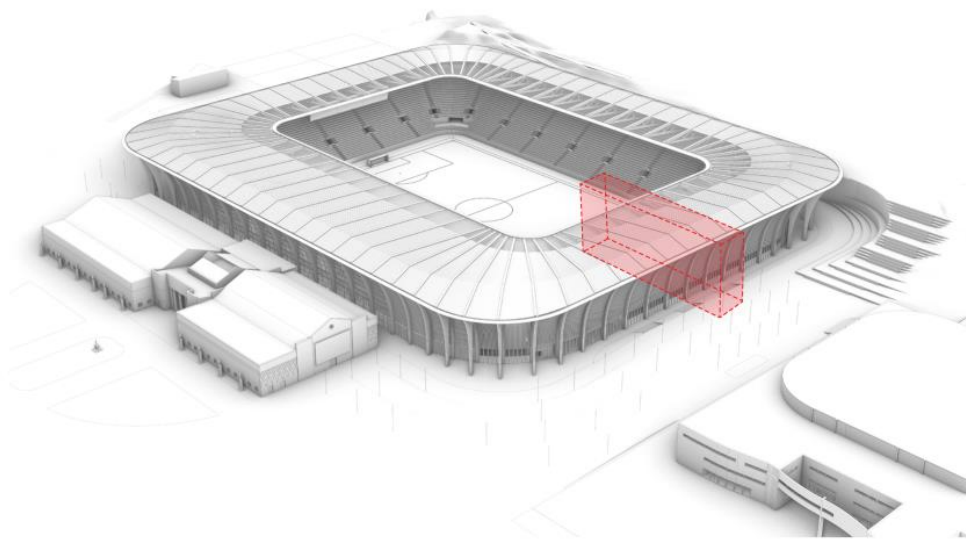


ALTERNATIVE OPTIONS

Byggbarhed

Tag og facade

24



EXPLODED AXONOMETRIC

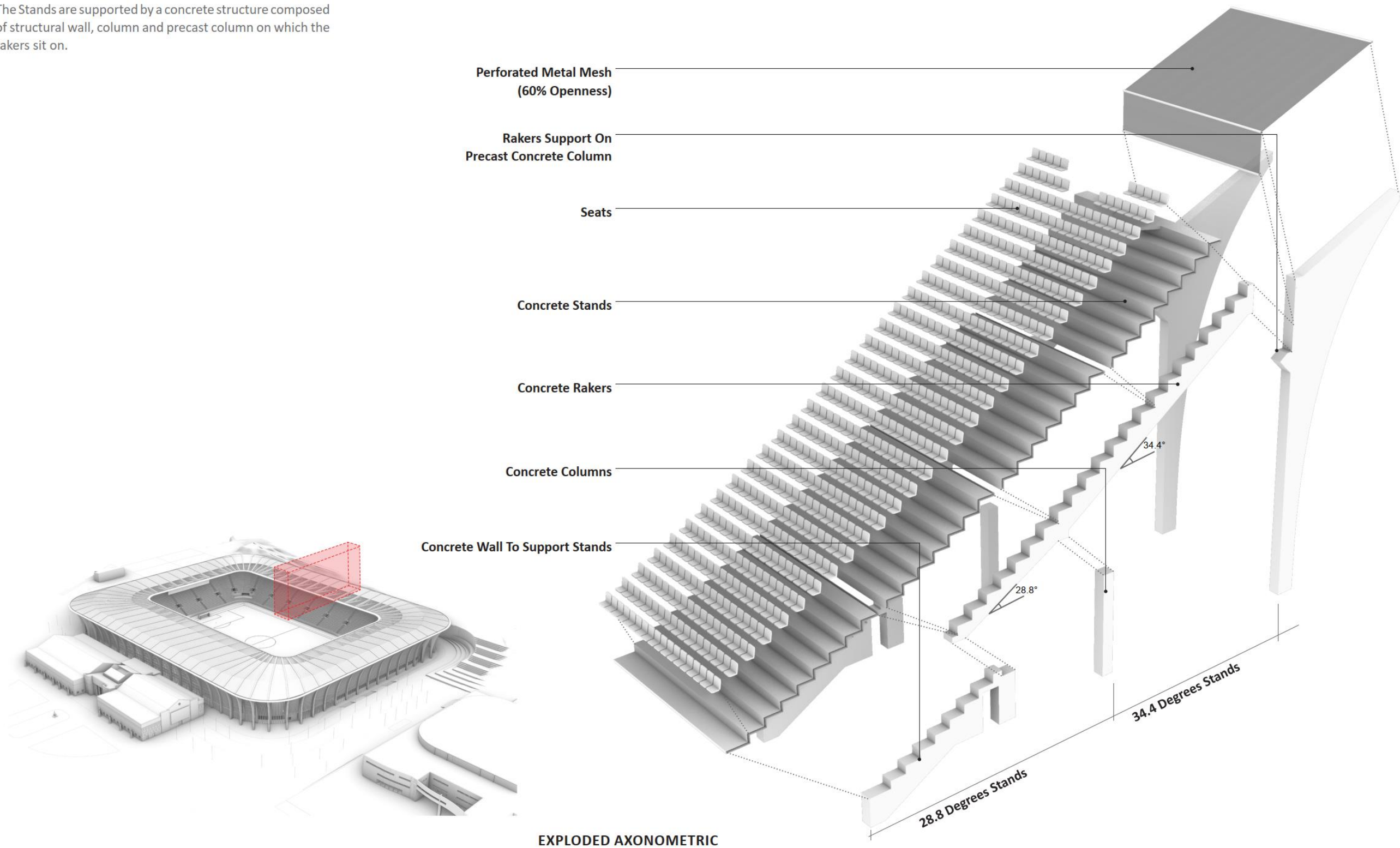
STATUS

TEST AF TRÆSORT

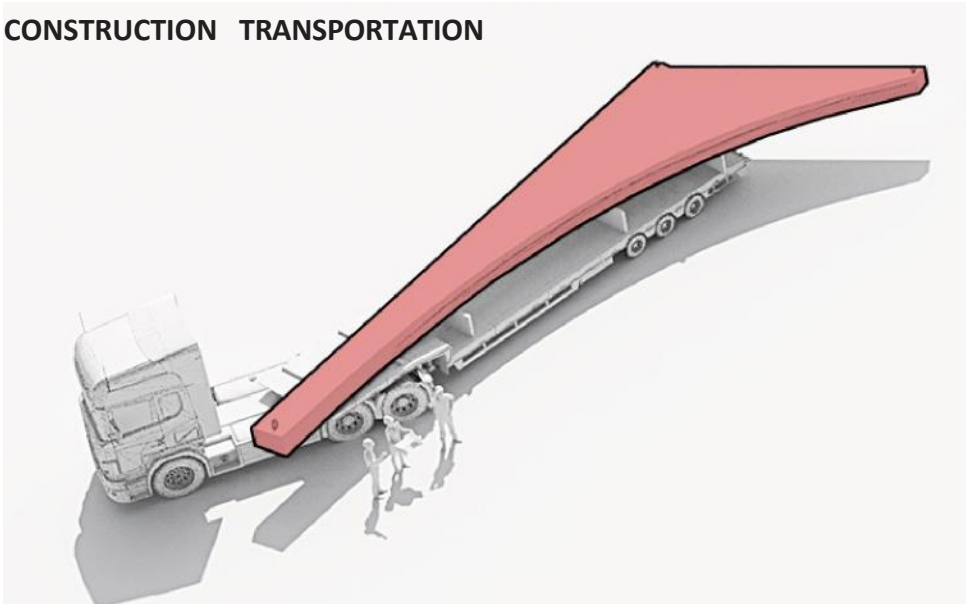
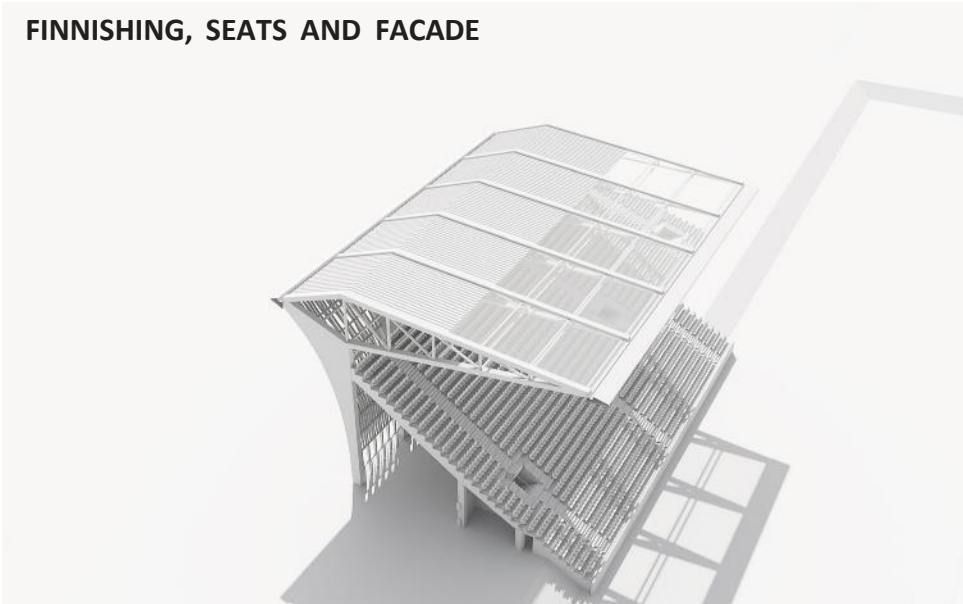
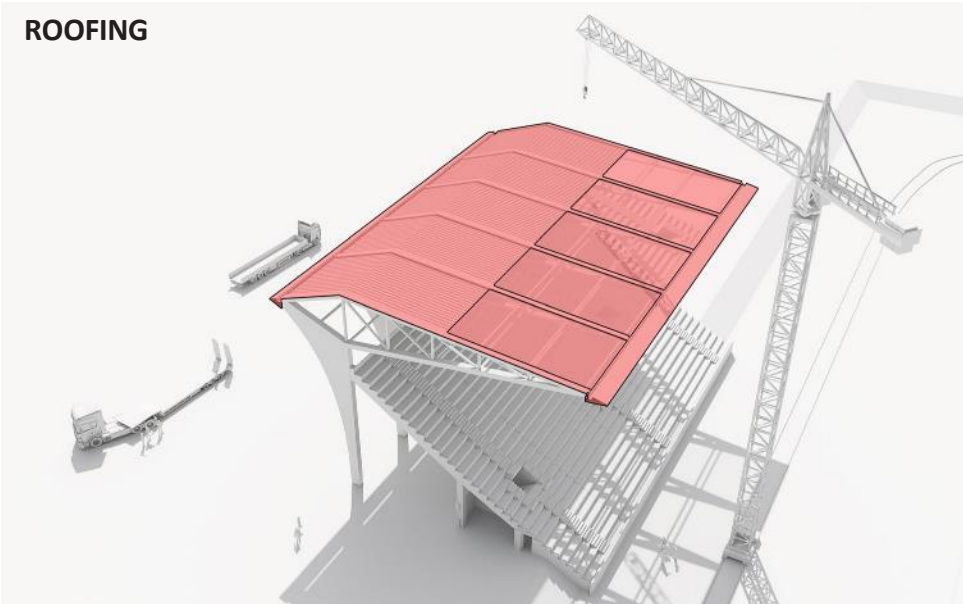
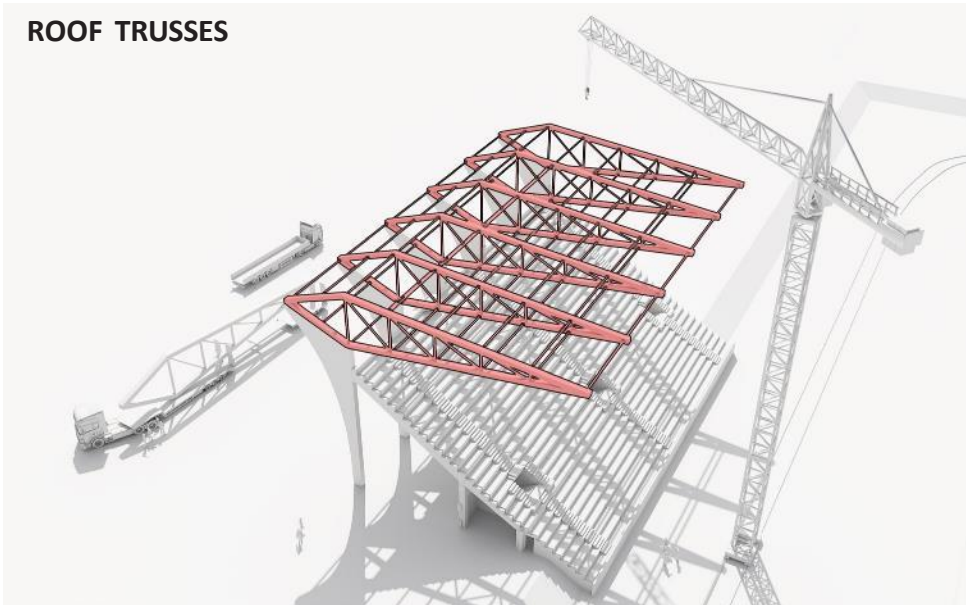
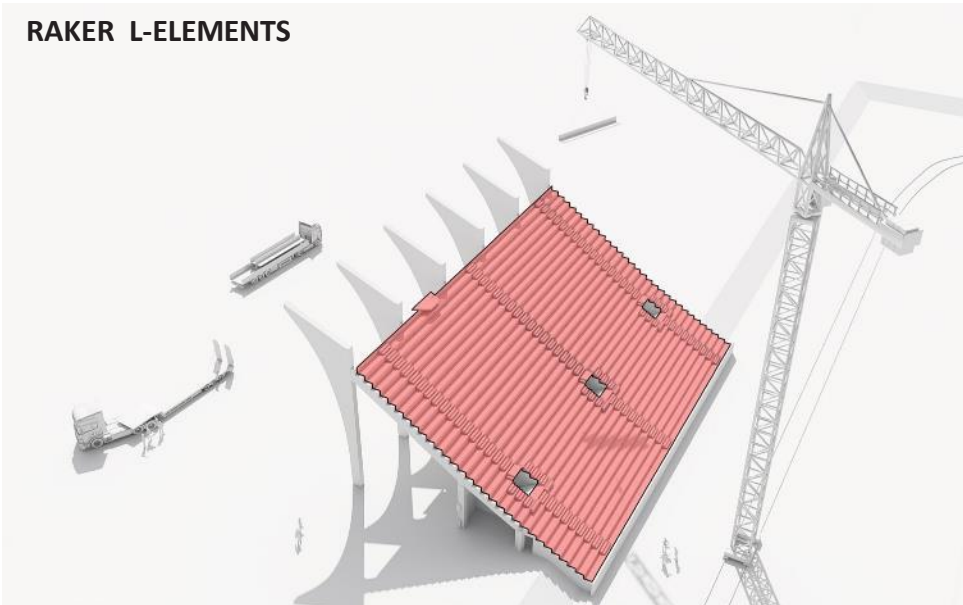
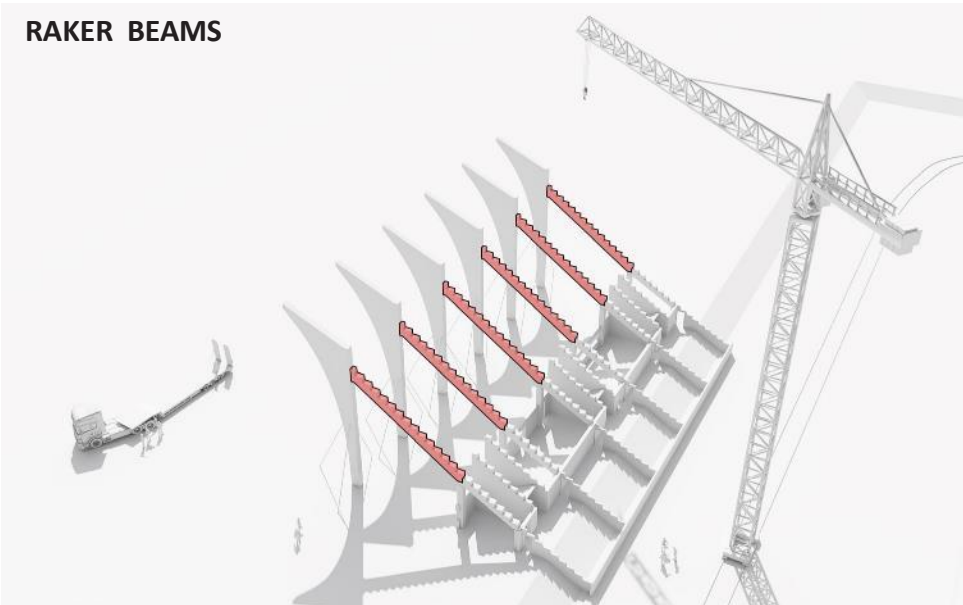
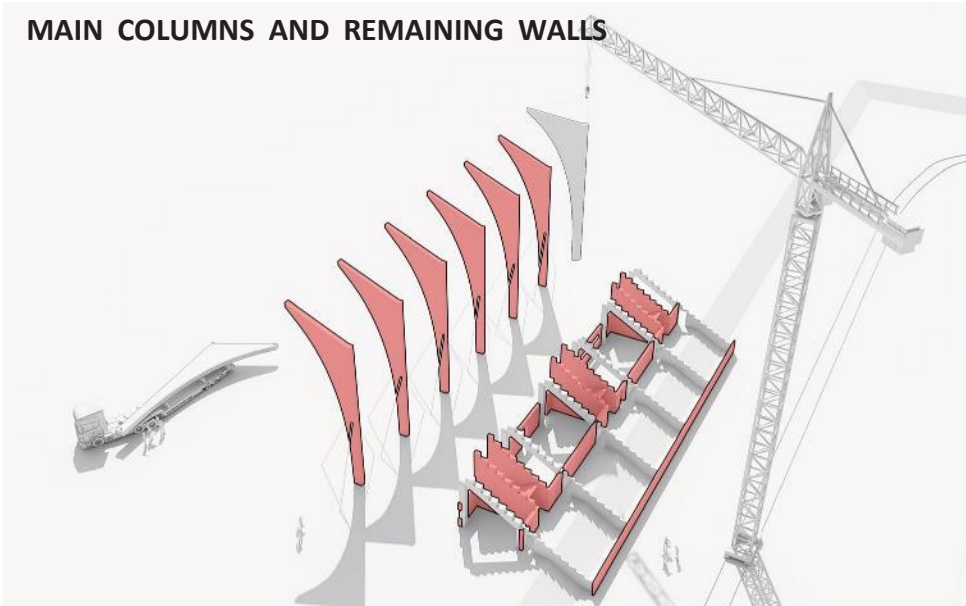
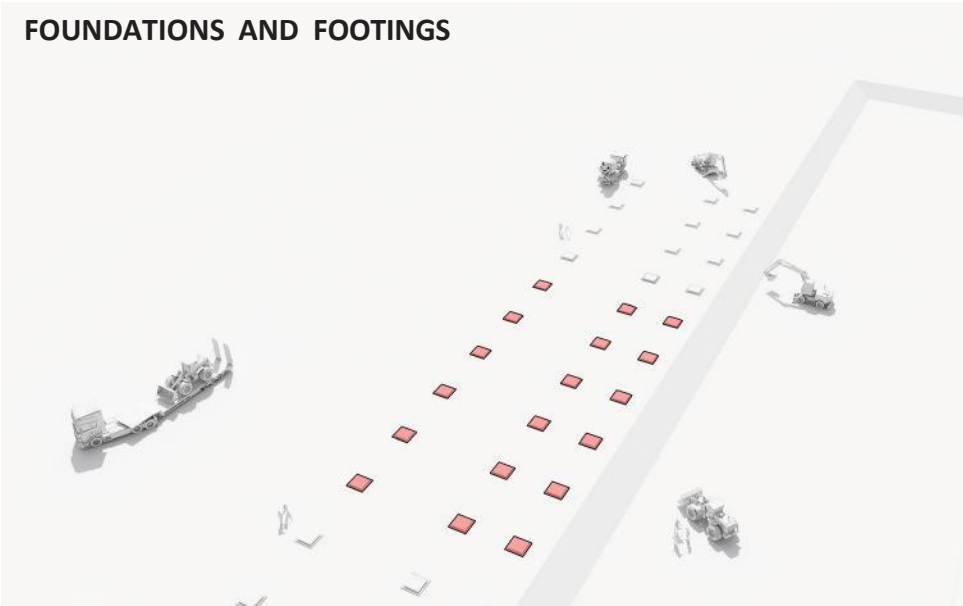


RAKER / STANDS CONSTRUCTION

The Stands are supported by a concrete structure composed of structural wall, column and precast column on which the rakers sit on.

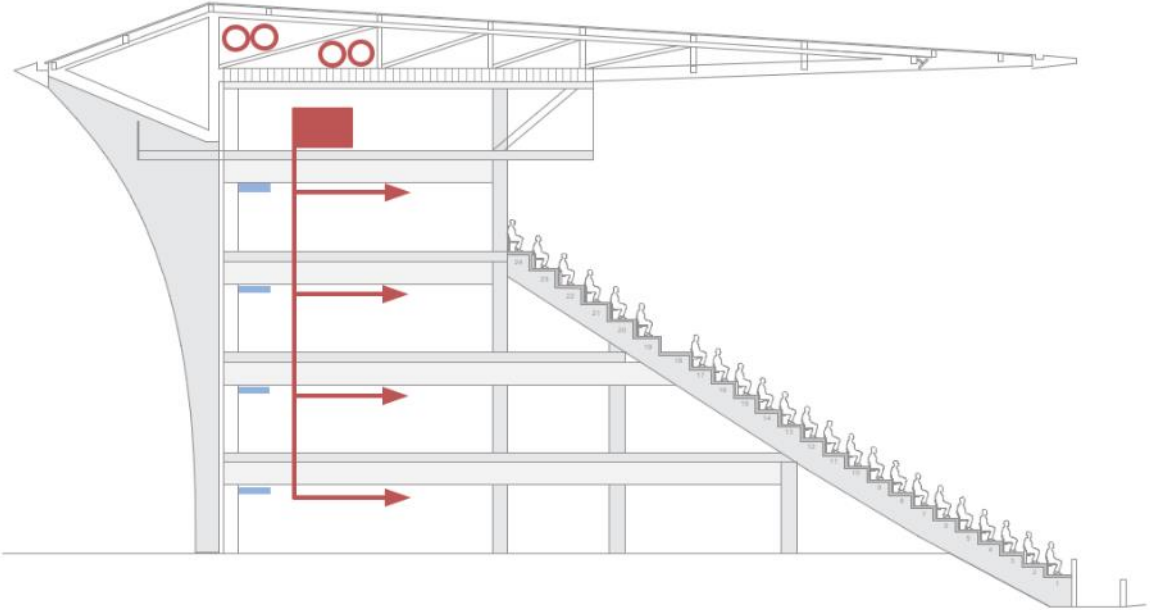


BYGGERYTME



Installationer

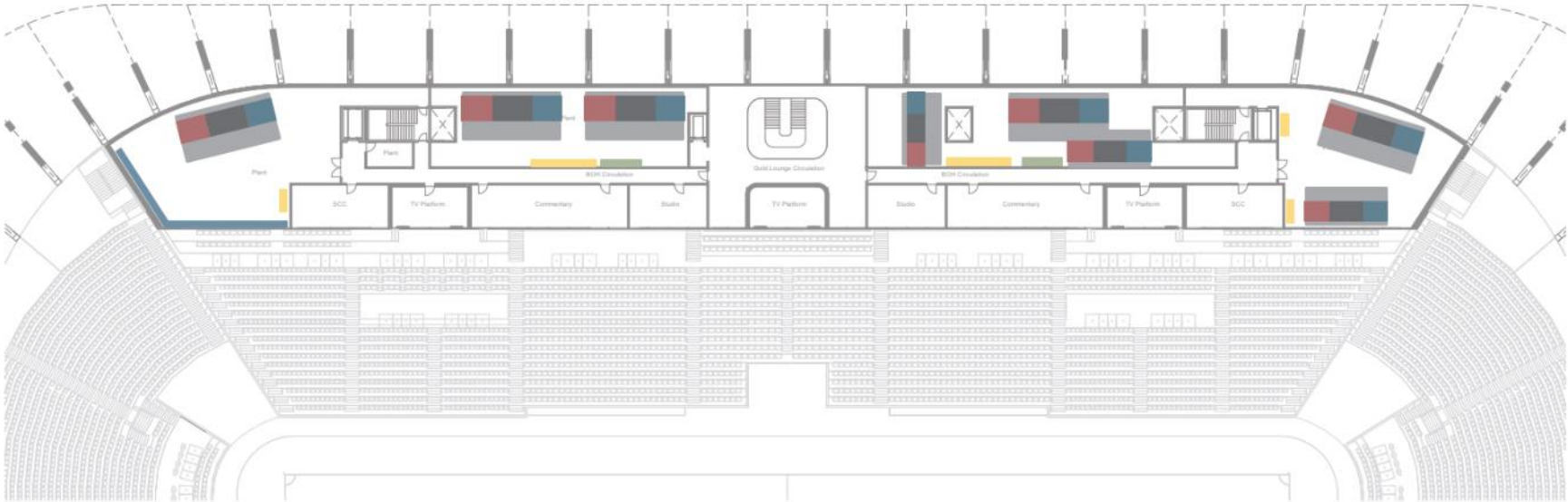
Principper for tekniske installationer



- SIGNATURES, SECTION**
- Main route for electricity supply incl. low voltage installations
 - Ventilation plant room
 - Air supply and return air
 - Air supply

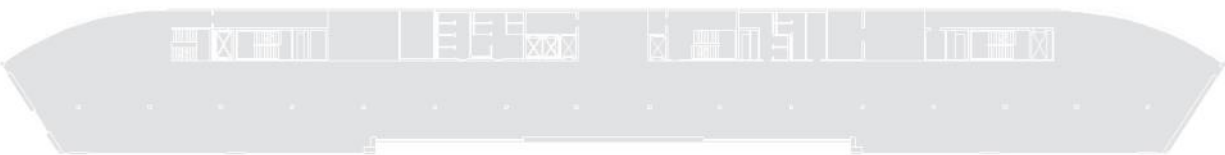
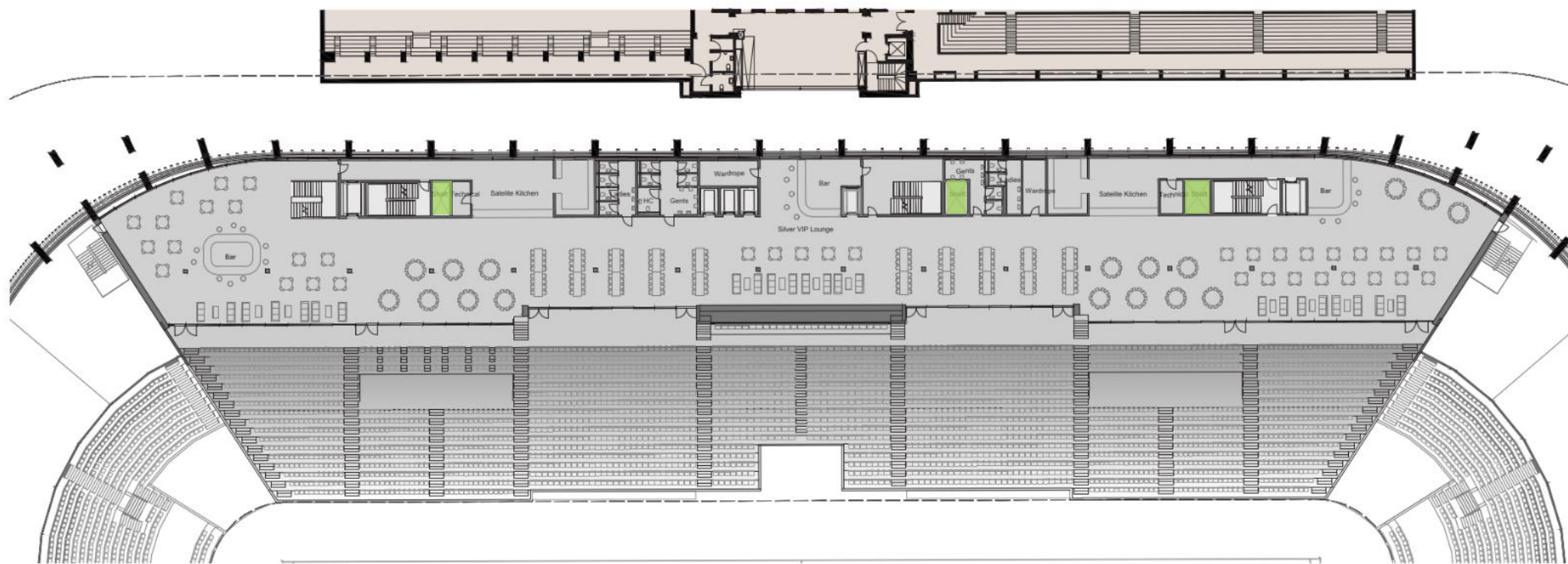
- SIGNATURES, PLAN**
- Water/heat
 - Electrical board
 - Mixing circuits and switchboard
 - Intake/Return
 - Ventilation system
 - Extraction/Inflow
 - Service area

MAIN ROUTING PRINCIPLE - REPRESENTATIVE SECTION OF MAIN BUILDING

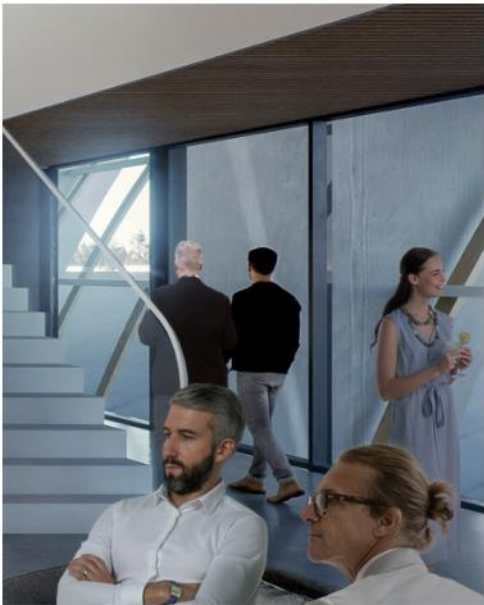


MAIN ROUTING PRINCIPLE - REPRESENTATIVE 4TH FLOOR PLAN OF MAIN BUILDING

NORTH STAND 2ND FLOOR 1:500



■ Silver

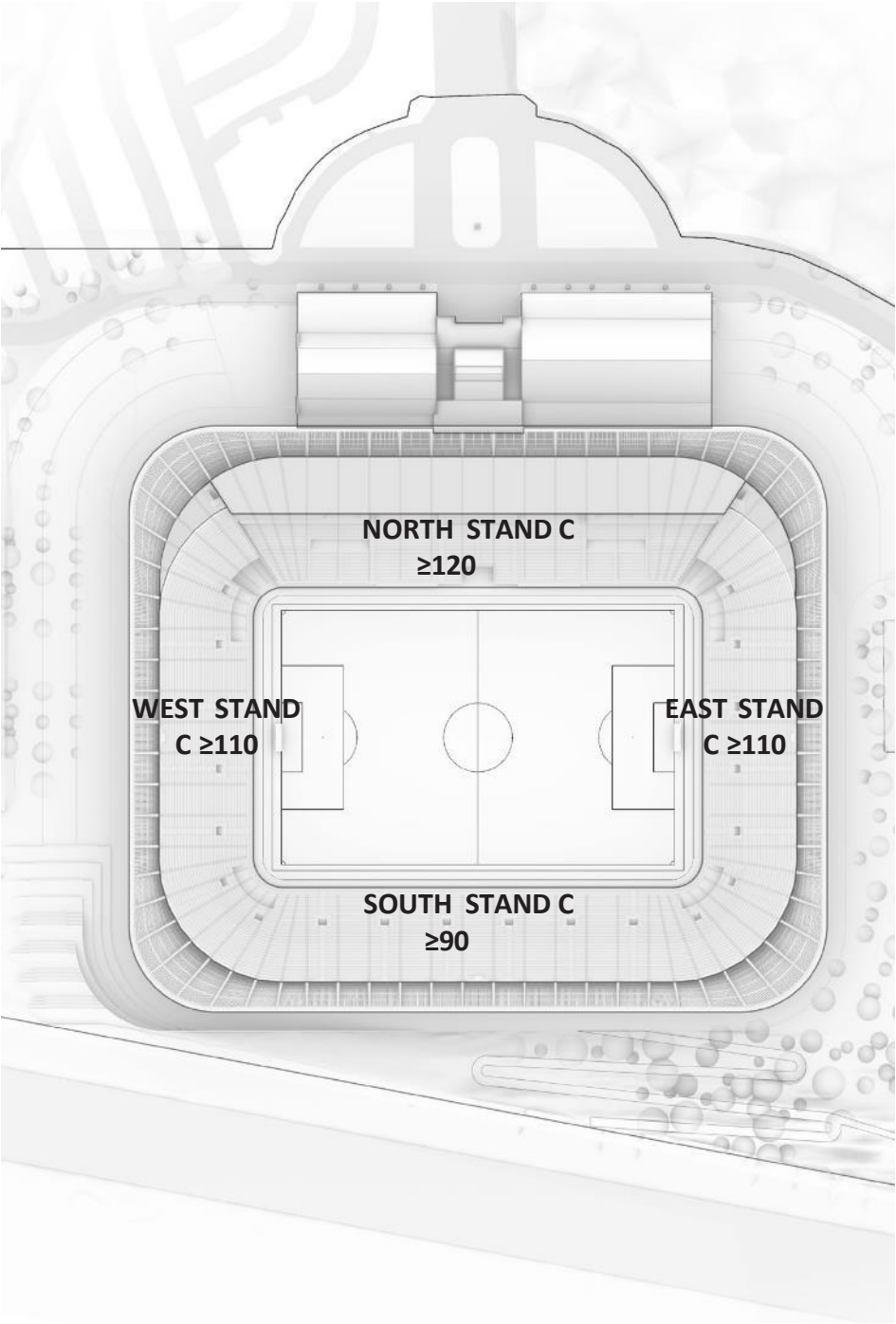


Clear Glazing And Concrete Floor



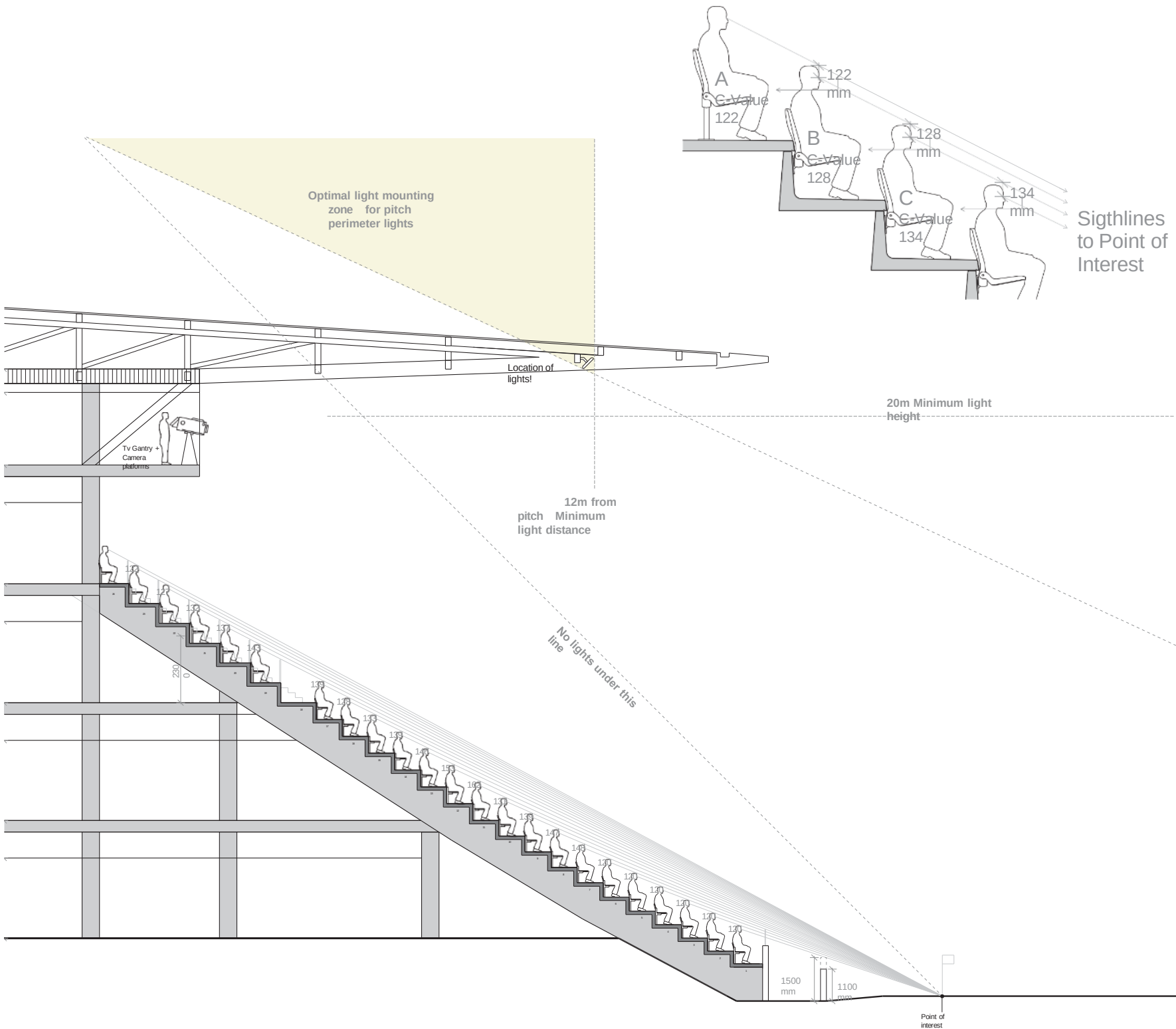
Acoustic Ceiling With Embedded Lighting

STADION BELYSNING



C-VALUES

Zaha Hadid Ltm, Sweco Danmark A/S, Tredje Natur Aps

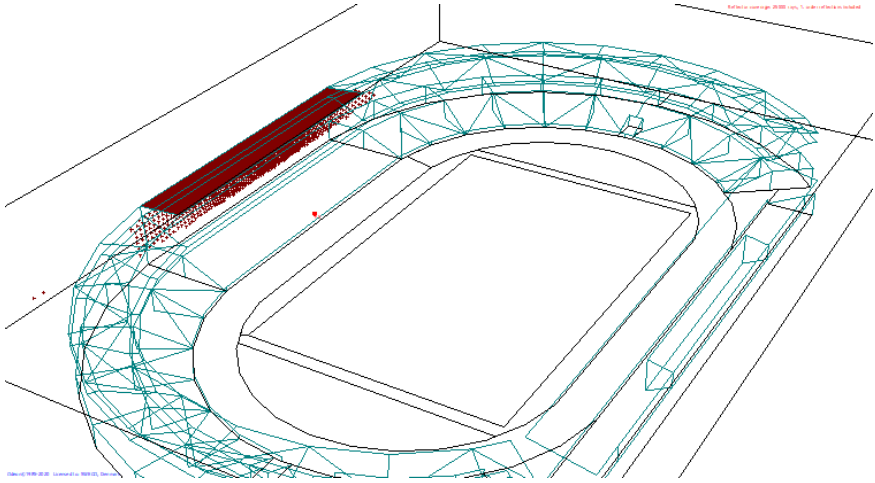
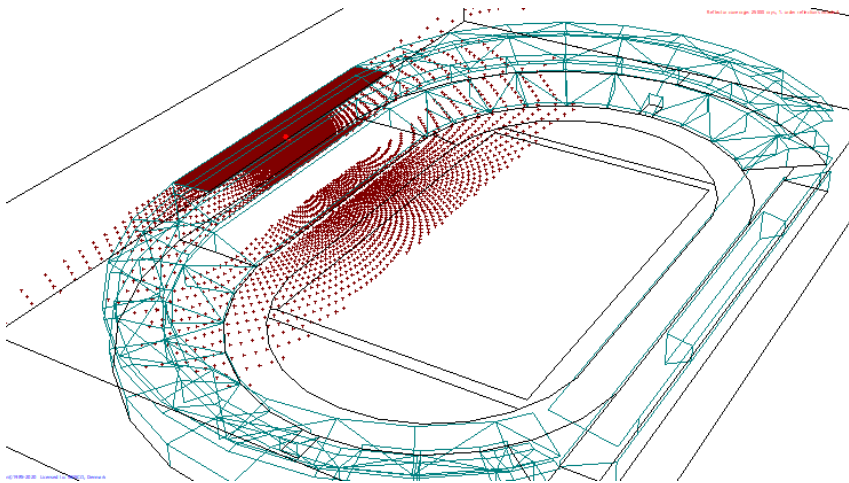
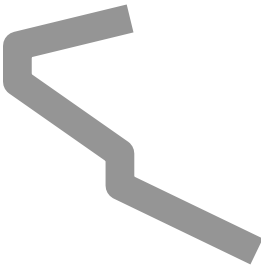


C-VALUES - NORTH STAND

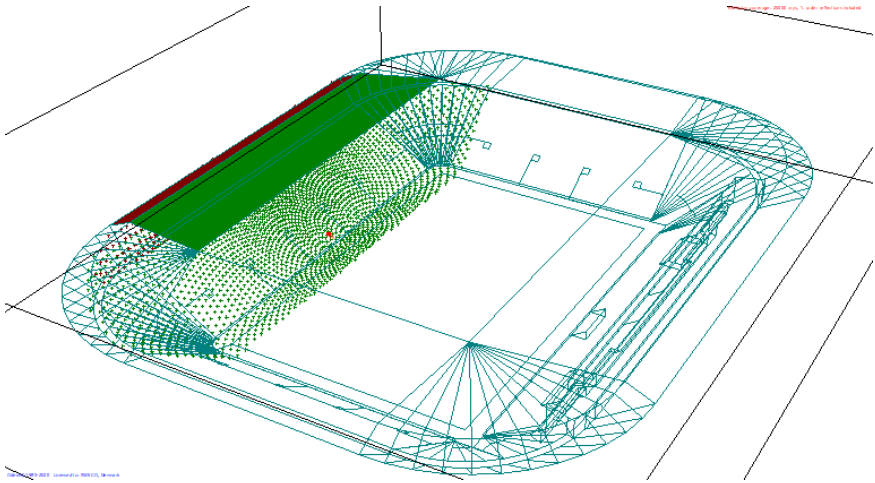
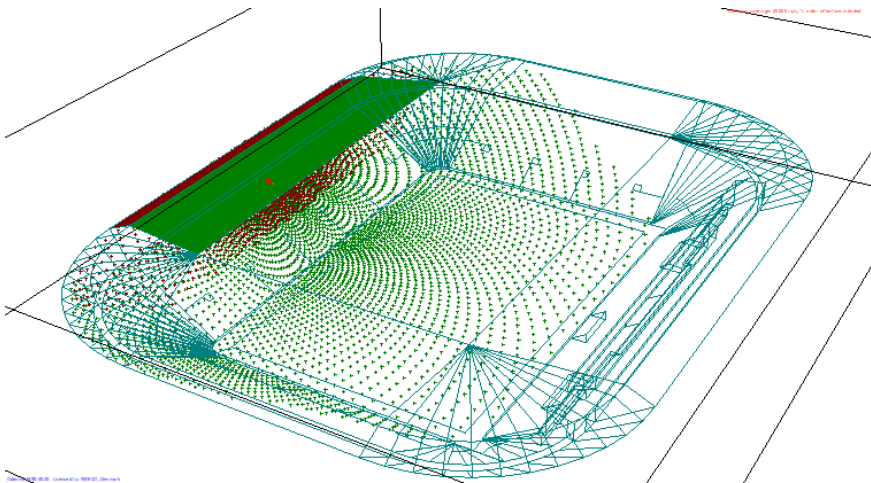
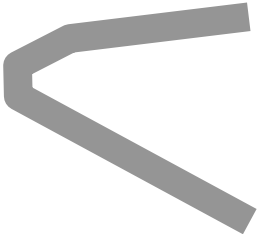
Akustik

Fodbold akustik

Existing stadium

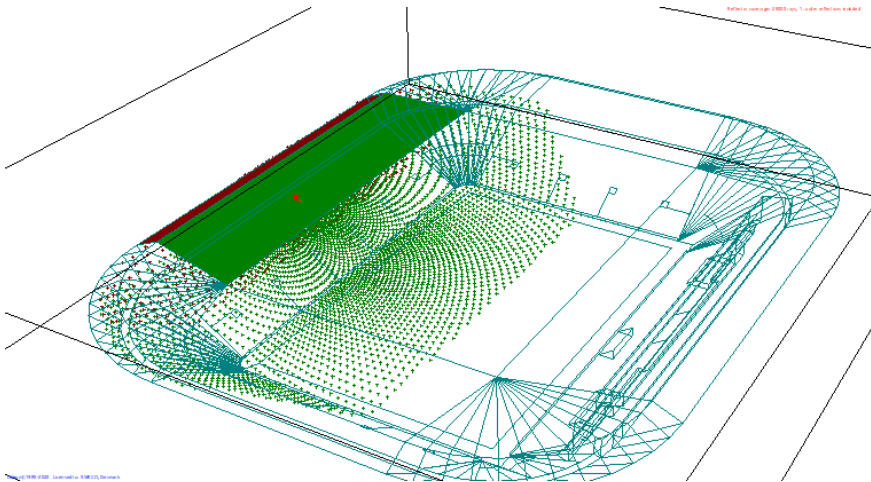
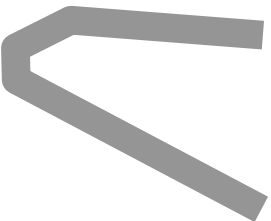


Inclining roof

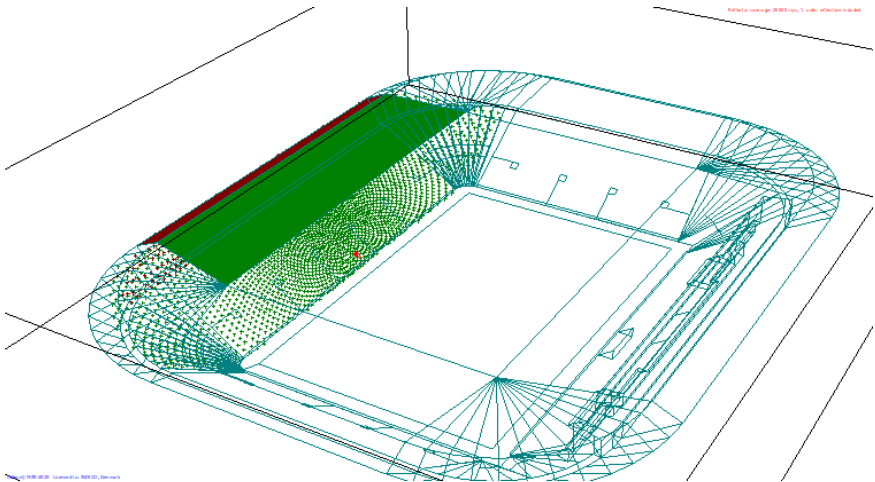


PROPOSED OPTION

Declining roof



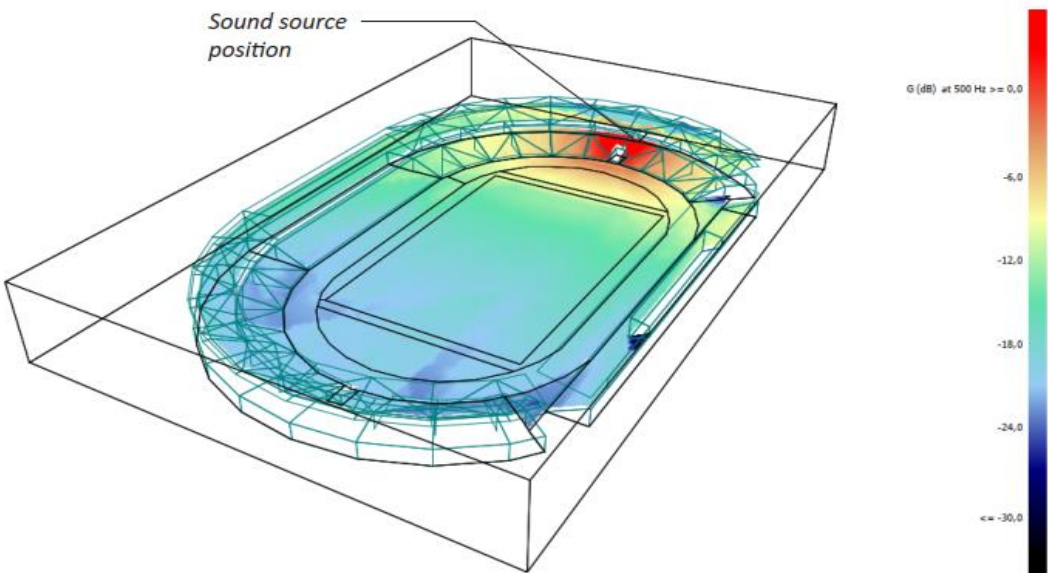
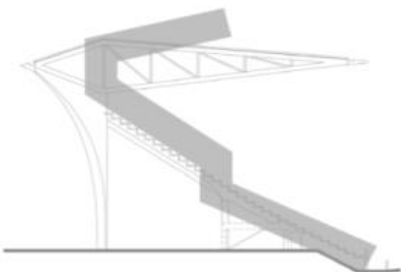
Spectator on rear part of stand



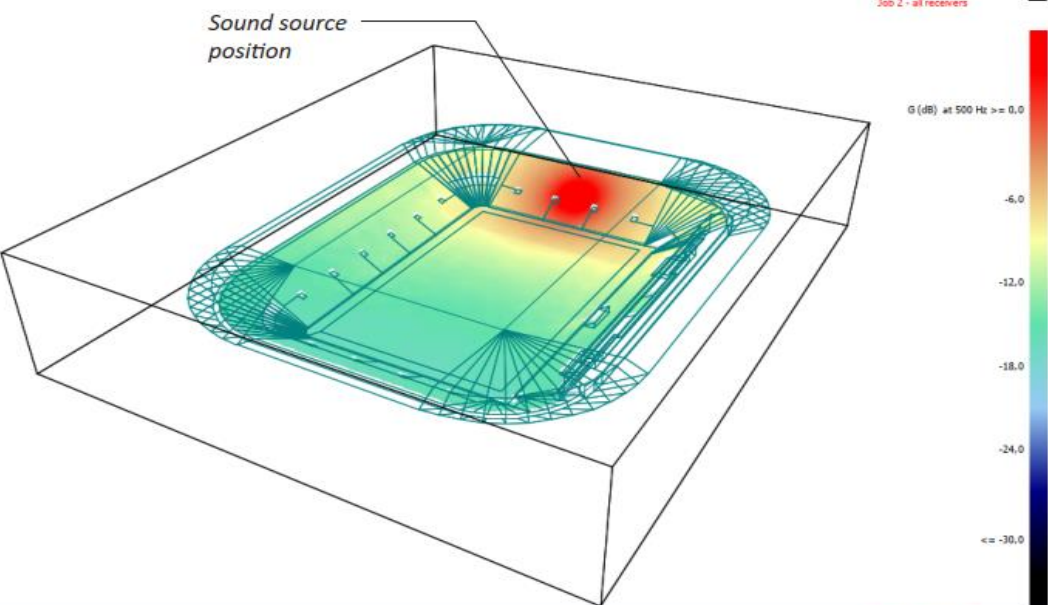
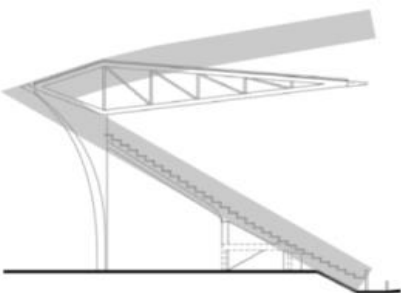
Spectator near the field

Koncert akustik

Existing stadium

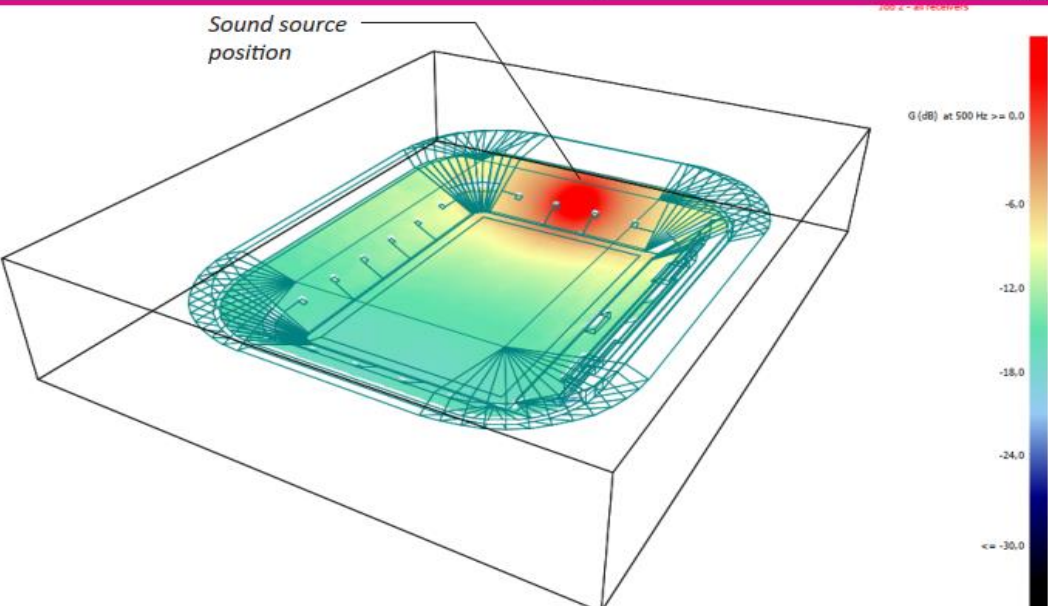
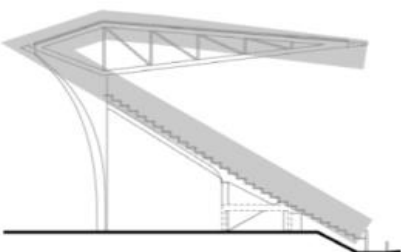


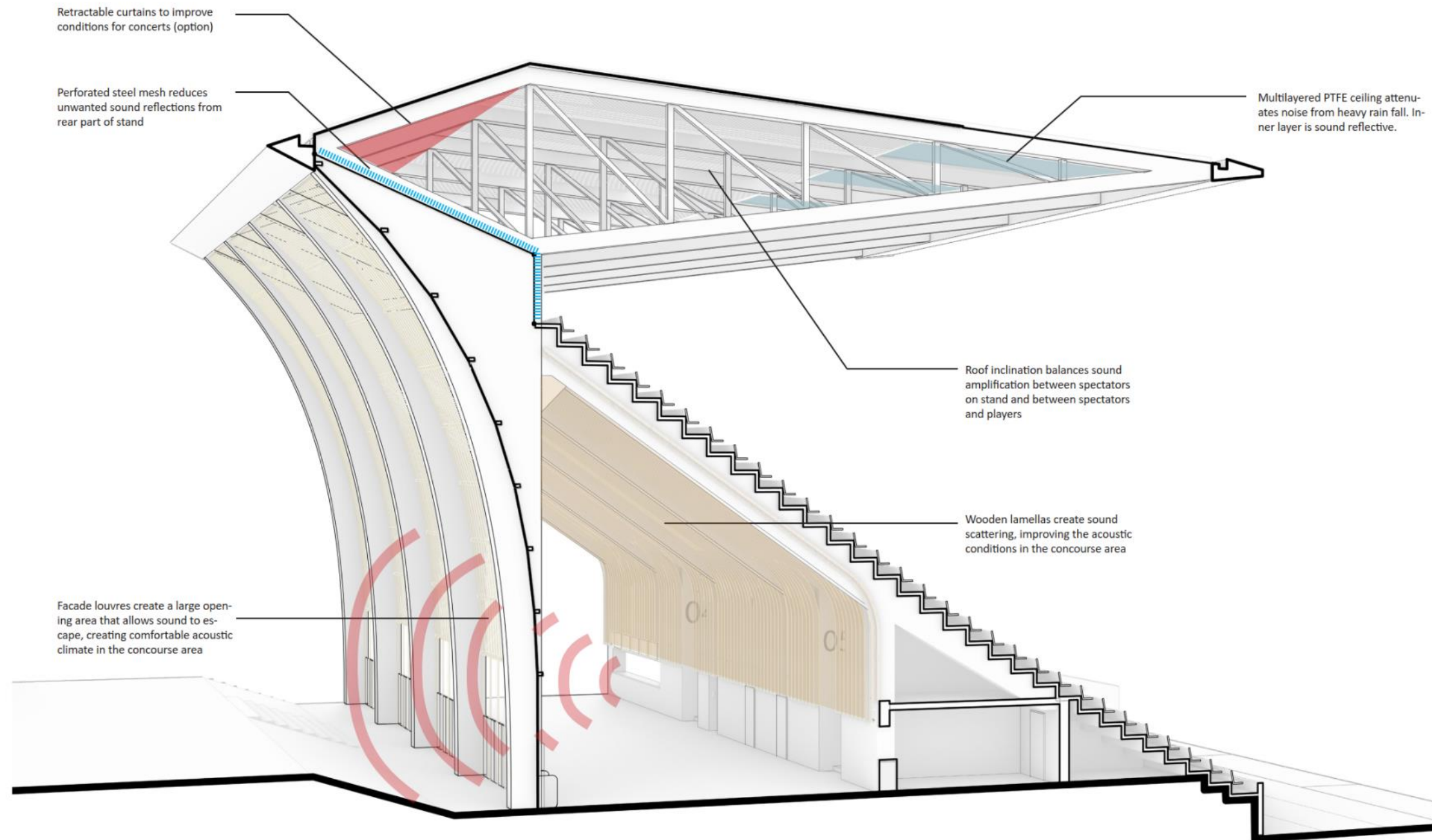
Inclining roof



PROPOSED OPTION

Declining roof





Vind

Vind comfort

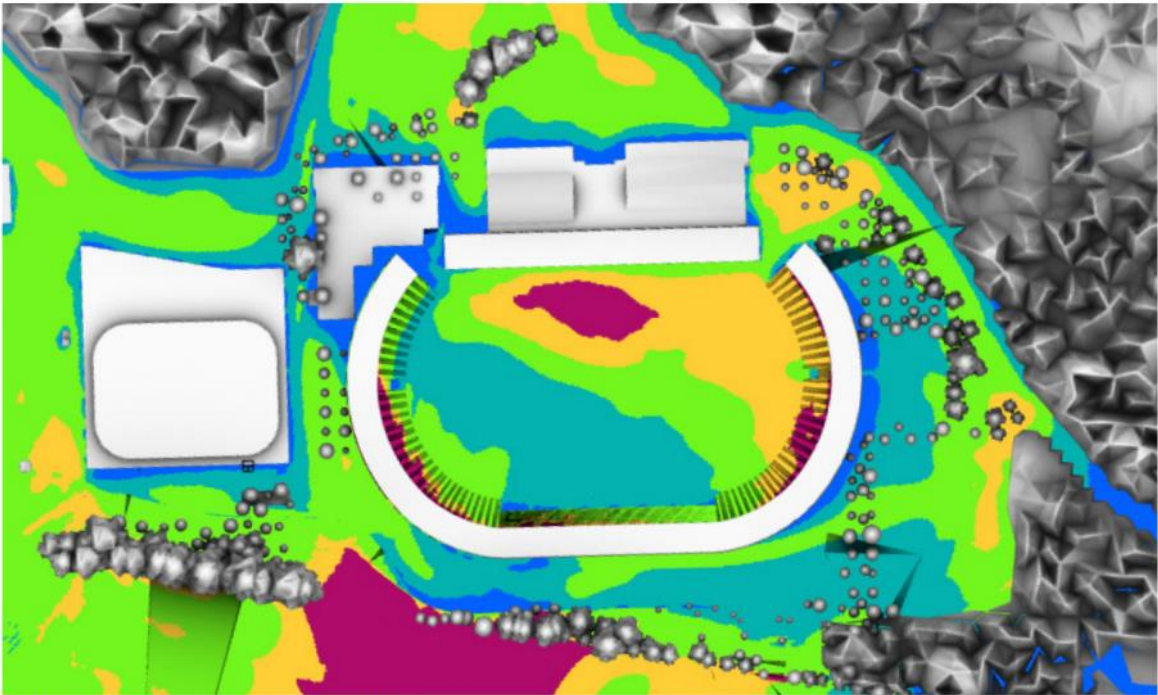
Føles der træk

37

A	2.5 m/s	< 5%	Frequent Sitting
B	4 m/s	< 5%	Occasional Sitting
C	6 m/s	< 5%	Standing
D	8 m/s	< 5%	Walking
E	8 m/s	> 5%	Uncomfortable
S	15 m/s	> 0.022%	Unsafe

EXISTING STADIUM

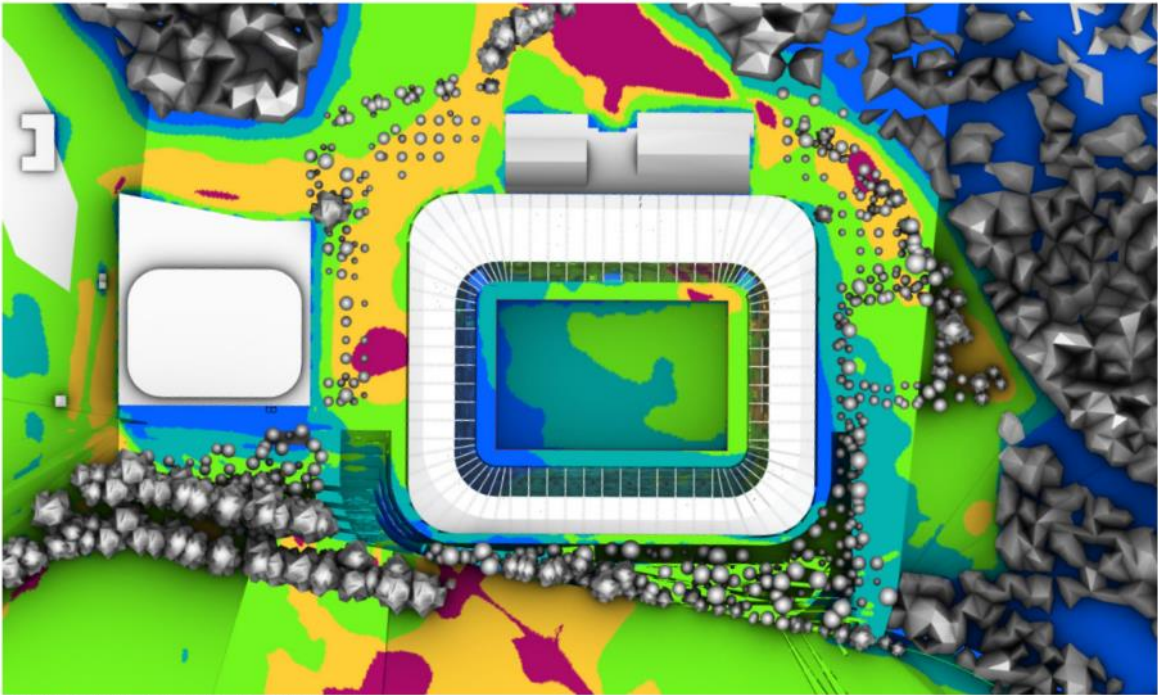
- The existing building being relatively open is highly exposed and doesn't provide sufficient protection for the players as well as the spectators.
- Due to the open design there is observable continuous wind flow across the spectator areas and playing field which creates high wind speeds leading to uncomfortable experience.



WIND ANALYSIS EXISTING STADIUM

NEW STADIUM

- The proposed stadium design in combination with lamella design and landscape proposal work together breaks the continuous wind flow and reduces the wind speed providing necessary protection for the players and spectators in the stadium and surrounding areas.
- This makes the stadium and surroundings area better equipped and usable for sports and cultural events
- The lamella and porous mesh design diffuses the head on wind effects and creates protective zones for the players on the pitch and spectators in the seating and concourse zones.



WIND ANALYSIS NEW STADIUM

WIND COMFORT MAPS

These maps show the wind speed and wind comfort we will achieve on the site once the project is built.

During the design process we considered certain elements to improve outdoor passive comfort levels, like:

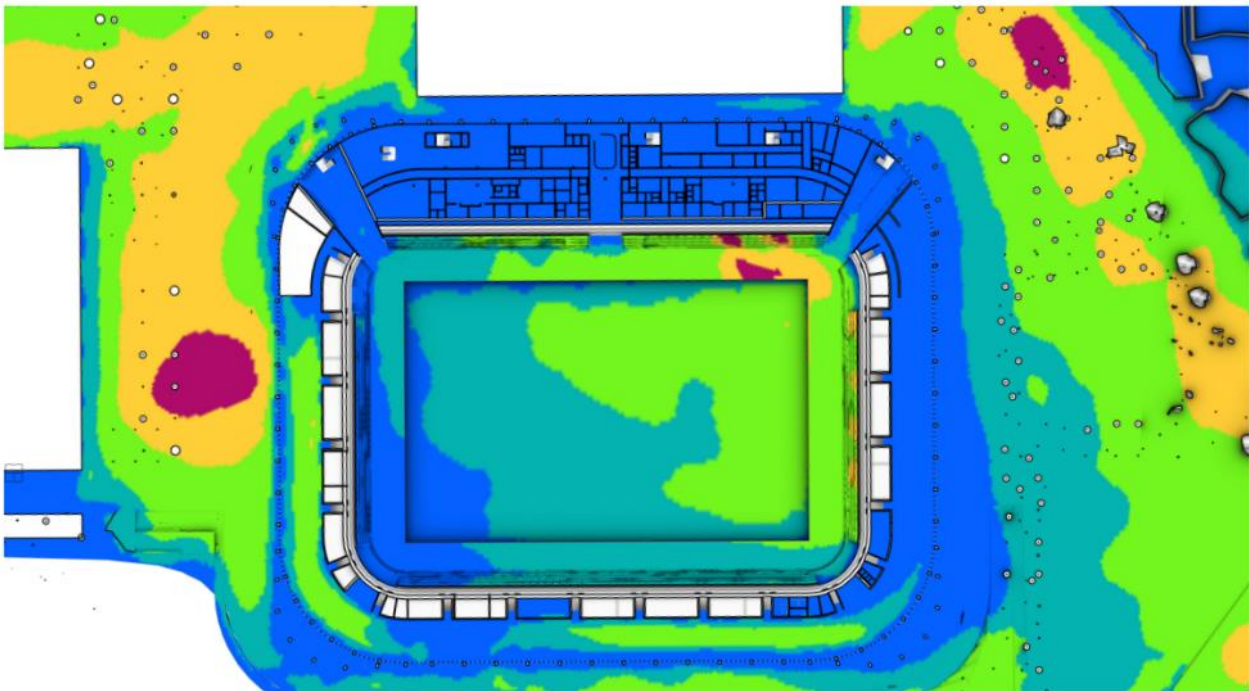
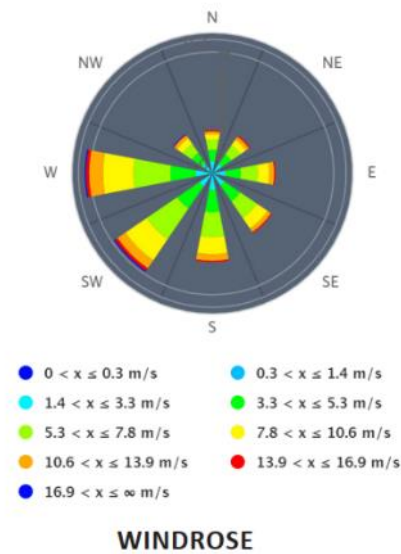
Landscaping - improves the quality of the plaza area making it a communal space for different activities

Lamella structure provide protection from the wind

The curvature of lamellas prevents excess down-draft wind at ground level

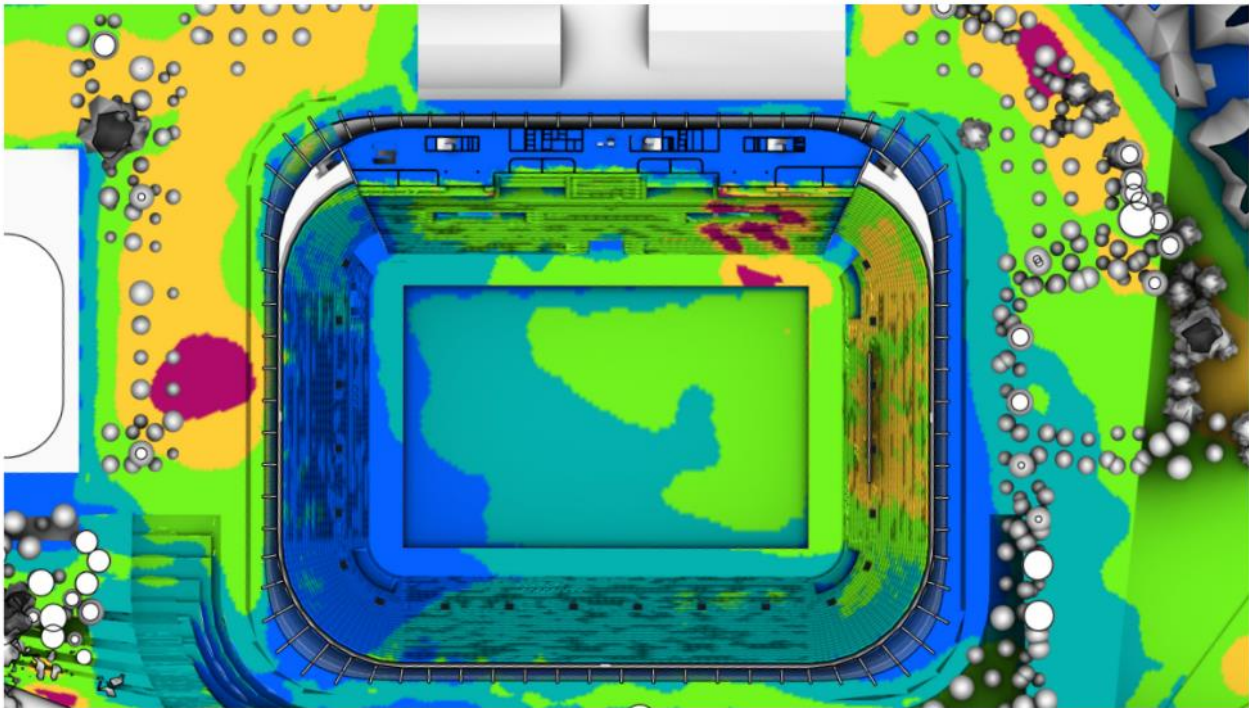
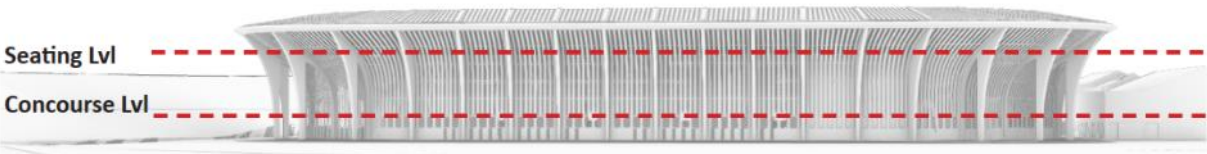
Uniform design of Lamella structure exerts uniform hindrance to wind which reduces uncomfortable near-ground wind

Mesh structure keeps wind passing to and from the stadium area via the concourse. The design is optimised to 60% open with density composition to dissipate wind energy efficiently



CONCOURSE LVL- PEDESTRIAN COMFORT -(BASED ON ALL WIND DIRECTION / ANNUAL DATA)

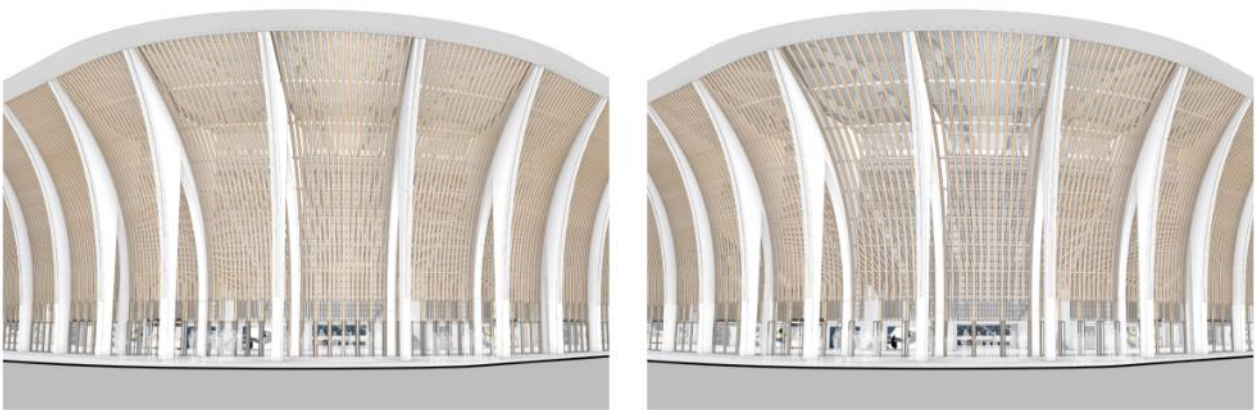
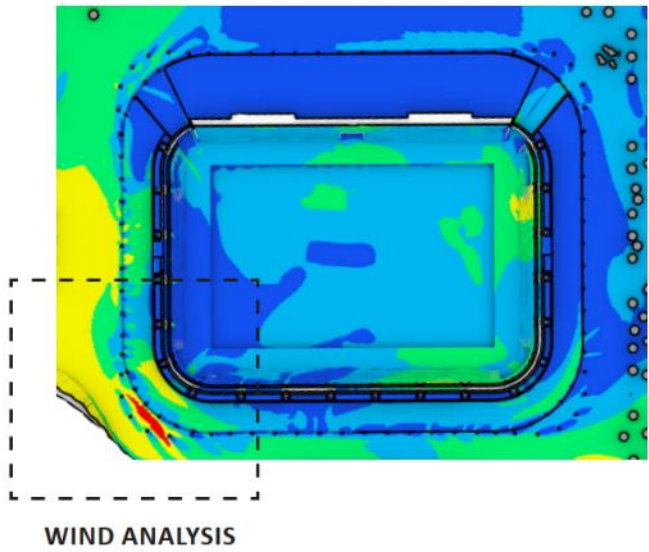
A	2.5 m/s	< 5%	Frequent Sitting
B	4 m/s	< 5%	Occasional Sitting
C	6 m/s	< 5%	Standing
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E	8 m/s	> 5%	Uncomfortable
S	15 m/s	> 0.022%	Unsafe



SEATING LVL- PEDESTRIAN COMFORT -(BASED ON ALL WIND DIRECTION / ANNUAL DATA)

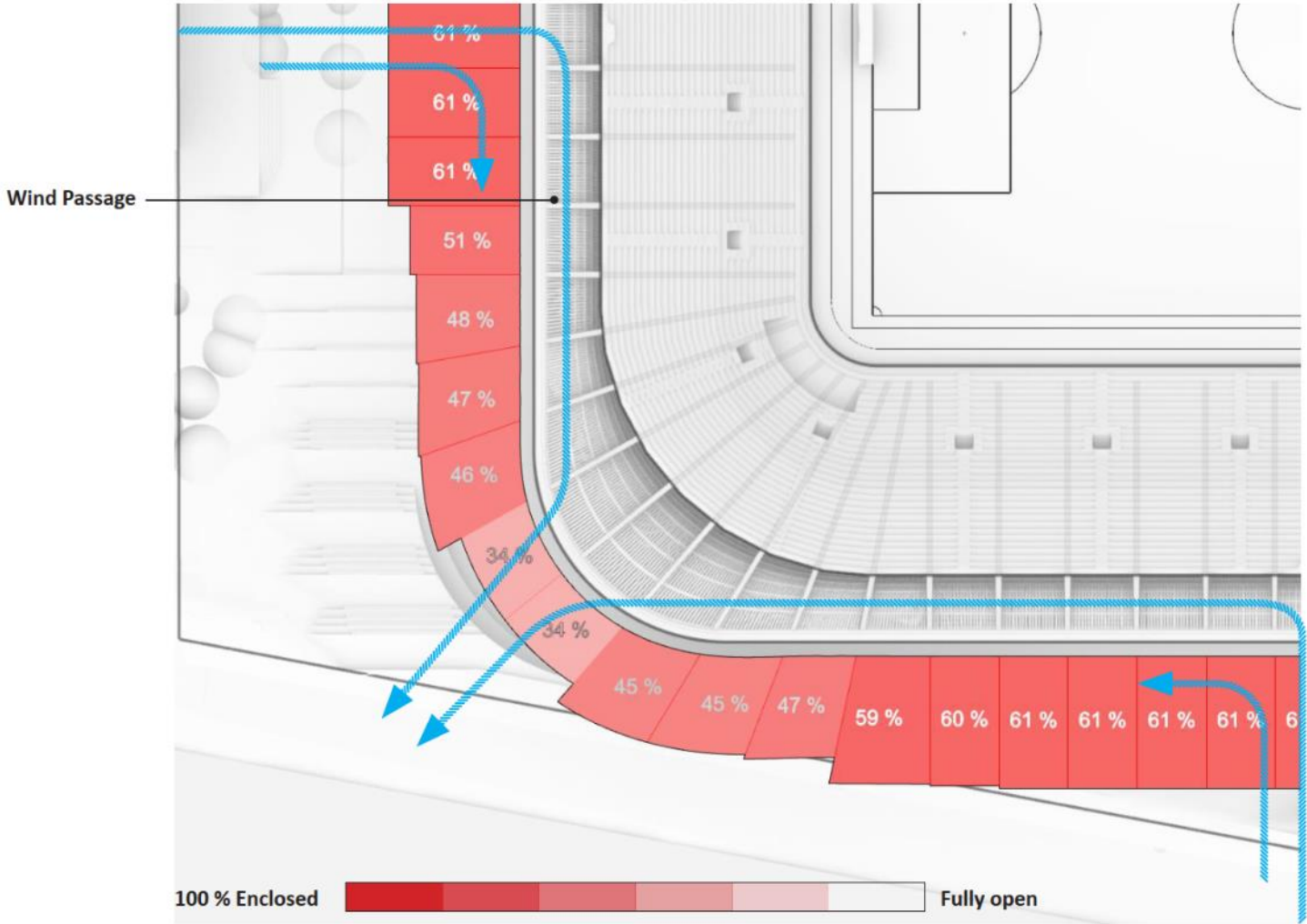
Vind og façade design

39

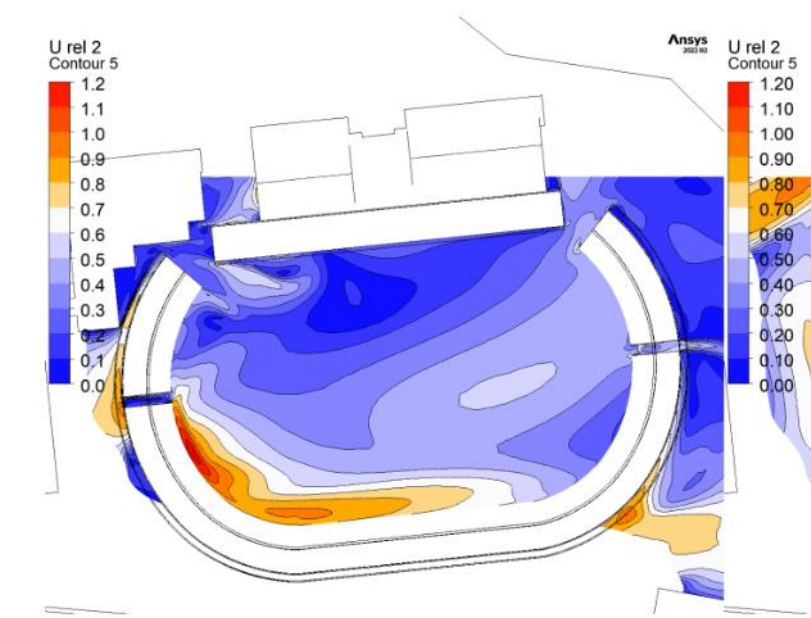


SOUTHWEST CORNER - DENSE COURNERS

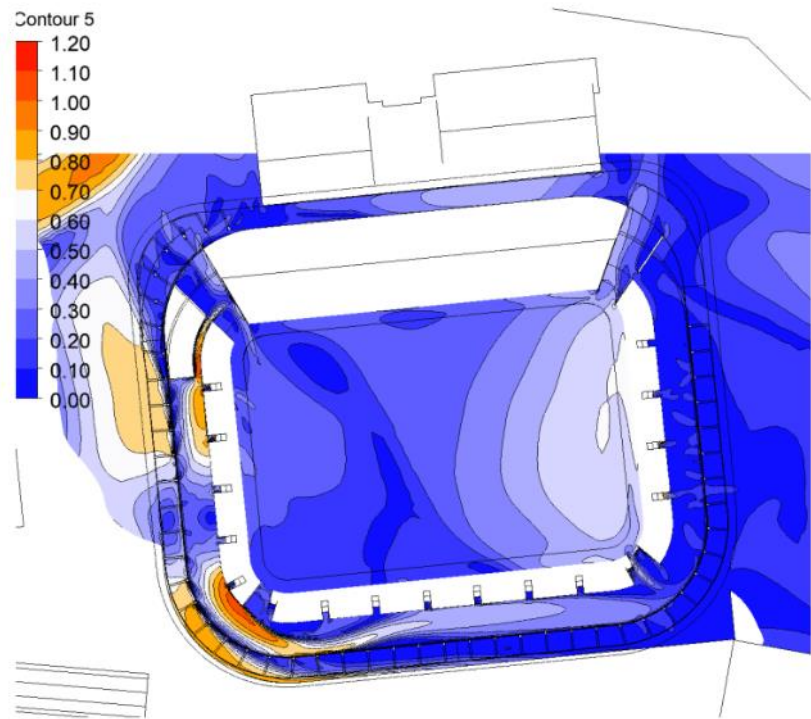
SOUTHWEST CORNER - POROUS CORNERS



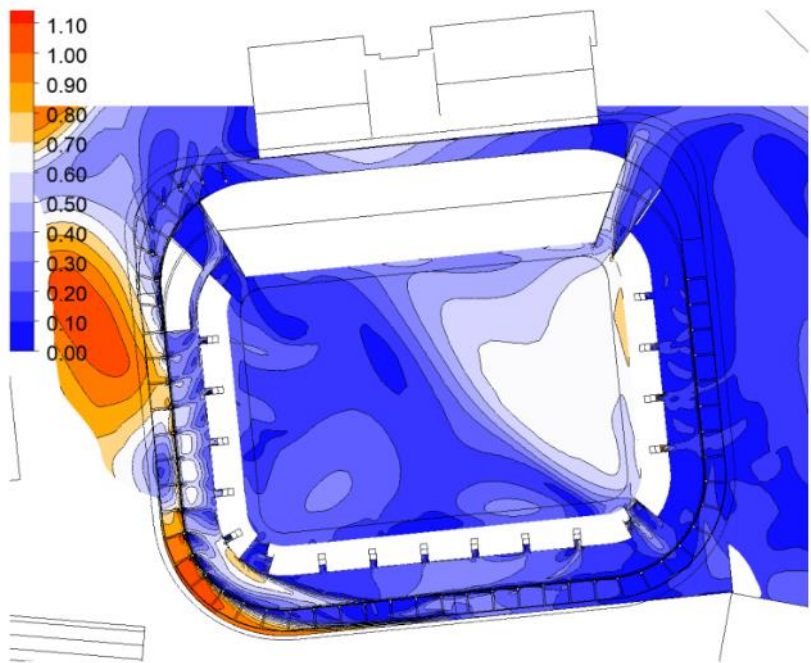
Vind og façade design



EXISTING STADIUM



POROUS STADIUM
40% OPEN WEST FAÇADE

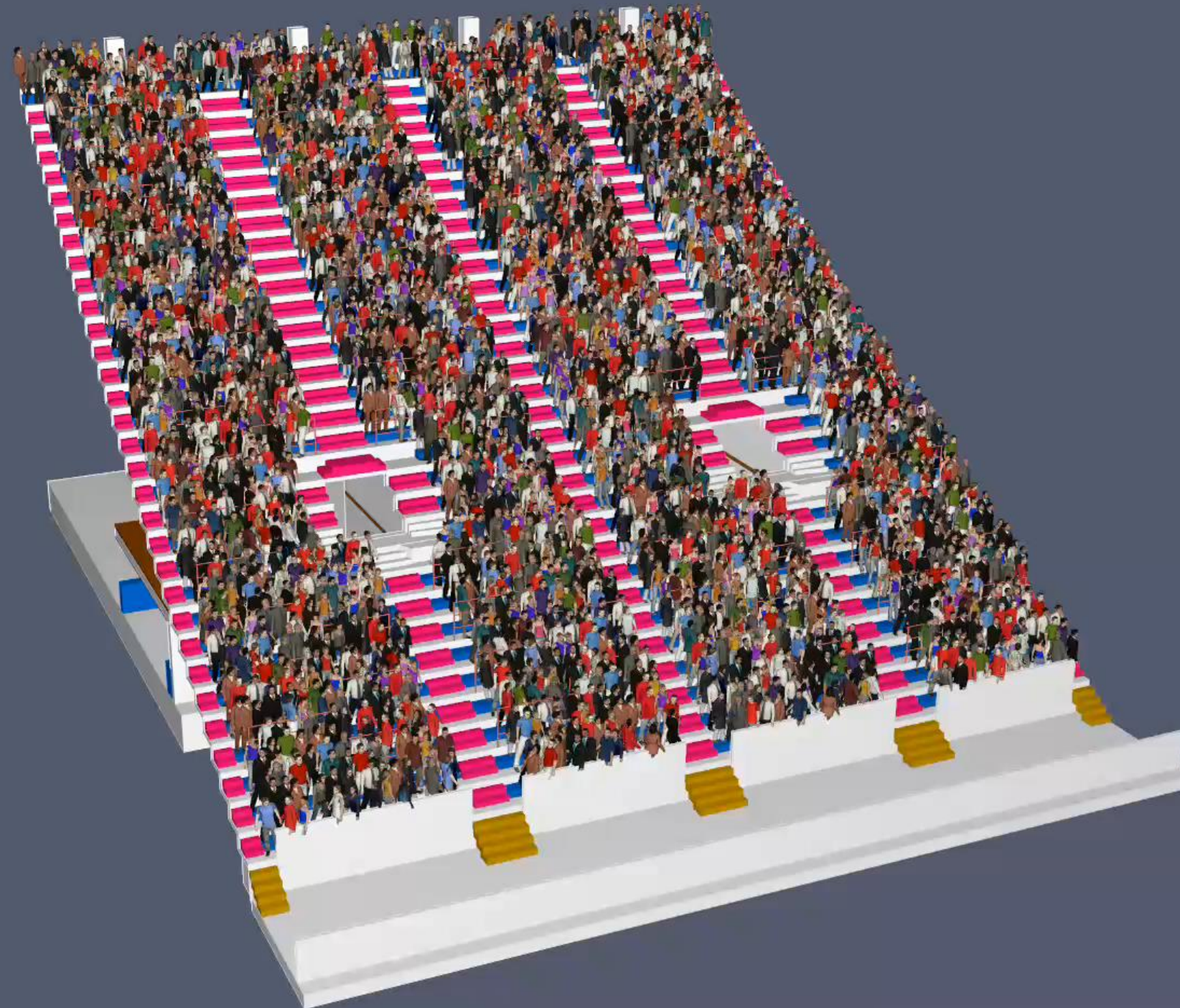


FULLY ENCLOSED STADIUM
100% DENSE WEST FAÇADE

Brand

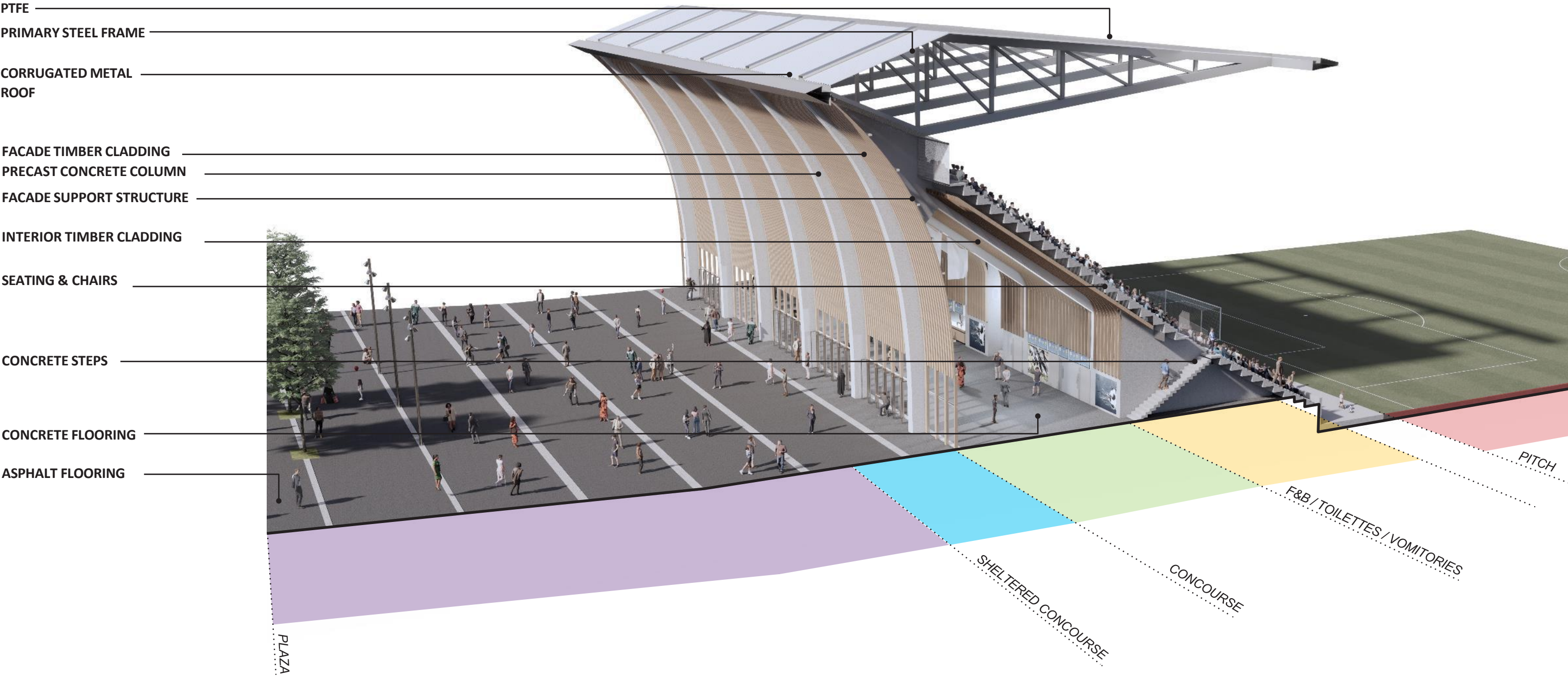
EVAKUERING PÅ 480 SEK

Exited: 0 / 2466



0,0

3D TRIBUNEUDSNIT



SKOVENS ARENA

