

# DESIGN REPORT

MULTIEVENT STADIUM @ KIRIBURU, JHARKHAND



CLASSIFICATION OF STRUCTURAL SYSTEM			
FORM ACTIVE	SECTION ACTIVE	VECTOR ACTIVE	SURFACE ACTIVE
Cable	Frame	Truss	Shell
Tent	Shear wall	Space Frame	Folded Plates
Pneumatic	Girders	Geodesic Dome	
Arch	Slab		

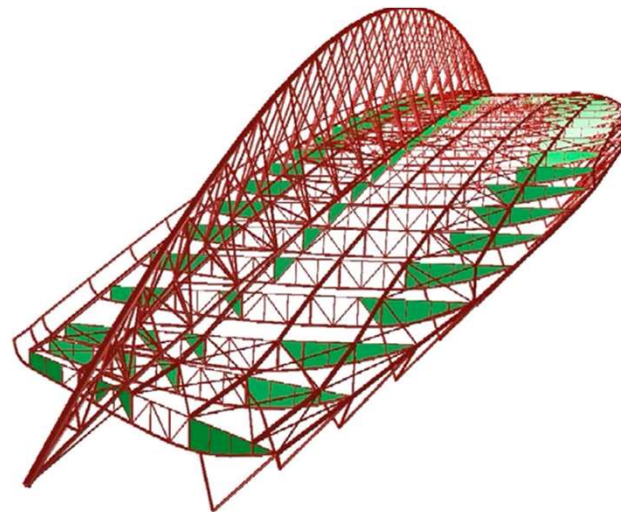
## Vector Active System:

- **Short, Solid, Straight, Linear elements** in which re-direction of forces is effected by **multidirectional splitting of single force simply to tension or compression elements**

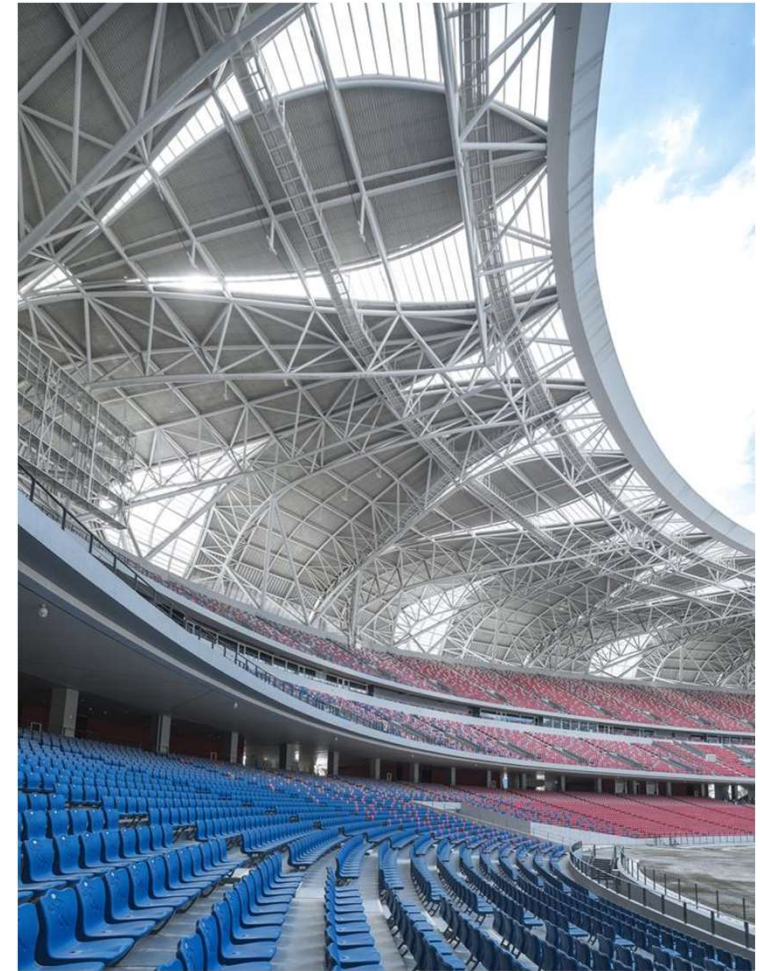
- Flat Trusses
- Curved Trusses
- Space frames
- Geodesic Domes



Castellated Cantilever Beam



VECTOR ACTIVE SYSTEMS: TRUSSES & SPACE FRAMES



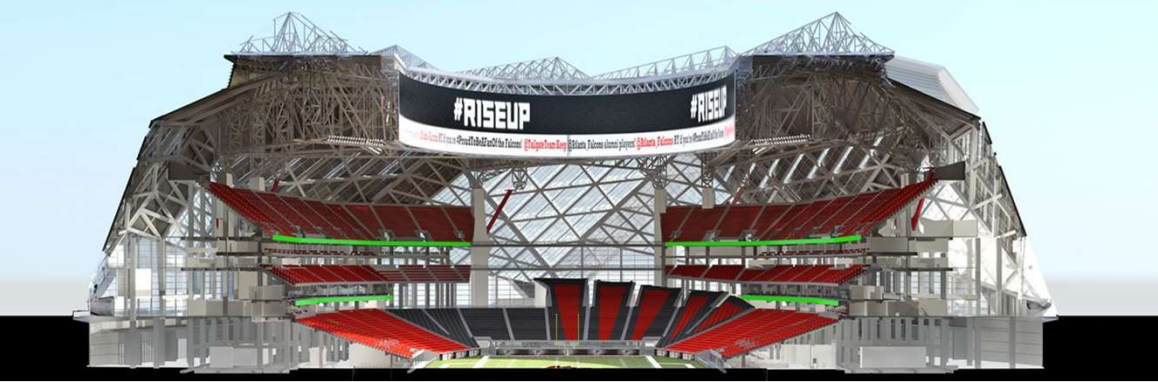
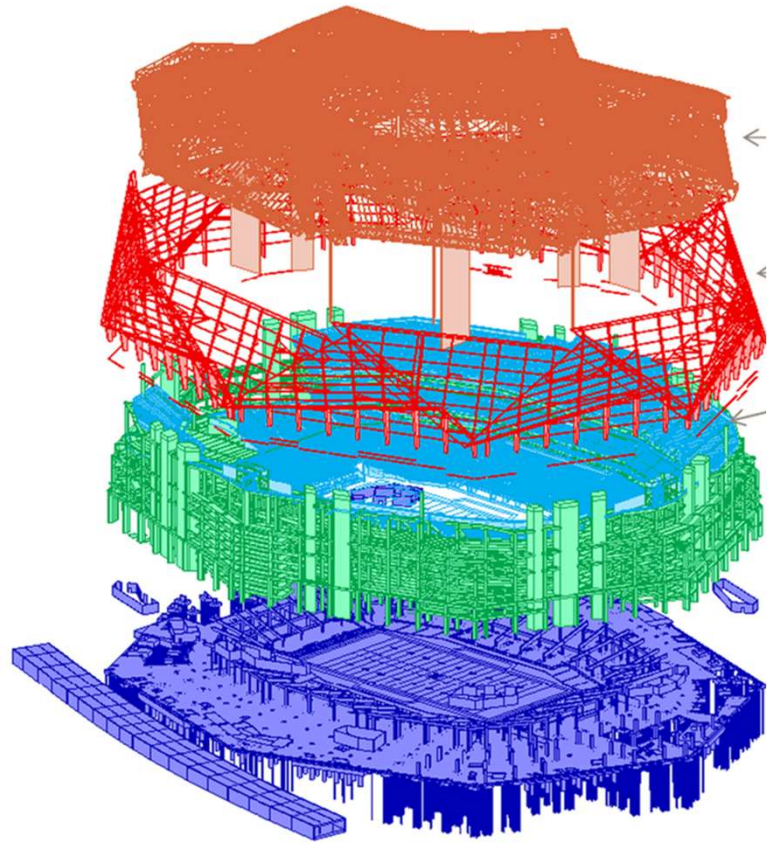
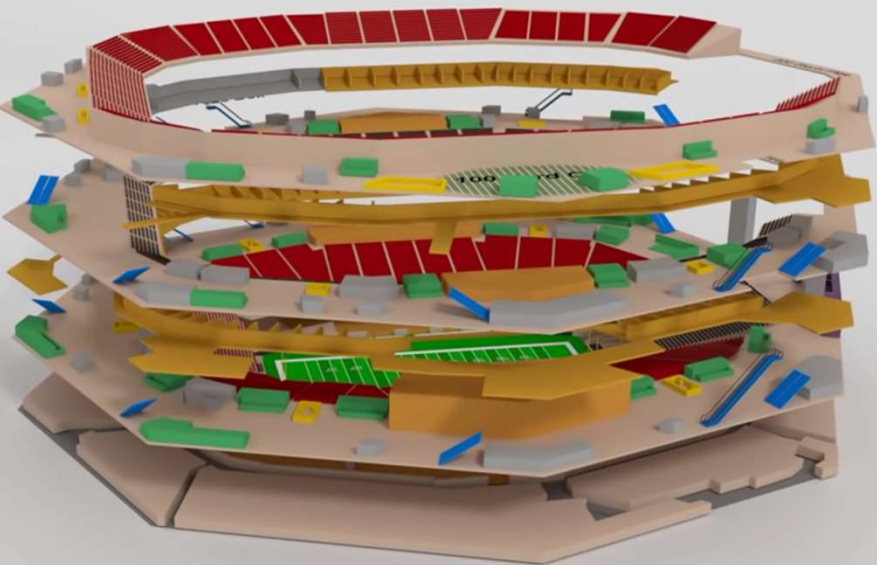
Hangzhou Olympic Stadium, China

The Structural load of the roof is transferred to the footing via Curved 3D Prismatic cantilever Truss system which blend in the form of leaf petal - Vector Active system



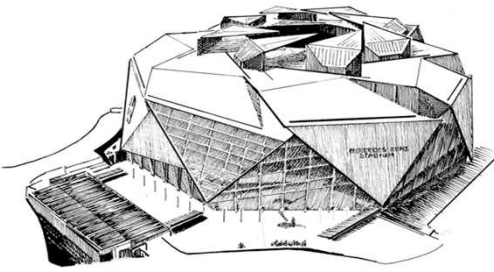
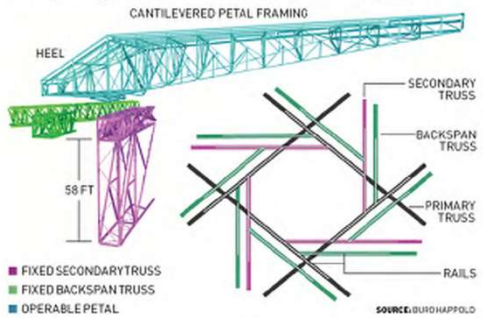
# Case studies- Mercedes Benz Stadium, Atlanta, USA:

300 Concourse  
 S2 Suite Level  
 200 Concourse  
 S1 Suite Level  
 100 Concourse  
 Field Level



## PETAL SUPPORT TRUSSES

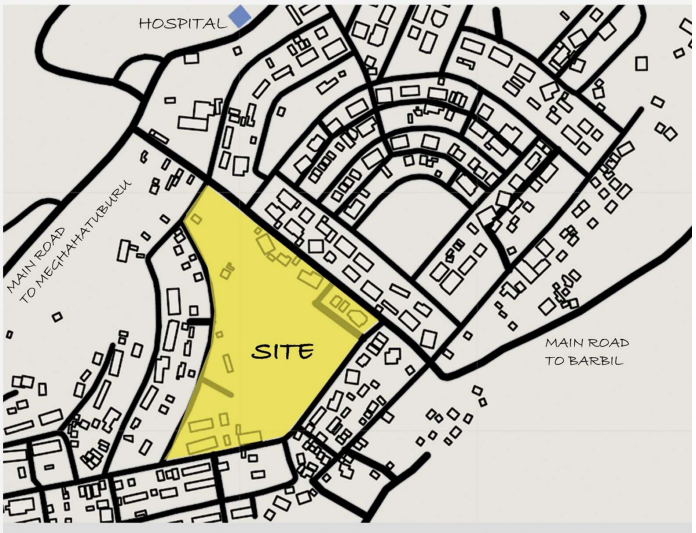
**TICK-TACK-TOE PLUS** Parallel rail tracks for the movable roof run diagonally along either a primary or secondary truss and a backspan truss. Rail lengths range from 225 ft to 375 ft, thanks to variations in petal sizes.



Source - HOK, TVS Architects & Buro Happold



**Site Analysis:**

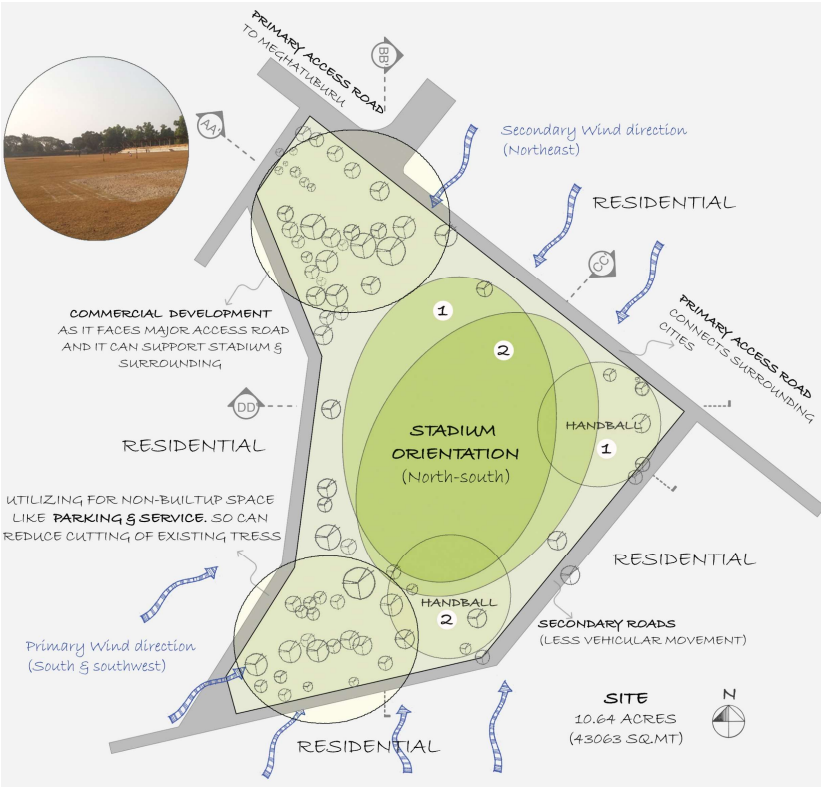


**SITE- KIRIBURU FOOTBALL GROUND**

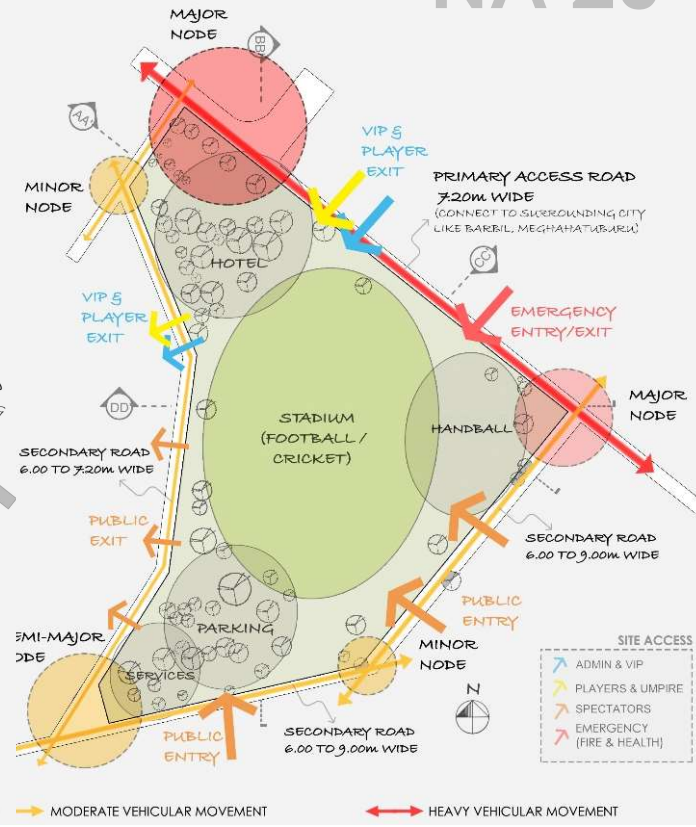
The site Kiriburu is a census town located on the borders Jharkhand and Orissa. The proposed site of Football ground lies the parts of Orissa.

Kiriburu is a famous tourist place, known for its Hill Station, Saranda Forest - "The land of 700 Hills".

The place is also known for two largest Iron-ore Mine yard - KIOM MIOM of SAIL.



The Site is Flat and the average mean sea level of the site is 893m



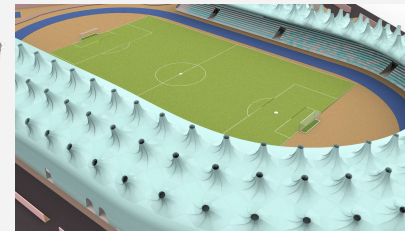
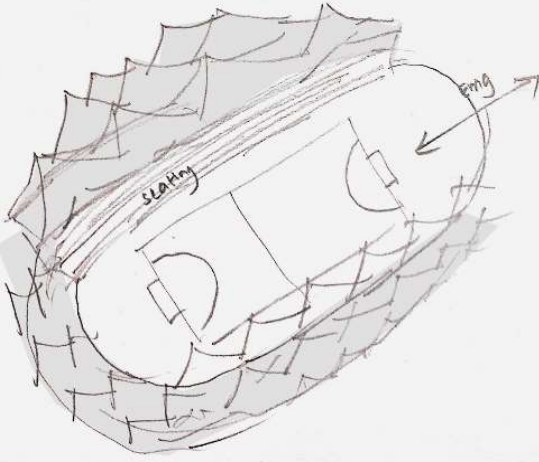
**Concept & Form Evolution:**



**Roofing - The Identity**

The concept of Stadium roofing is inspired from the theme of depicting the 700 hills of Saranda Forest. In order to do so, the roofing is designed based on the hexagonal pyramid juxtaposition to create an interesting effects as shown in the conceptual sketch below.

Pyramidal abstract roofing is supported by Hexagonal based bracing held by cantilever truss system. The skin of the roofing is of PTFE fabric.



Roofing - 700 hills of Saranda Forest



**Area Statement – Preliminary :**

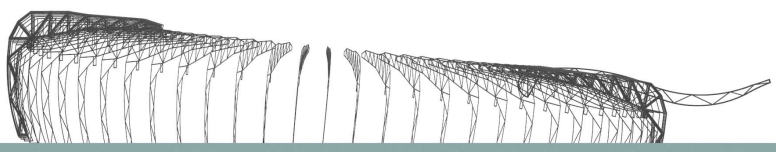
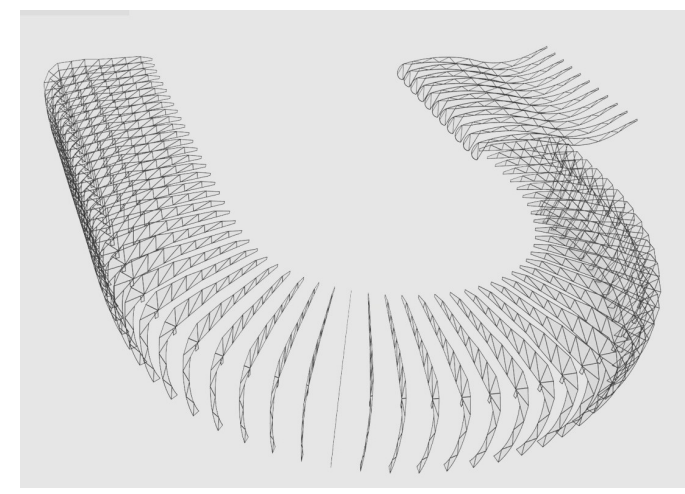
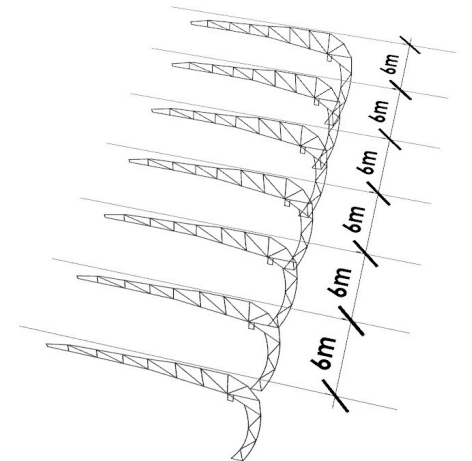
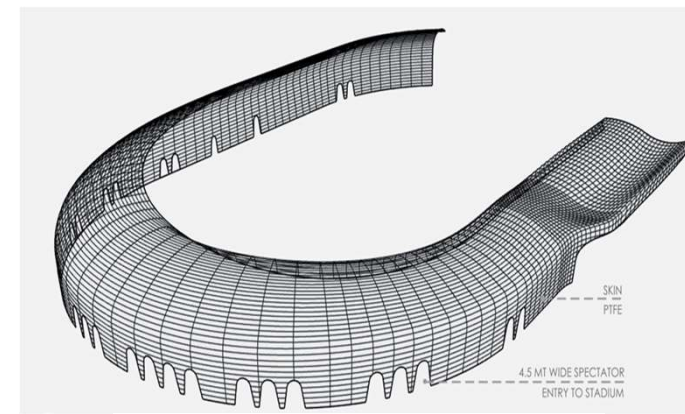
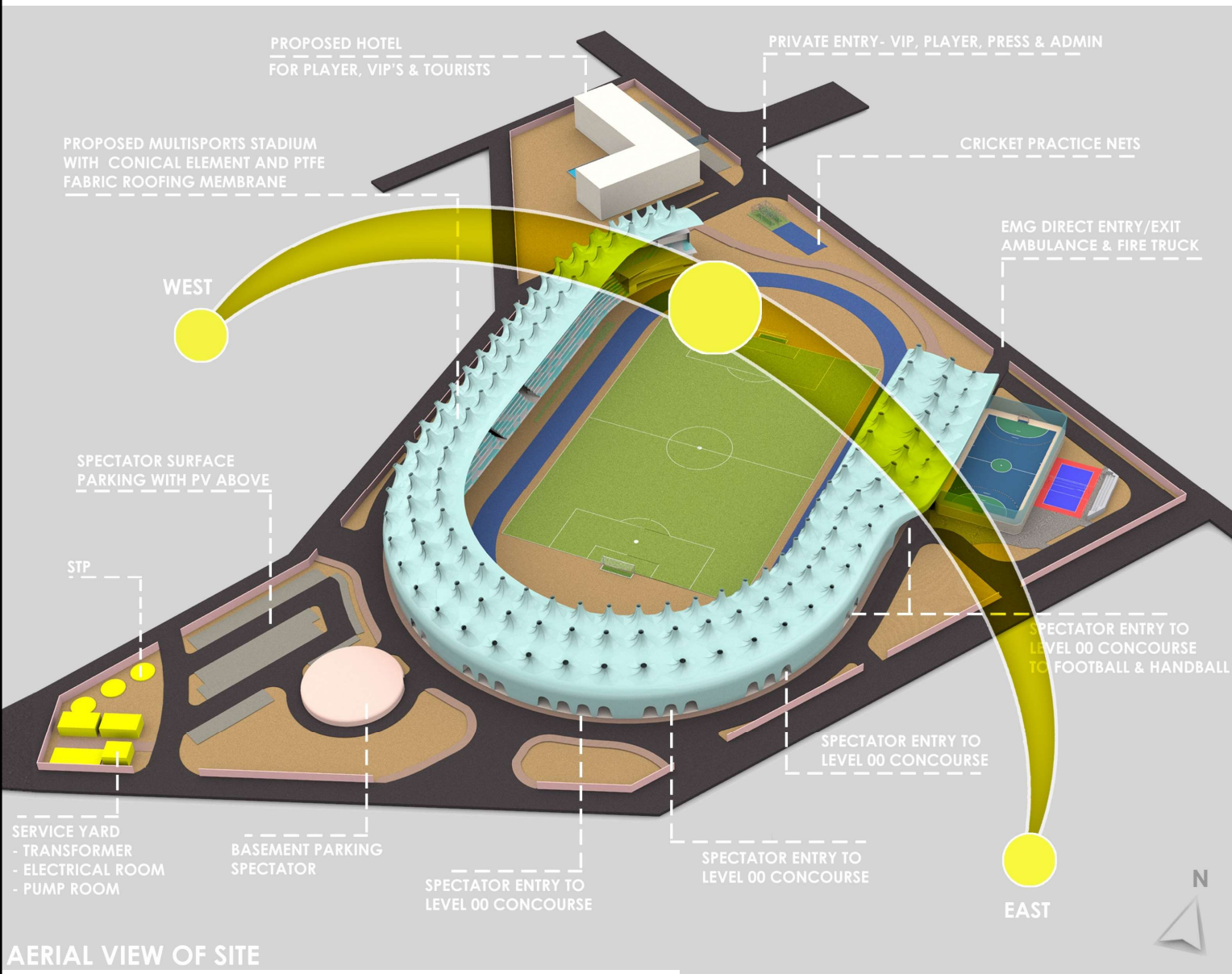
Sl. No	Requirement	No's	User capacity	Area (sq.mt)	Total Built up Area (sq.mt)
<b>A) Stadium- Bowl</b>					
1	Spectator Stands		4500	1	4500
2	Circulation		40% of spectator area	1800	1800
3	Toilet		1 : 100 person= 60	120- 150 (splitted)	120 - 150
4	Staircase				
5	Food kiosk	6 to 9		15	90
6	Canteen	2		100	200
7	Display Gallery	1		150	150
8	Ticket counter	6	1 of 4 sq.mt	50	50
9	Help Desk / Info centre	2		20	40
10	First Aid Room/ Medi	1		20	20
<b>B) Player</b>					
1	Dressing Room	2	15	50	100
2	Wash Room	2	15	25	50
3	Physio/ Doctor	1		20	20
4	Gym	1	30	60	60
5	Dope Test	1		20	20
6	Store	1		20	20
<b>C) Umpire</b>					
1	Umpire Room	2	6	20	40
2	VAR	1	2	15	15
<b>D) VIP</b>					
1	Lobby	1		60	60
2	VIP Lounge	1		60	60
3	VIP Private Room	2	4	18	36
4	VIP Box / Suite room	5 to 6	40	18	90
5	Wash room	1		18	18
<b>E) Admin</b>					
1	Director	1	1	25	25
2	Ass. Director	1	1	25	25
3	Secretary	1	1	25	25
4	Conference Room	1	10	60	60
5	Office	1	1	45	45
6	Record	1	1	20	20
7	Control Room	1	1	18	18

<b>F) Media/TV/Press</b>					
1	Media Office Room	1	1	30	30
2	Media Gallery	1	1	60	60
3	Dining/ Conference	1	10	45	45
4	Broadcasting	1	1	75	75
5	Commentary Room	2		40	80
6	Radio Box	2		10	20
7	Recording/ Interview Room	2		30	60
<b>G) Service Area</b>					
1	Equipment Room	2	1	80	160
2	Light Control Room	1	1	30	30
3	Sound Control Room	1	1	30	30
4	Electrical Room	1	1	20	20
5	Camera/ Surveillance/ Contro	1	1	20	20
6	Police Control	2	1	15	30
7	Maintanance Room	3		15	45
8	Gardener Room	1		15	15
9	Pump Room	1		80	80
10	Under Ground Sump	1			
11	Septic Tank	1			
12	Sewage treatment plant	1			
13	Electrical Substation	1		50	50
14	Transformation Yard	1		25	25
15	DG Unit	1		25	25
<b>H) Parking</b>					
1	Vip Parking	10	40	24	240
2	Spectator Parking (if provided)	137	1 ECS for 50 sq.mt built up	24 (open) or Stack same for 2	1600 (approx)
3	Emergency Parking	2	2.5 ECS	24	120
4	Broadcast Van Parking	2	2.5 ECS	24	120



# Proposed Multievent Stadium @ Kiriburu, Jharkhand :

NA 20

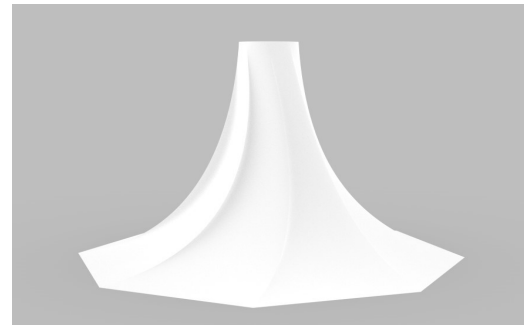
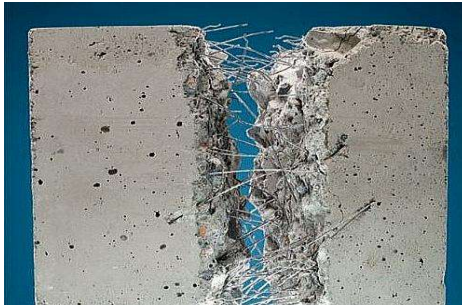


Steel Truss System – Form Evolution



# Section & Material Palette :

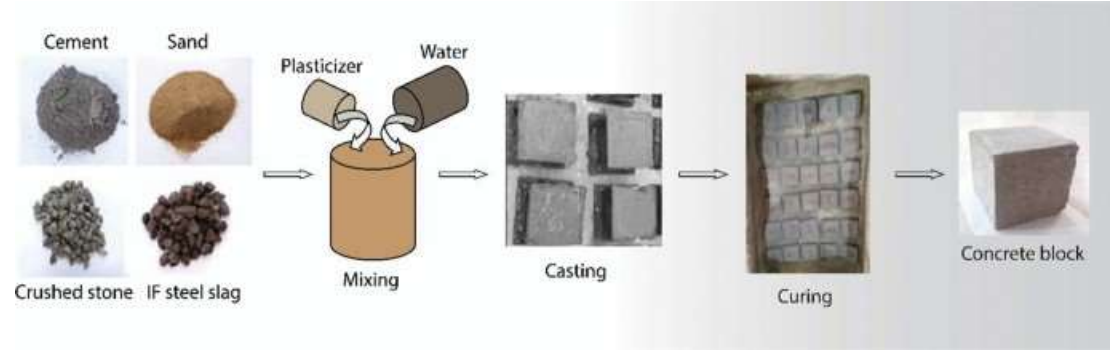
NA 20



Recycled Plastic Seating

FIFA Certified Astro Turfing

Steel Fiber Reinforced Concrete – Column, Beam, Roofing, Seating Deck



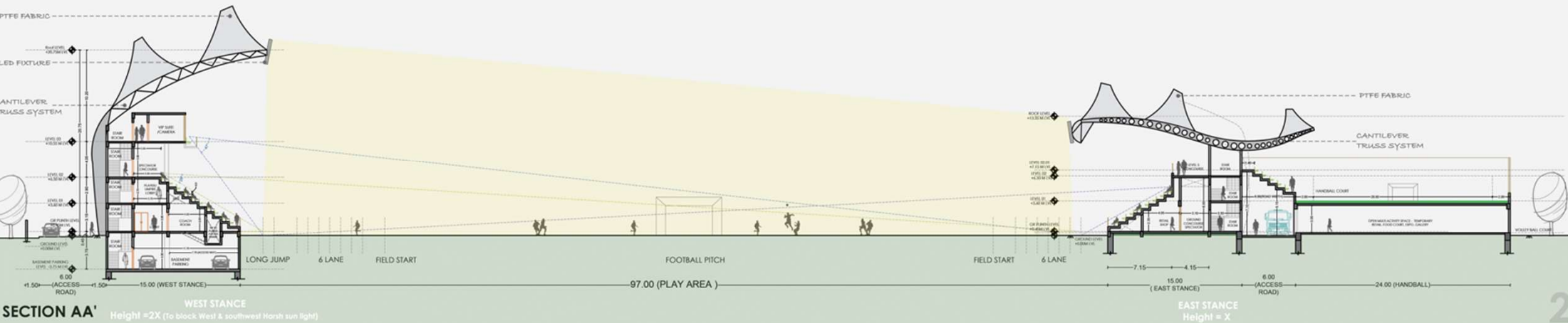
Blocks made from Steel slag – Partition and Non load bearing walls



Galvanized pipe Steel cantilever Truss – Roof Structure



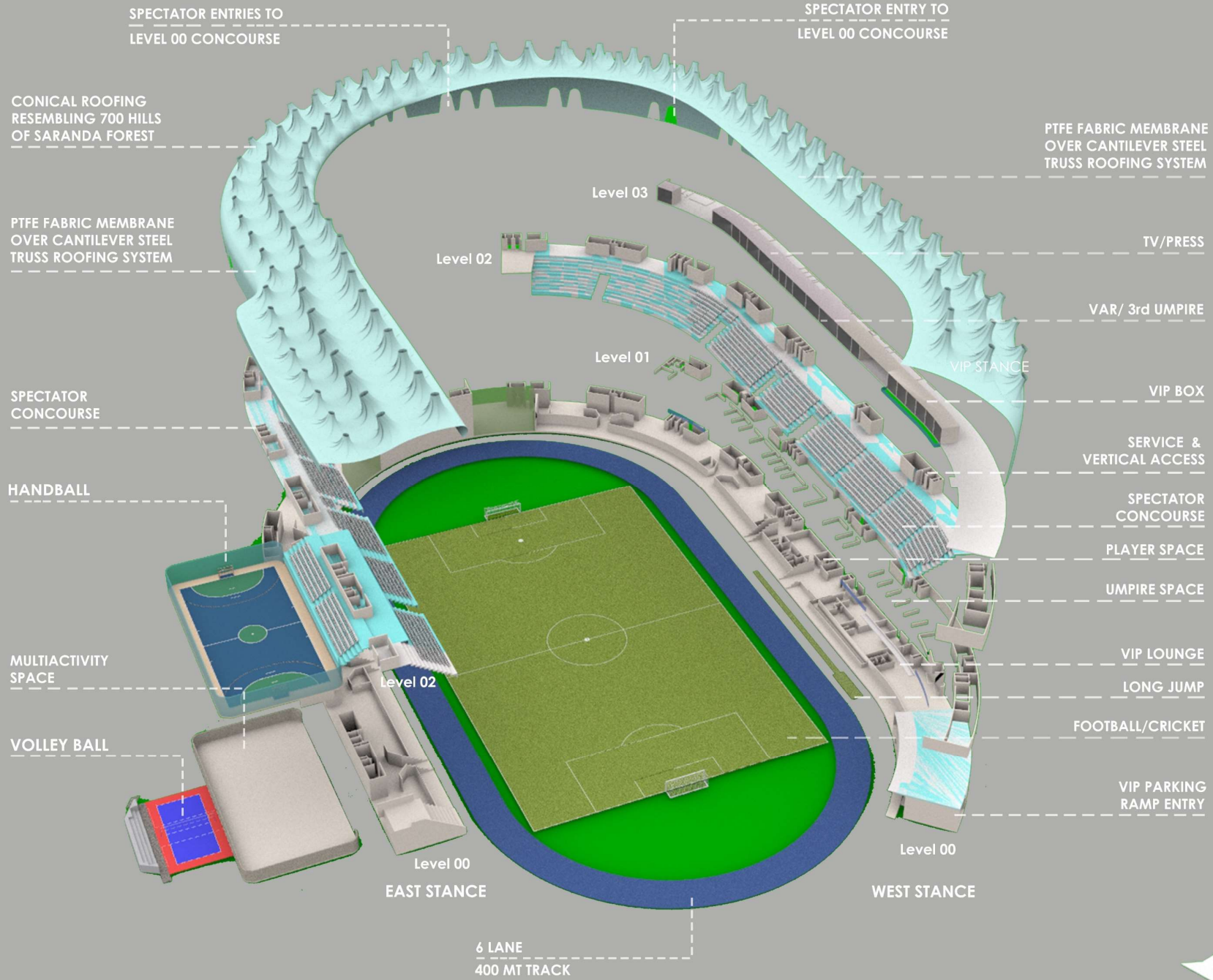
PTFE Fabric – Roof cover



SECTION AA' Height = 2X (To block West & southeast north sun light)

EAST STANCE Height = X





AXONOMETRIC VIEW OF STADIUM

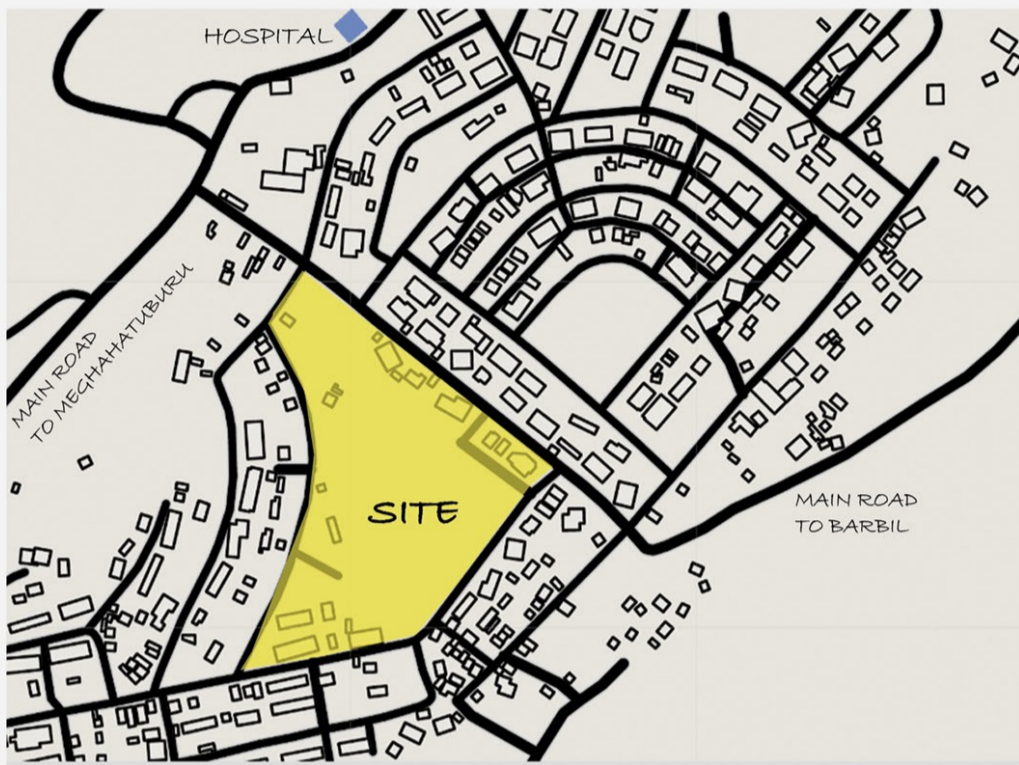


THANK YOU....





**SITE- KIRIBURU** LATITUDE - 22.0605  
LONGITUDE - 85.1733

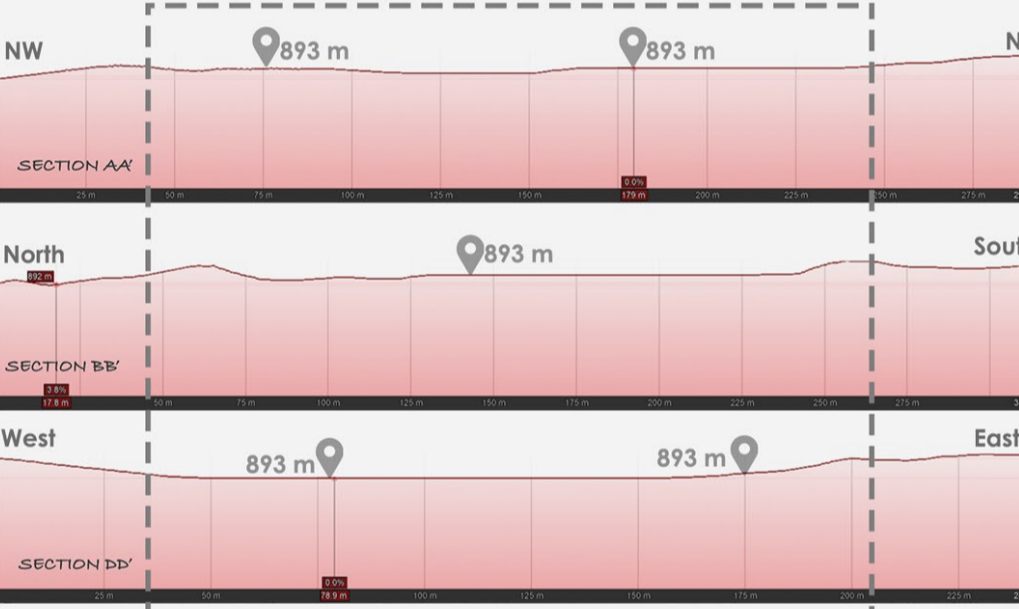


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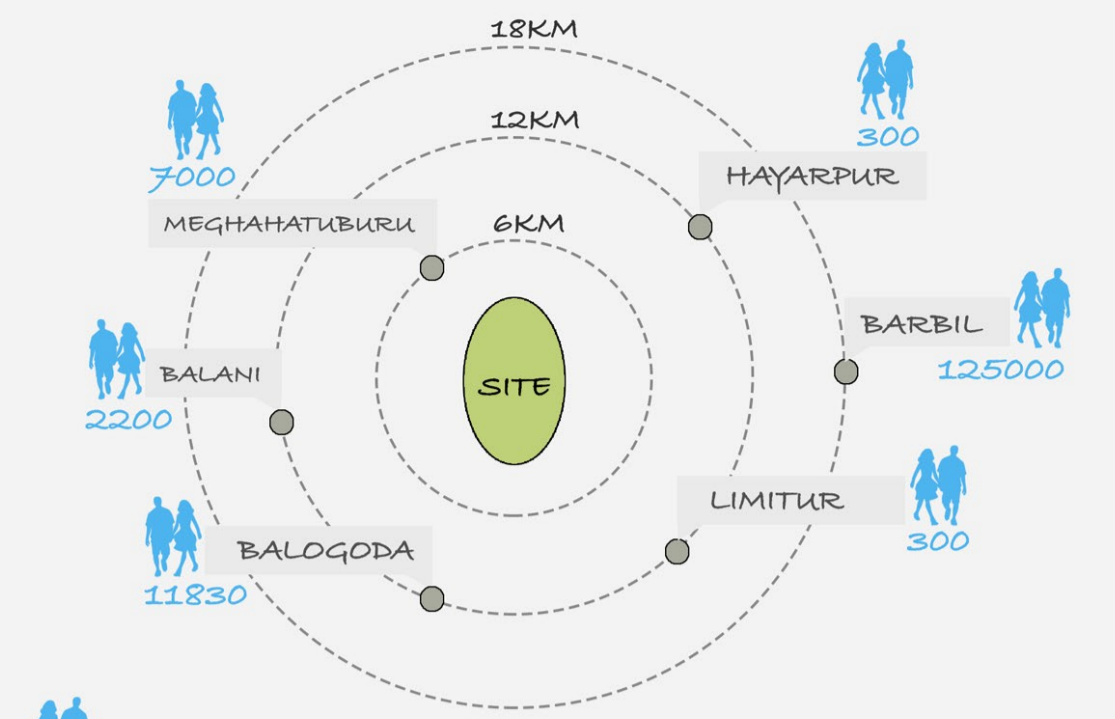
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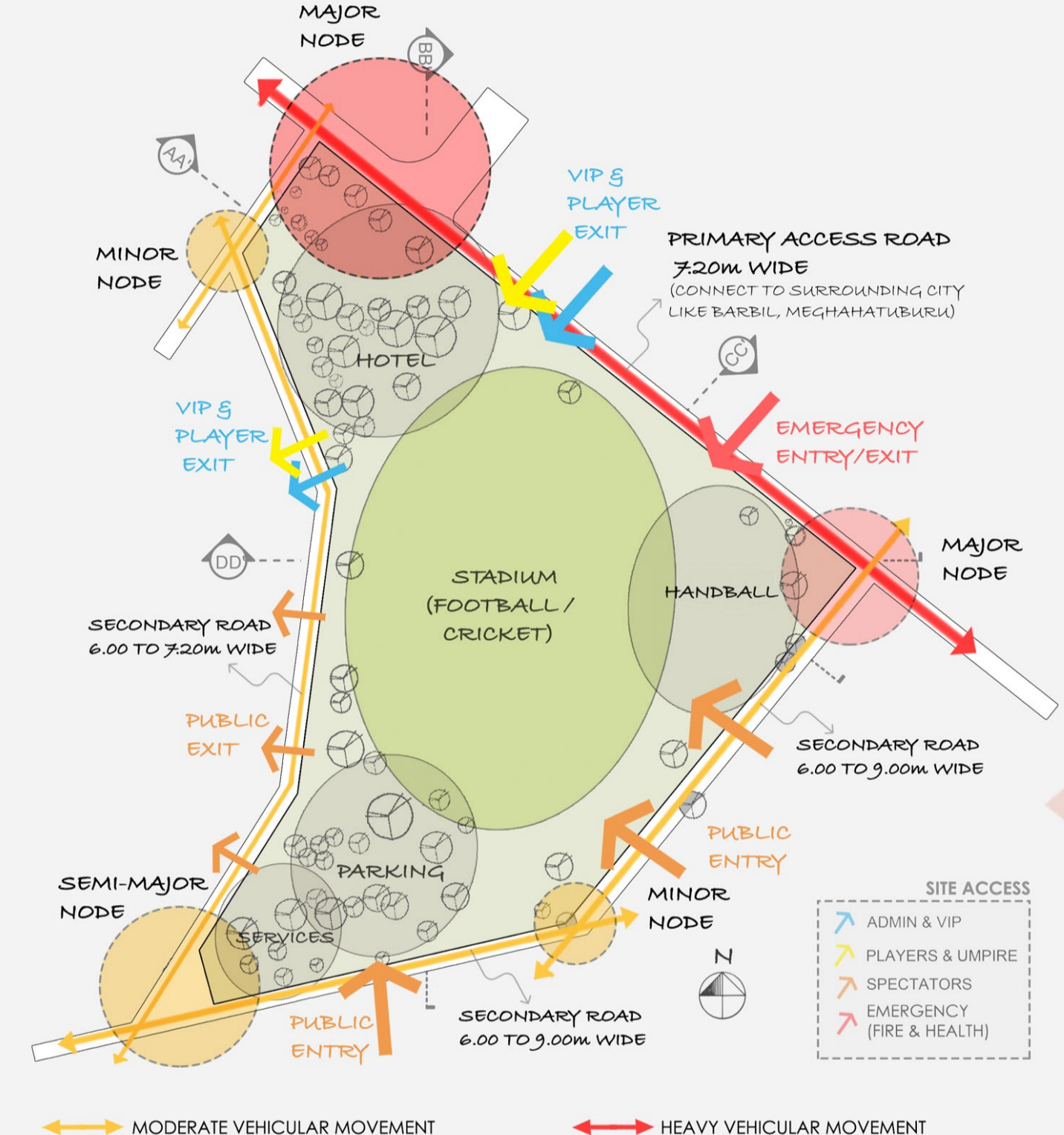
**Site- Contour Section**  
The Site is Flat and the average mean sea level of the site is 893m



**POPULATION IMPACT ASSESSMENT** TOTAL - 1.60 LAKHS

To understand the impact of the stadium to the immediate surrounding, this population impact assessment is studied. So, as per data of census, the proposed ground may impact approximately 1.60 lakhs people.

As per URDPFI norms, to serve 1 lakh population, it require 2 hectare of land area for Community level Multipurpose Ground. But in our case, the Site is of 1 Hectare approx. So it is little challenging to design a Multipurpose stadium in a constrained site area.

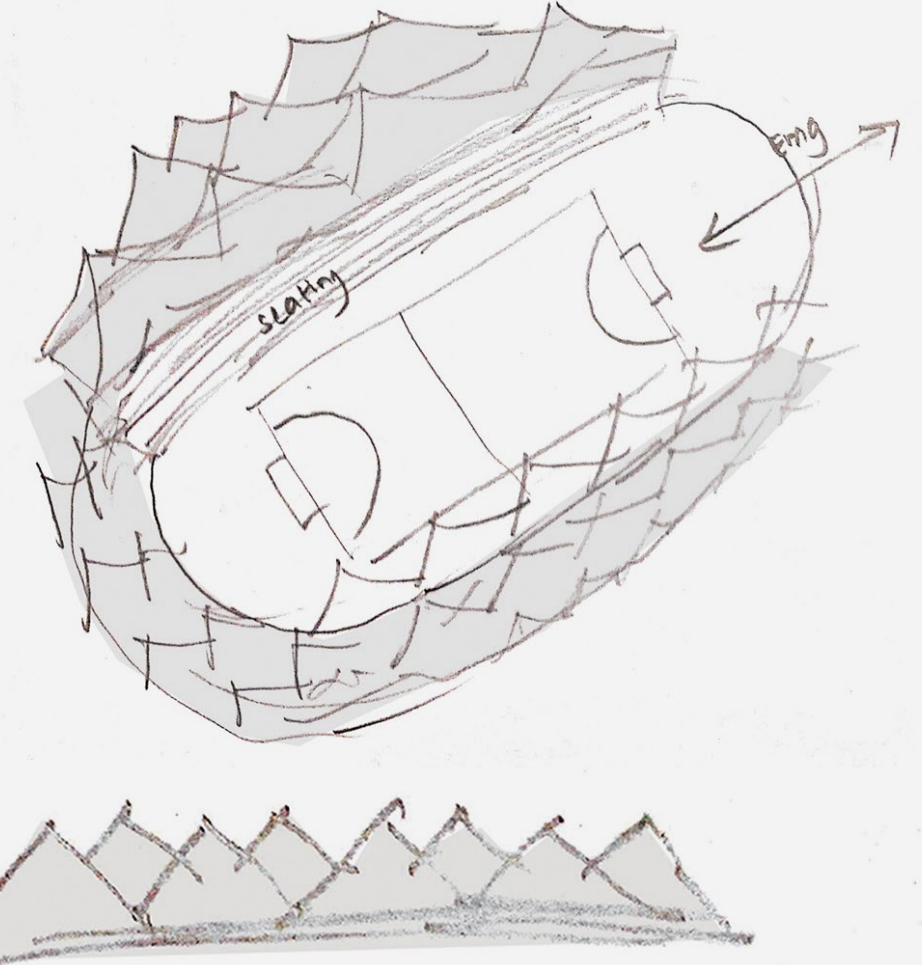


MODERATE VEHICULAR MOVEMENT (Yellow arrow) HEAVY VEHICULAR MOVEMENT (Red arrow)

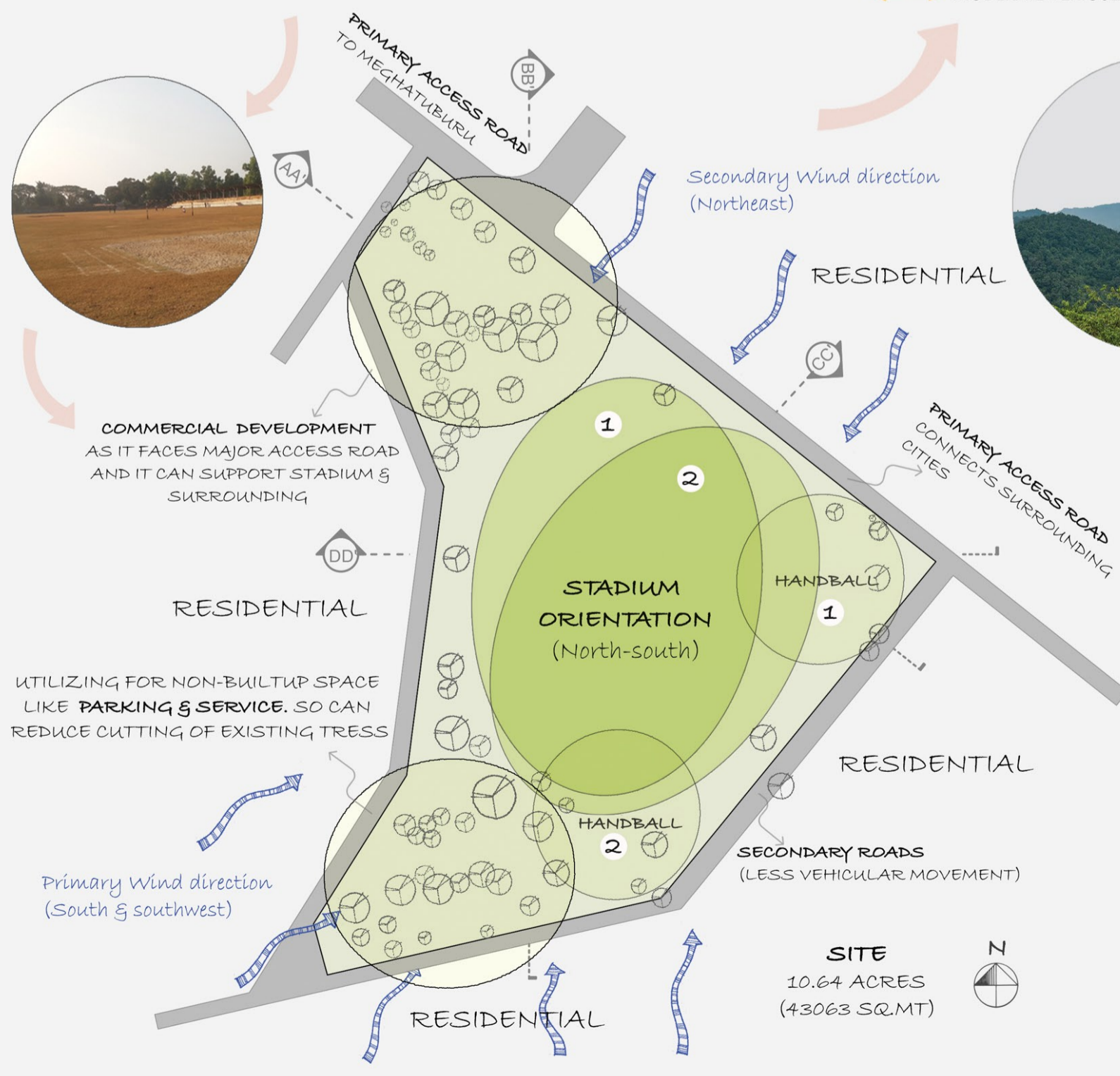
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Roofing - 700 hills of Saranda Forest



**SITE ANALYSIS & CONCEPT**

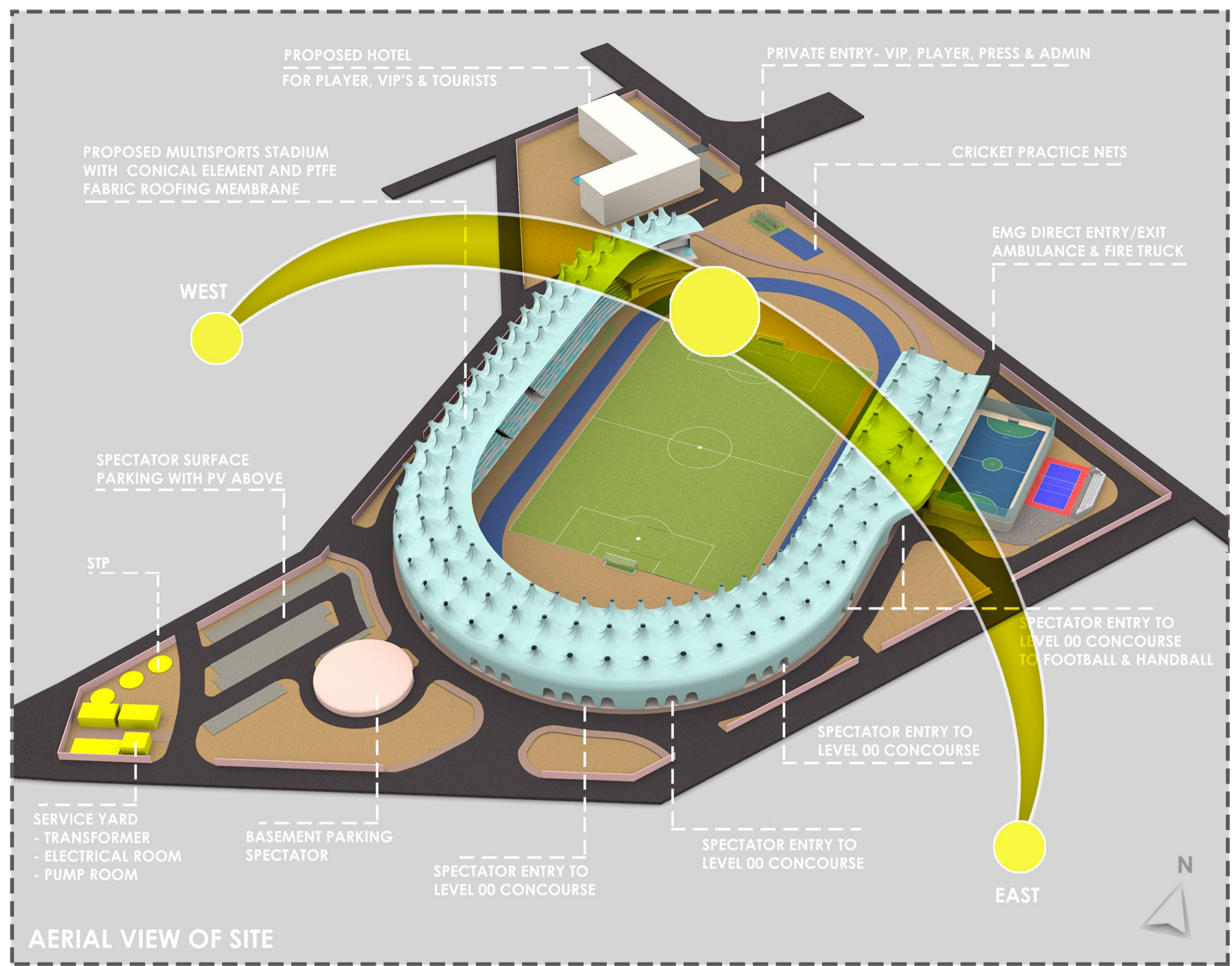


**AREA STATEMENT:**  
 SITE AREA- 43,063 SQ.MT (10.64 Acres)  
 GROUND FLOOR PLAN - 4808 SQ.MT  
 LEVEL 01 FLOOR PLAN - 718.50 SQ.MT  
 LEVEL 02 FLOOR PLAN - 5307 SQ.MT  
 LEVEL 03 FLOOR PLAN - 1481 SQ.MT  
 BASEMENT FLOOR PLAN - 3550 SQ.MT  
**TOTAL STADIUM BUILTUP AREA- 15,864 SQ.MT**  
 FAR AREA = 12,314.5 SQ.MT

- PRIVATE - VIP, PLAYER, ADMIN & PRESS
- PUBLIC - SPECTATORS
- EMERGENCY - AMBULANCE & FIRE TRUCK

ACCESS: A ENTRY, Z EXIT, A/Z ENTRY / EXIT

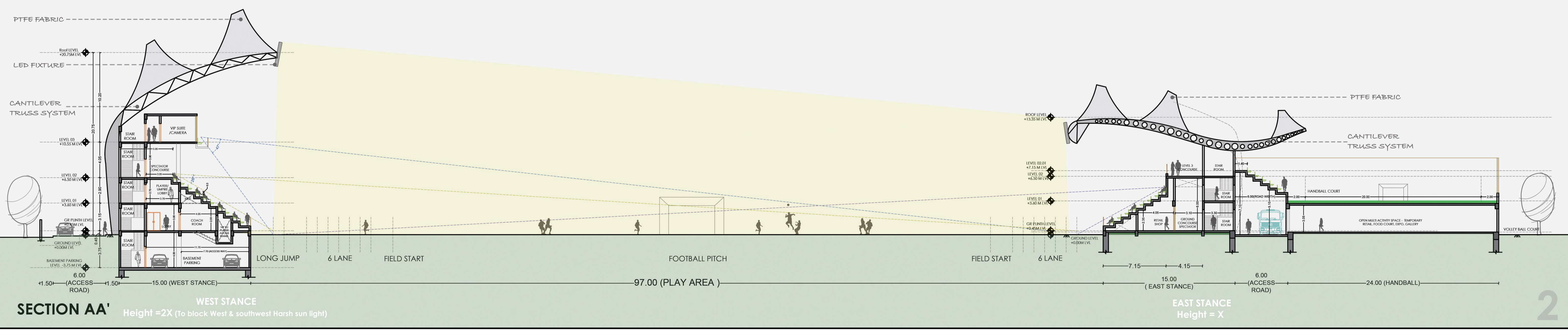
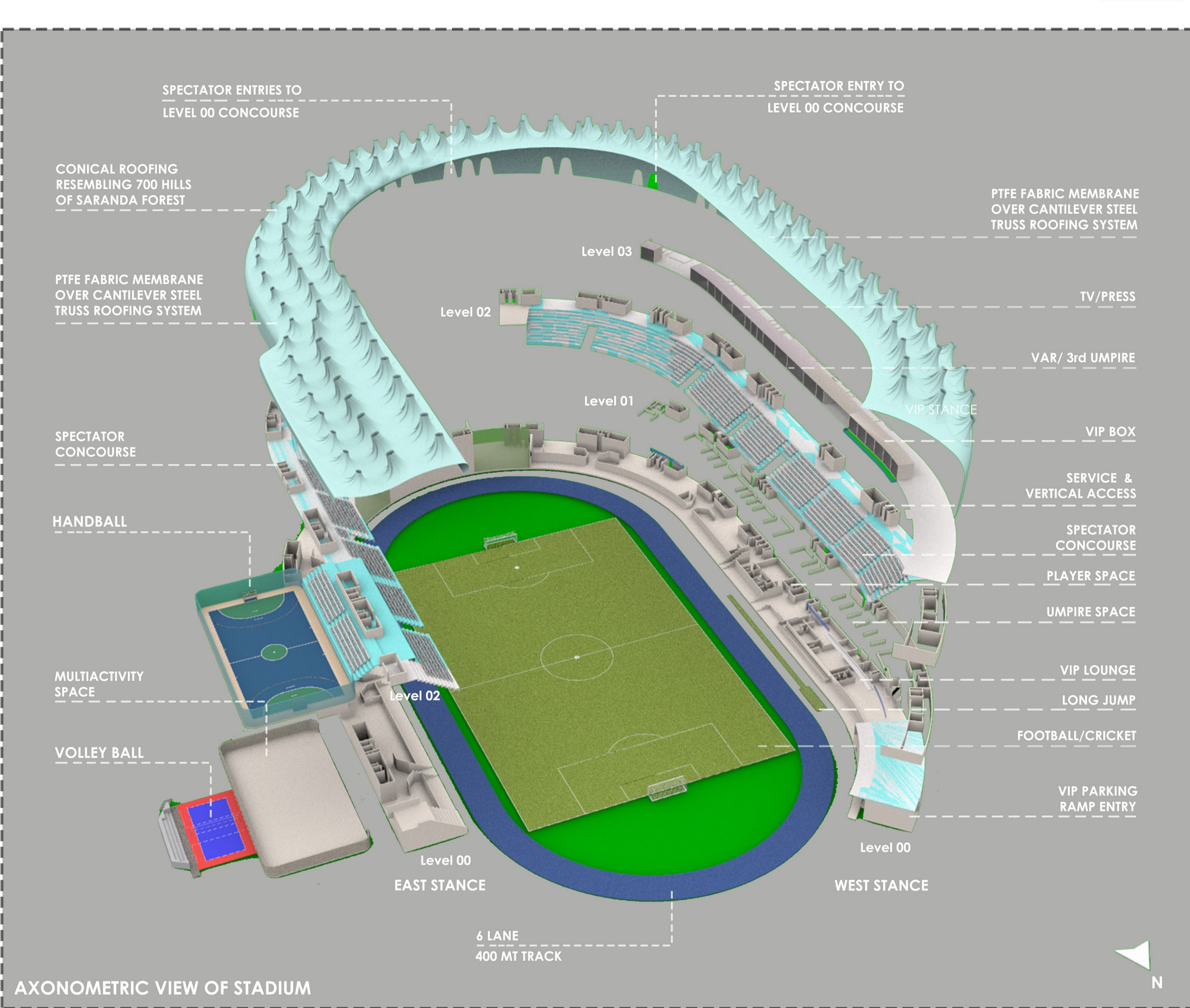




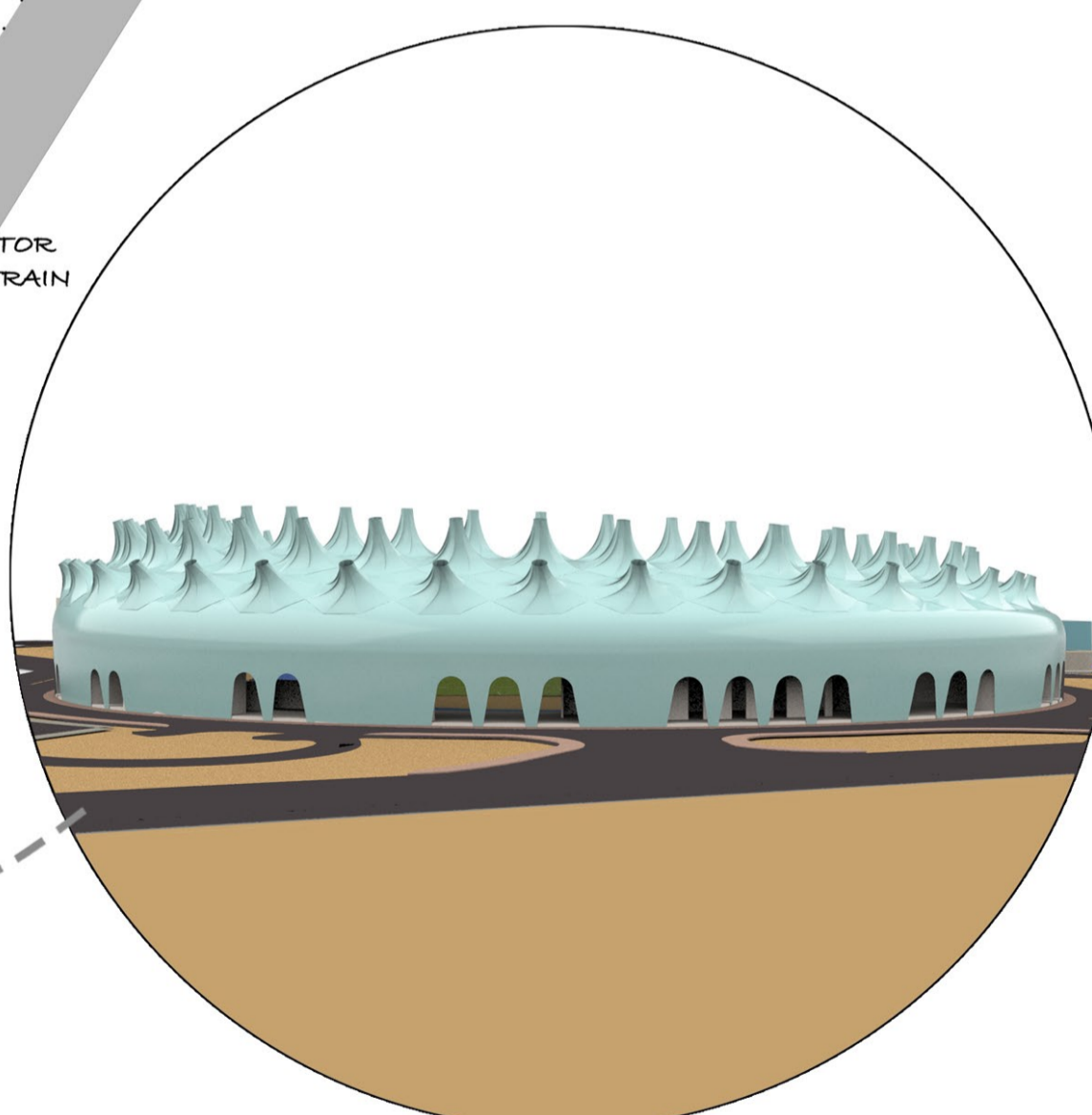
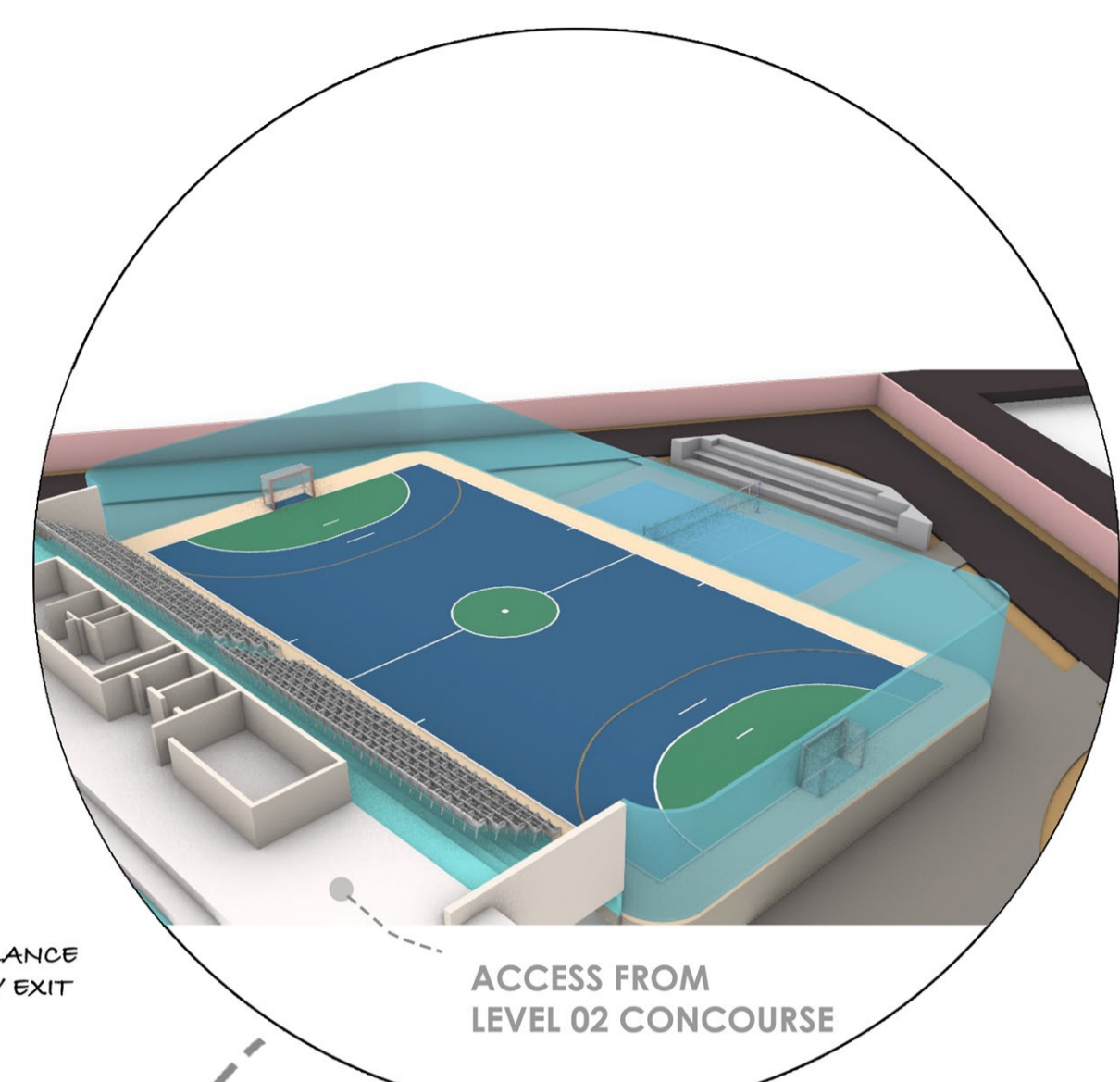
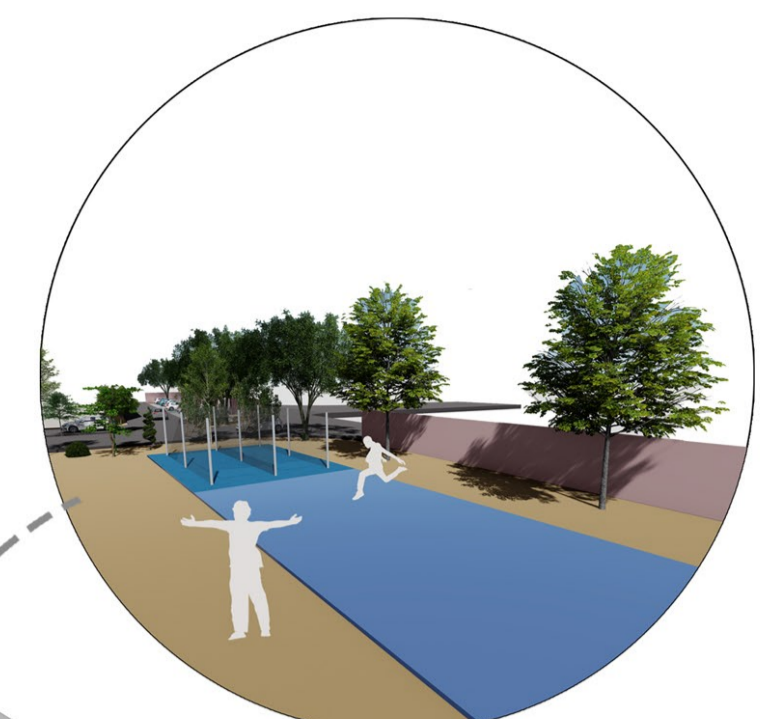
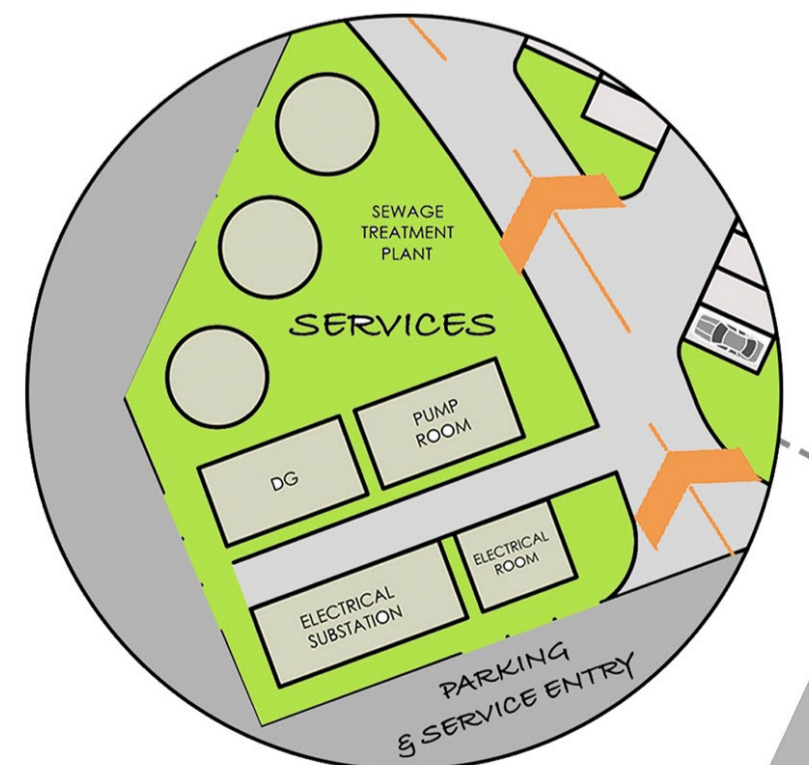
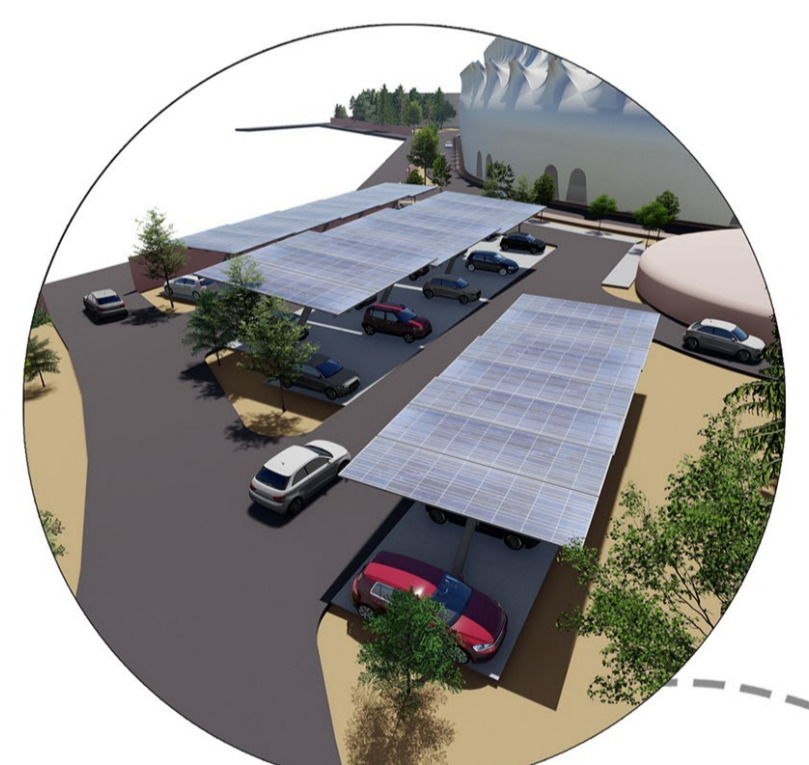
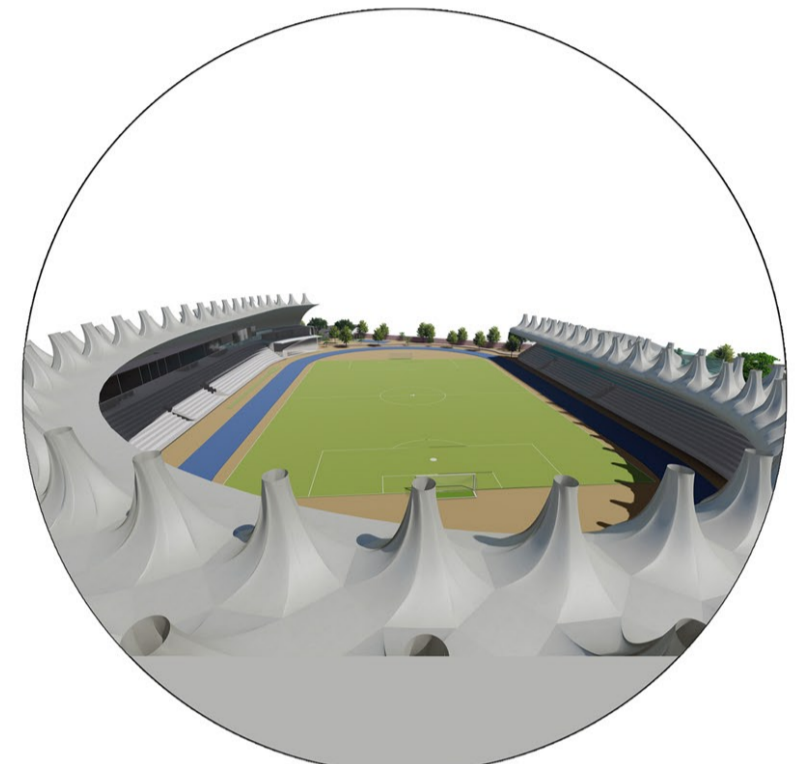
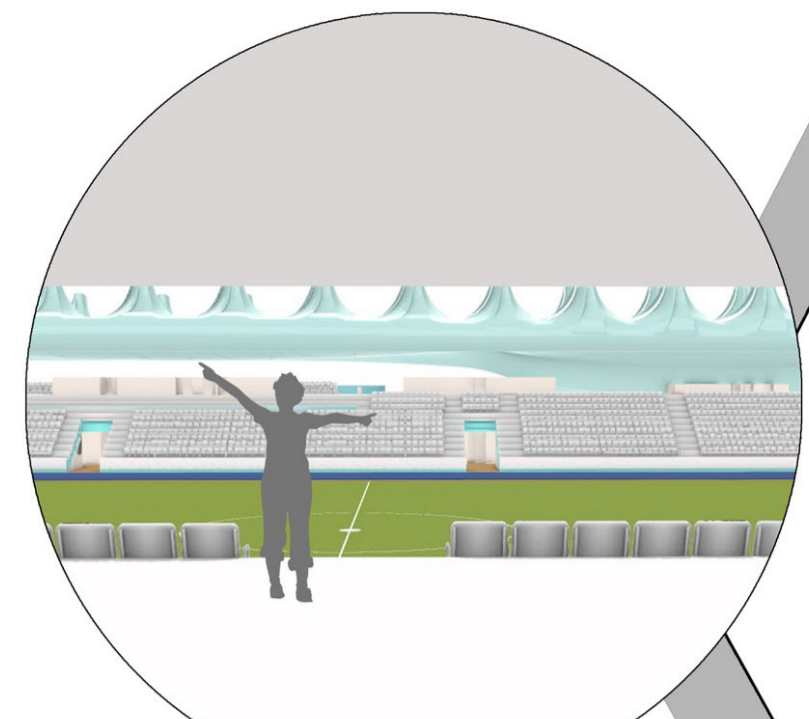
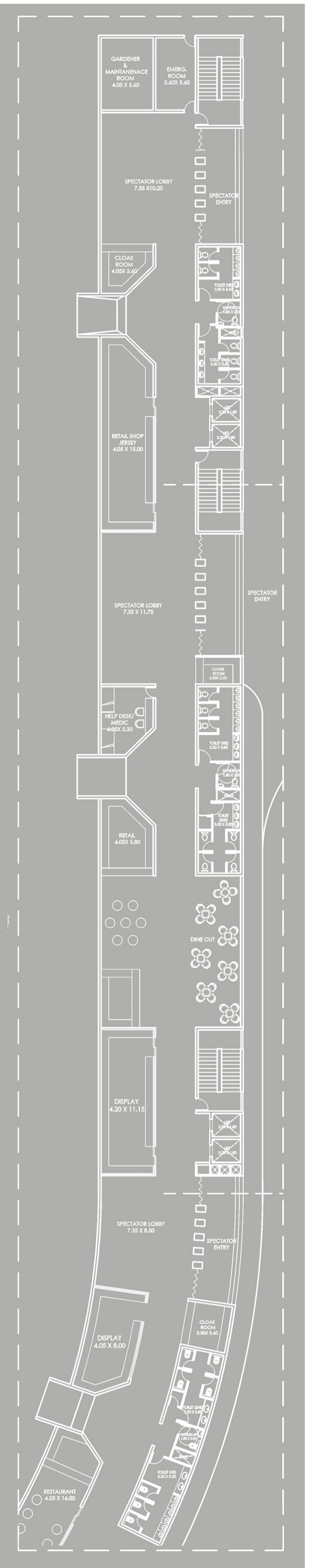
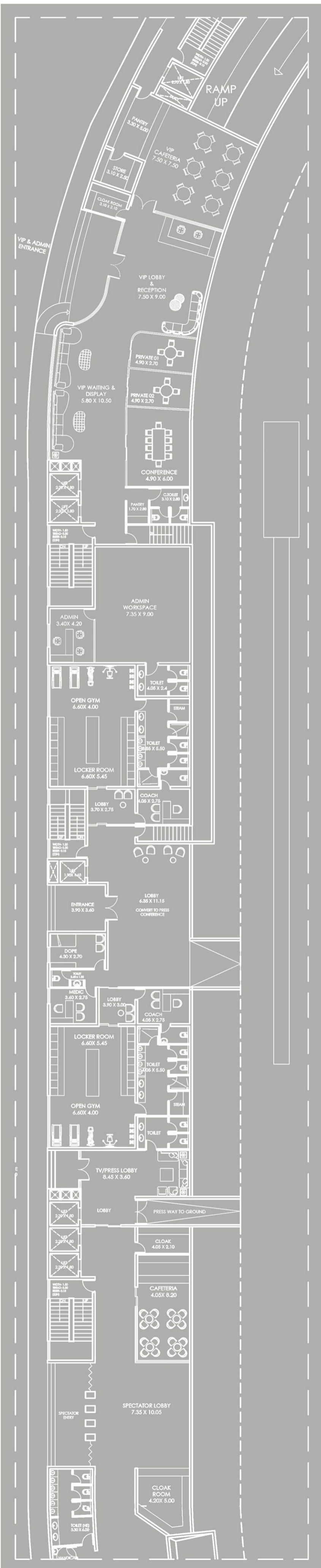
**SITE ACCESS:** Entry access for the Spectator to the stadium are splitted into separate zones through five gates facing East and South secondary road and the exit access are managed through the five gates on East, South and West secondary roads. Since the crowd are splitted into into separate zones based on their seating allotment in the stadium, it ensures easy circulation, security and safety management.

There is a special private entry for the Players, VIPs, TV/Media/Press, Admin on the northwest side of the site accessed directly from the Primary road near to the proposed Hotel and there is an Emergency direct access is also planned on the Northern side of the site from the Primary road for the Ambulance, Fire Truck to enter the stadium to prevent fire break-out or any disaster. Parking are managed through both surface and Basement parking with a capacity of 160 ECS and separate Bike park spaces. All the major electrical, Plumbing and Sewage service requirements are zoned out on southwest region and are access through a parking gate which ensure segregation from rest of the zones.

**PLANNING:** The stadium is planned in a U shaped form with open-end toward the North direction, which helps in achieving better orientation, privacy, Safety, security, direct emergency exiting the site to major roads and helps in segregating service zone visually and functionally apart from stadium activities. U shaped form consist of West stance and East stance. West Stance is of 4 storey and Basement parking whereas East stance is of 2 levels only (Refer section AA' and BB').





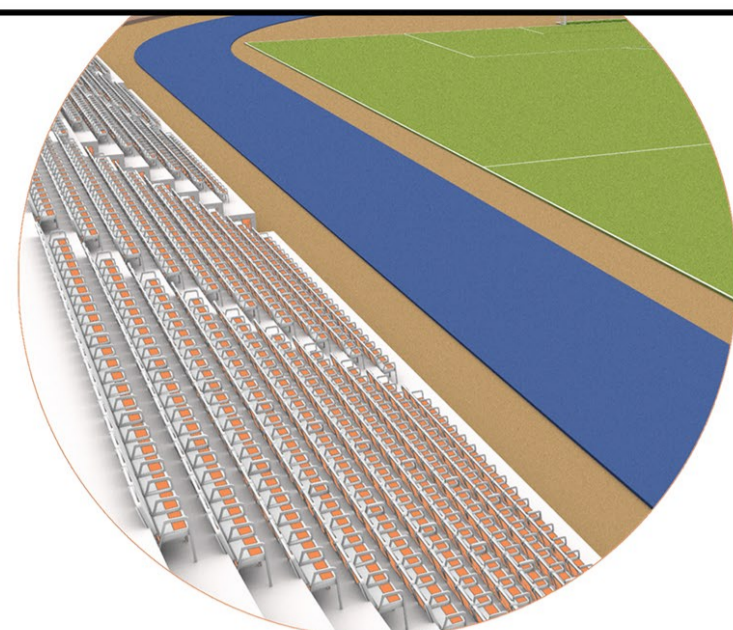


3 LEVEL 00 PART PLAN - WEST STANCE Scale - 1:200

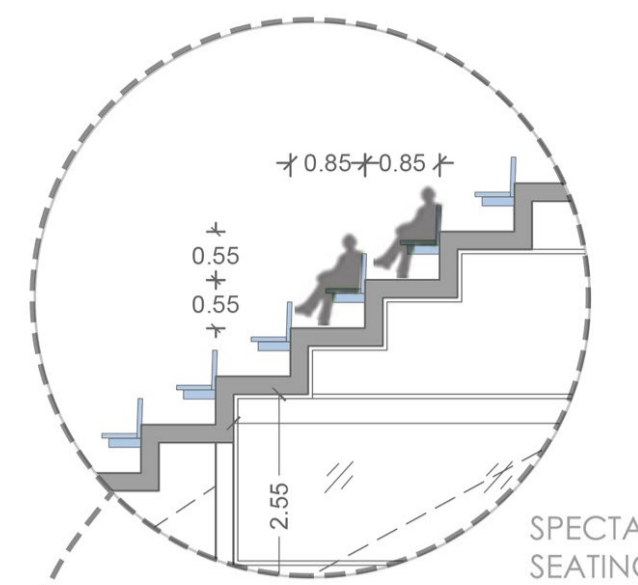
ADMIN, PLAYER, UMPIRE, TV/PRESS, SEPTATOR SPACE  
LEVEL 00 FLOOR PLAN  
±0.45M LVL SCALE - 1:600  
SITE LEVEL CIRCULATION

LEVEL 00 PART PLAN - EAST STANCE Scale - 1:200

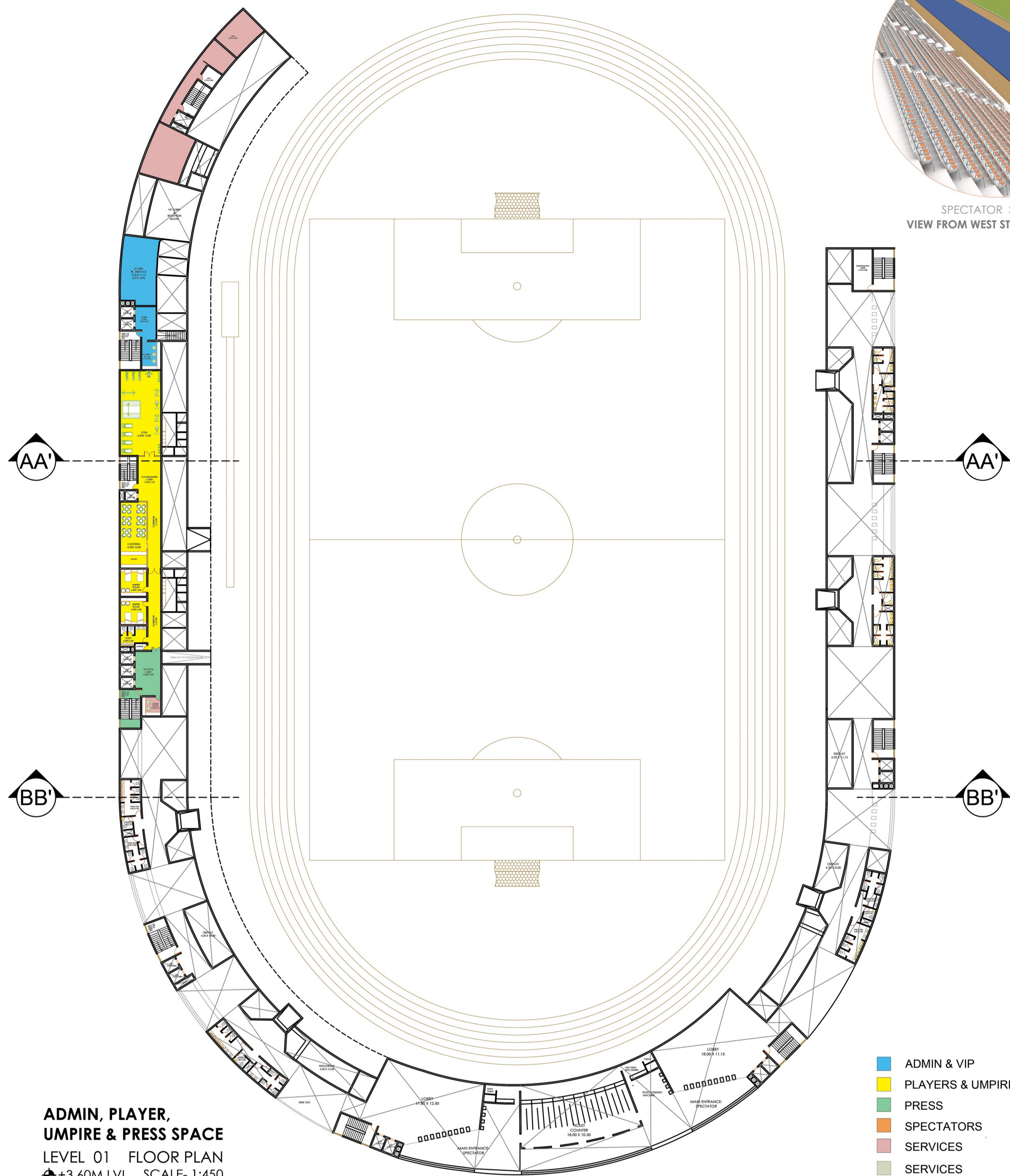




SPECTATOR SEATING  
VIEW FROM WEST STANCE LEVEL 02

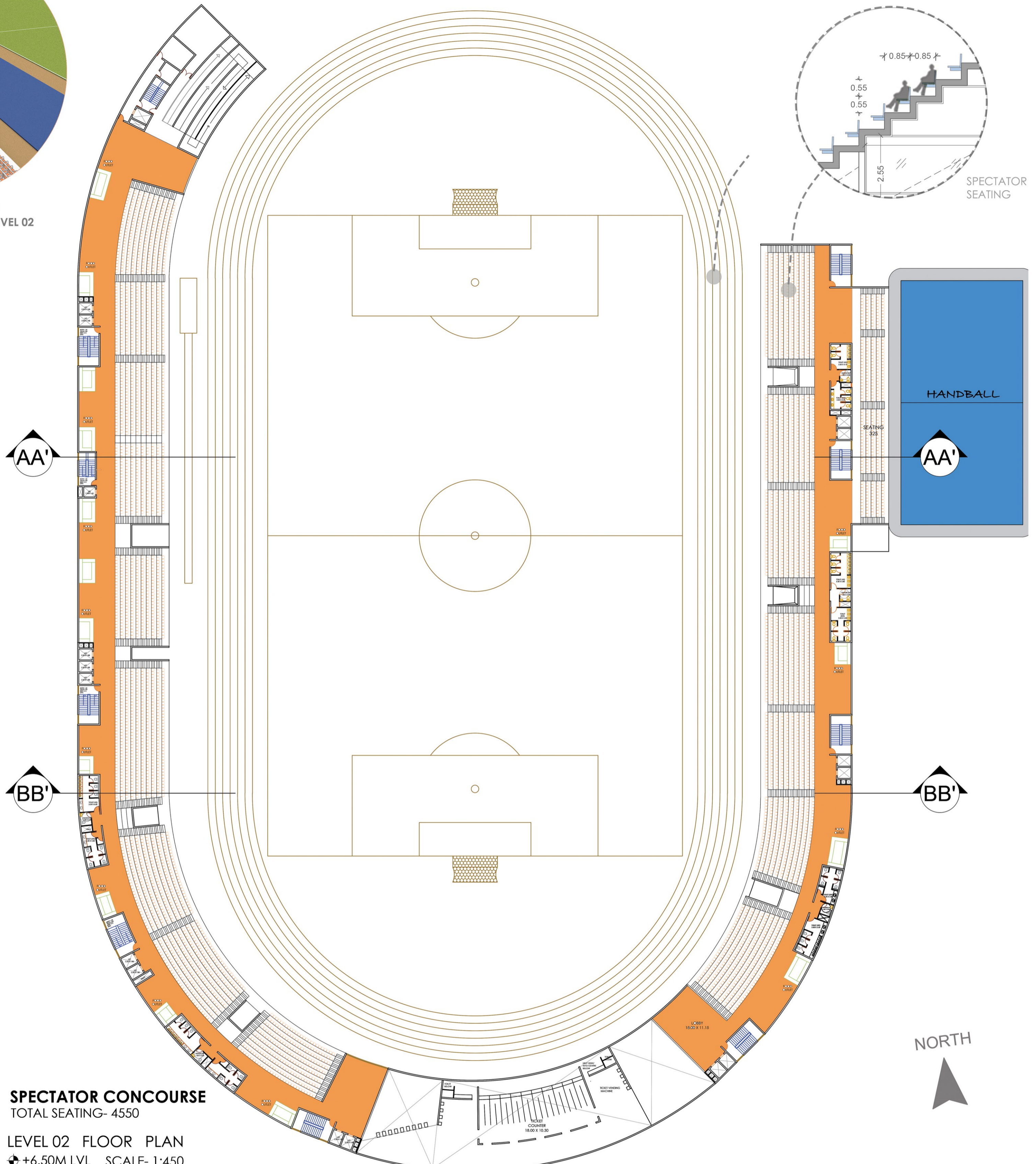


SPECTATOR SEATING

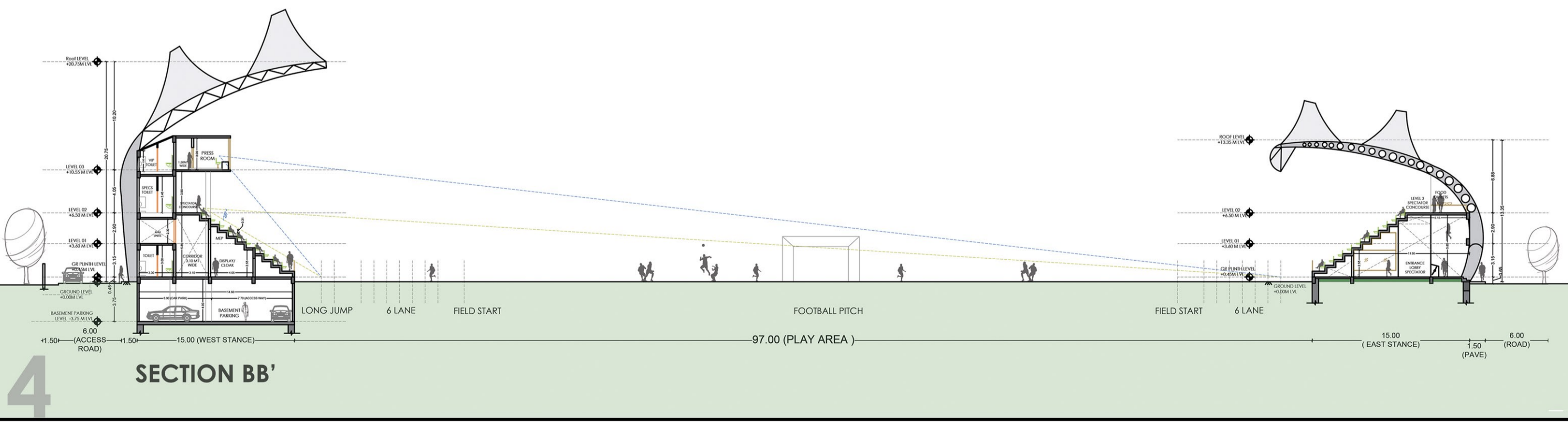


**ADMIN, PLAYER,  
UMPIRE & PRESS SPACE**  
LEVEL 01 FLOOR PLAN  
+3.60M LVL SCALE- 1:450

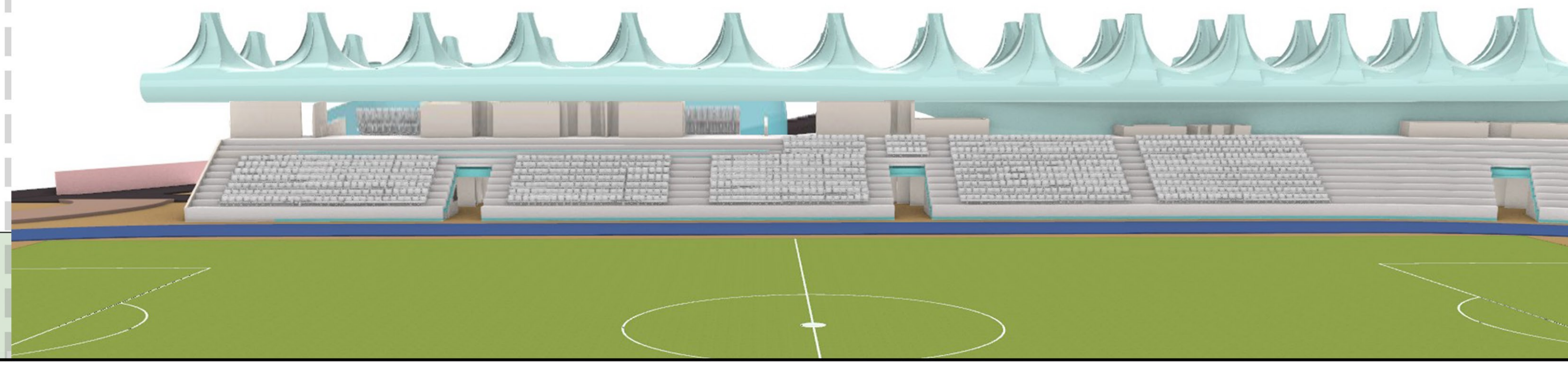
- ADMIN & VIP
- PLAYERS & UMPIRE
- PRESS
- SPECTATORS
- SERVICES
- SERVICES



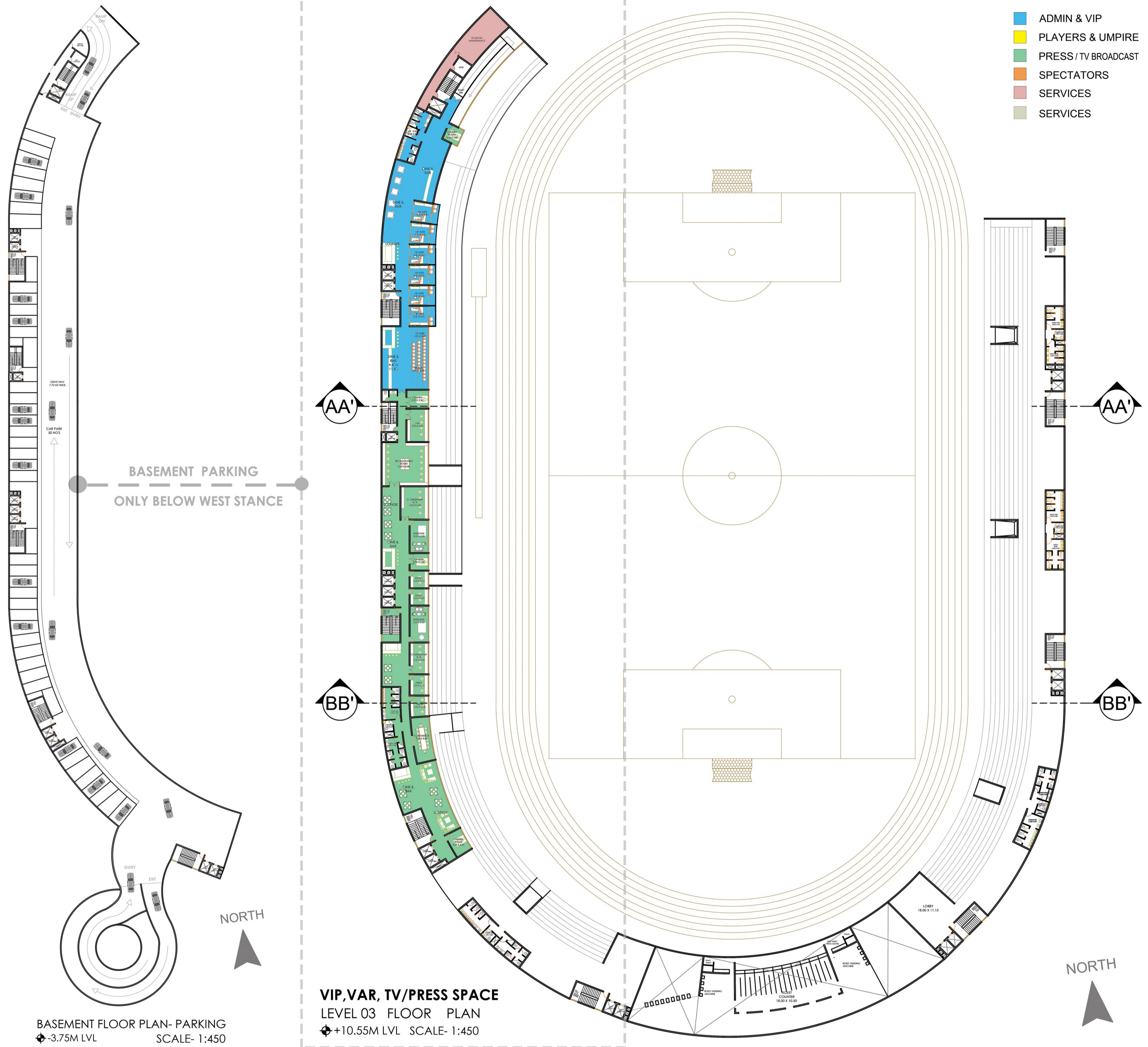
**SPECTATOR CONCOURSE**  
TOTAL SEATING- 4550  
LEVEL 02 FLOOR PLAN  
+6.50M LVL SCALE- 1:450



SECTION BB'







- ADMIN & VIP
- PLAYERS & UMPIRE
- PRESS/TV BROADCAST
- SPECTATORS
- SERVICES
- SERVICES

**HOTEL :** A Hotel is proposed on the Northwest region of the site with a direct public entry and a separate VIP and player entry. Hotel is of 4 storey - Ground with restaurants, retail space, cafeteria, admin and waiting spaces and 2 typical floors with rent rooms and a terrace garden with private dine out, party space and view points.

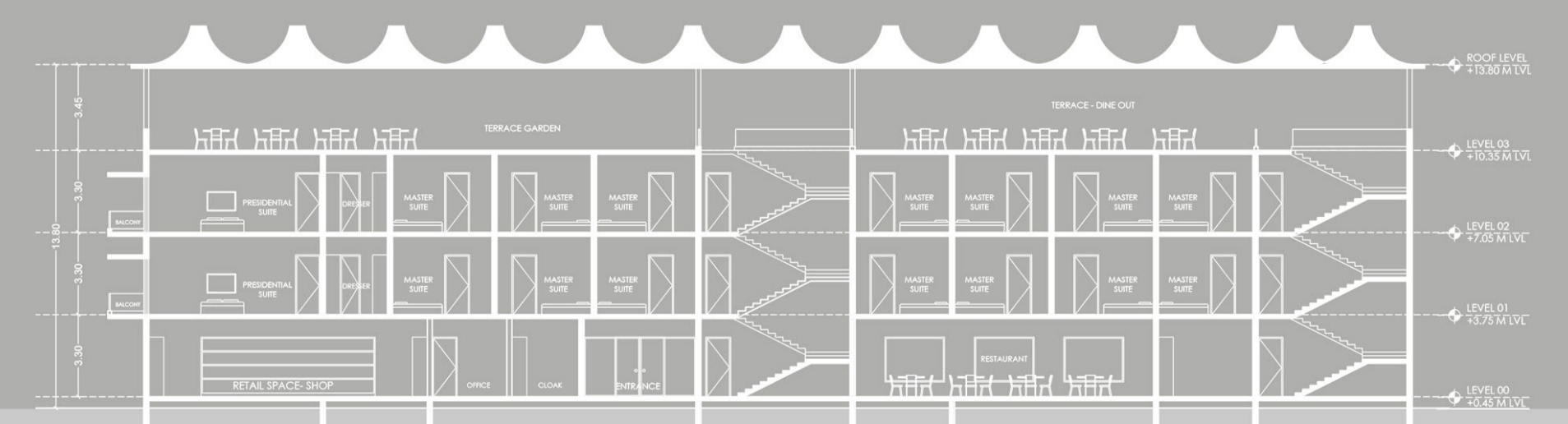
During matches, Hotel rooms serves as a accommodation for the players and VIPs in second floor and public stay in the First floor and during off season, it supports tourist stay and helps in ensuring business throughout the year and improving economy of the stadium .



GROUND FLOOR PLAN



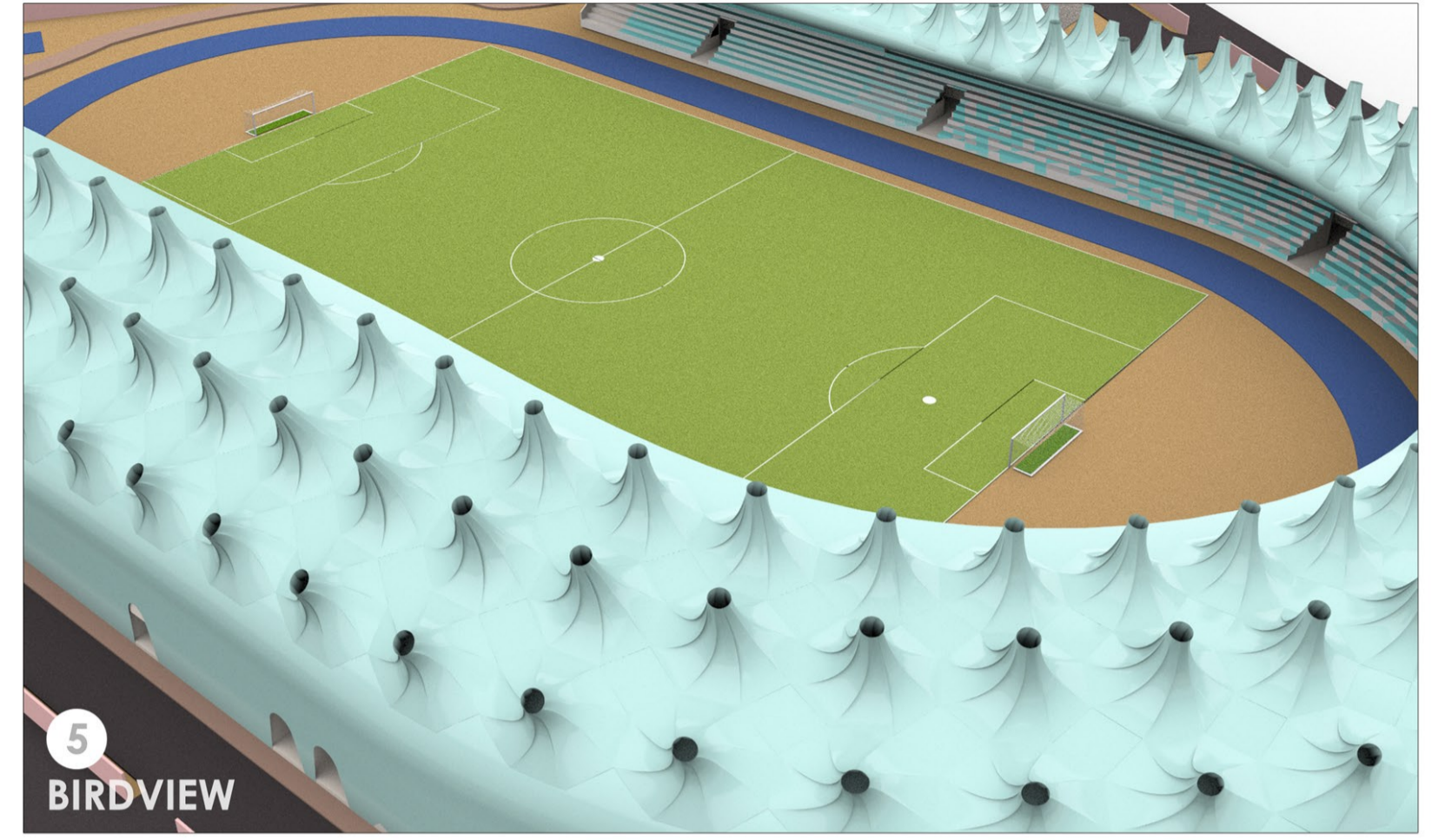
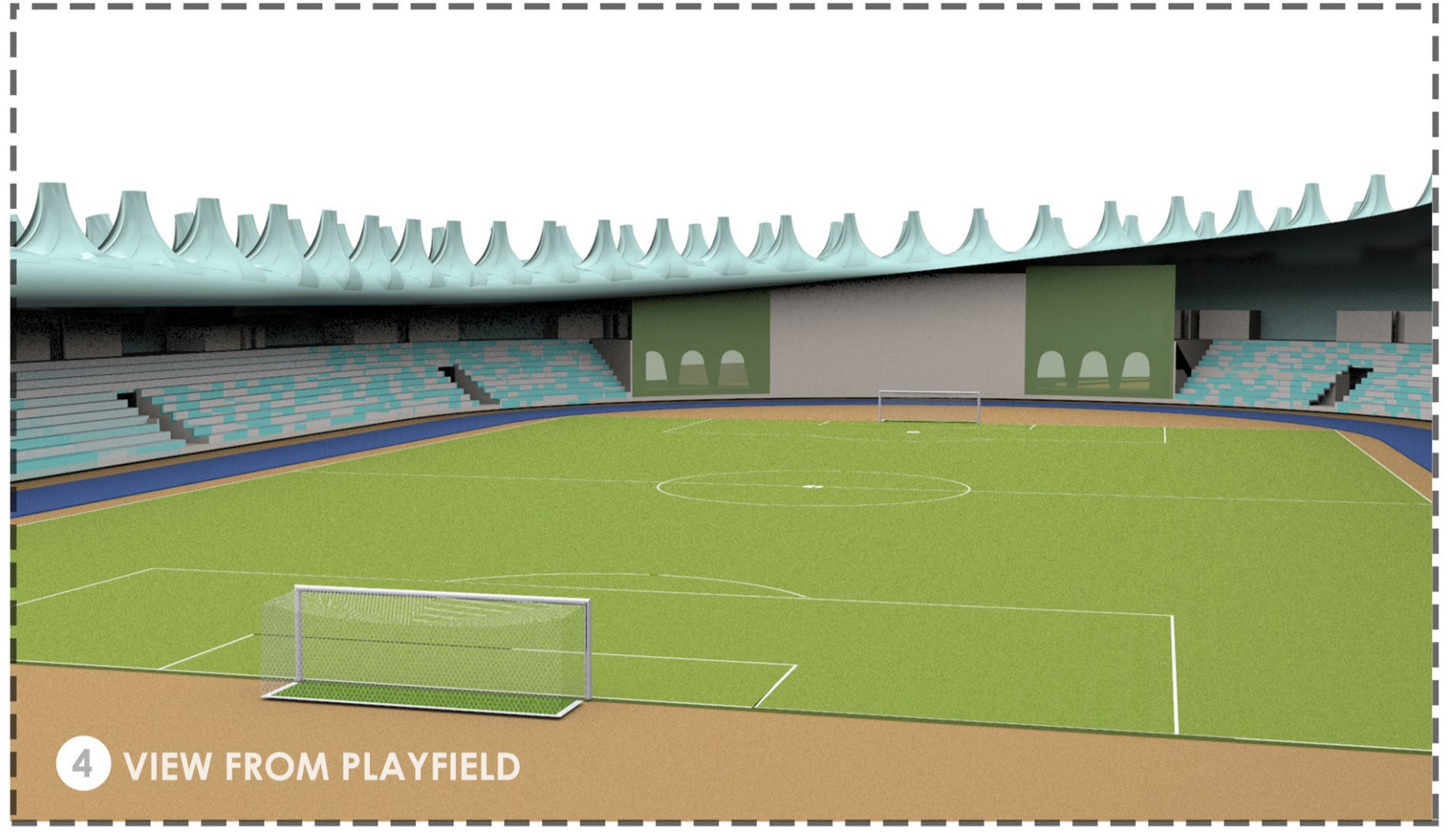
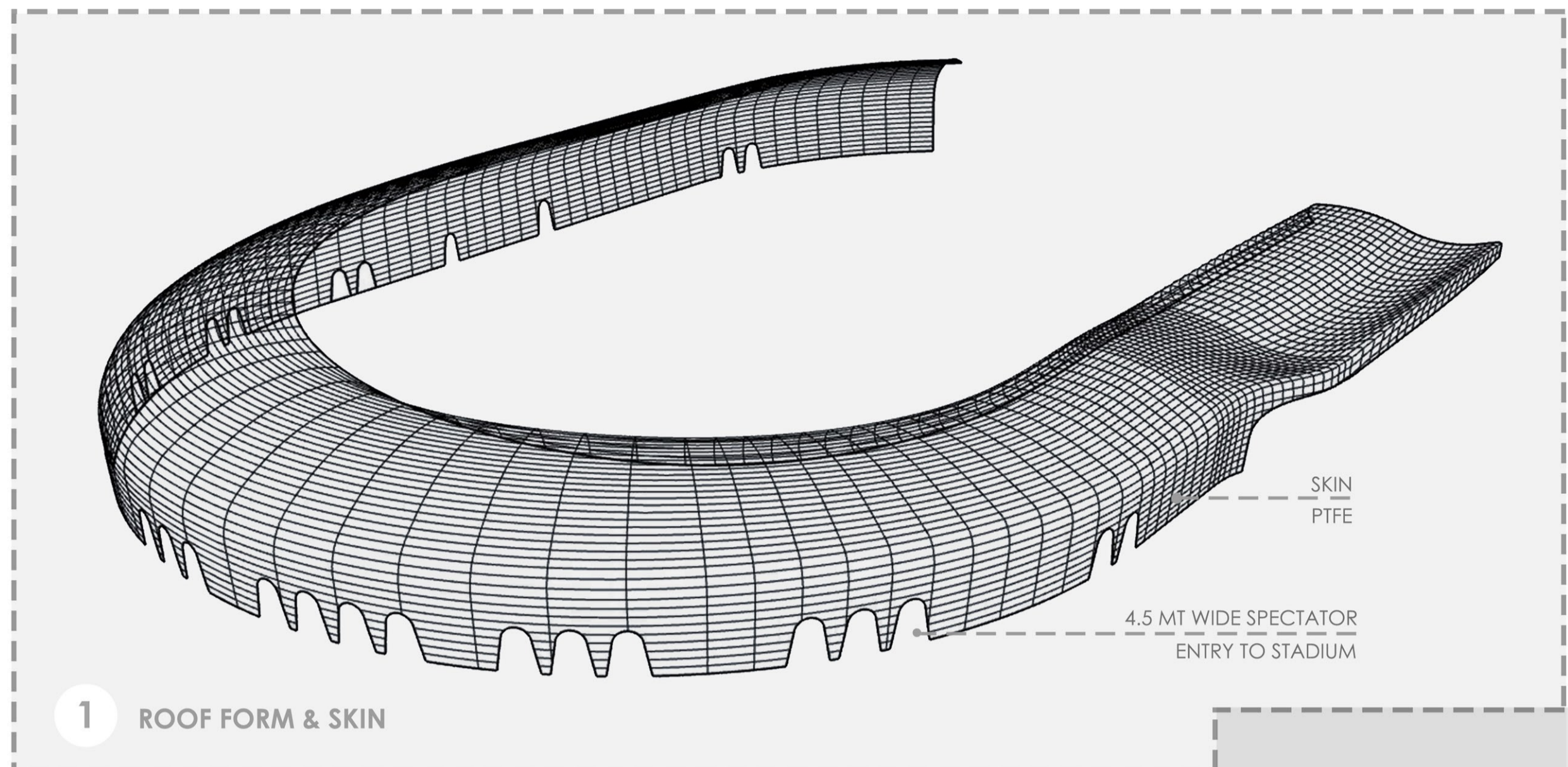
TYPICAL FLOOR PLAN



SECTION XX'



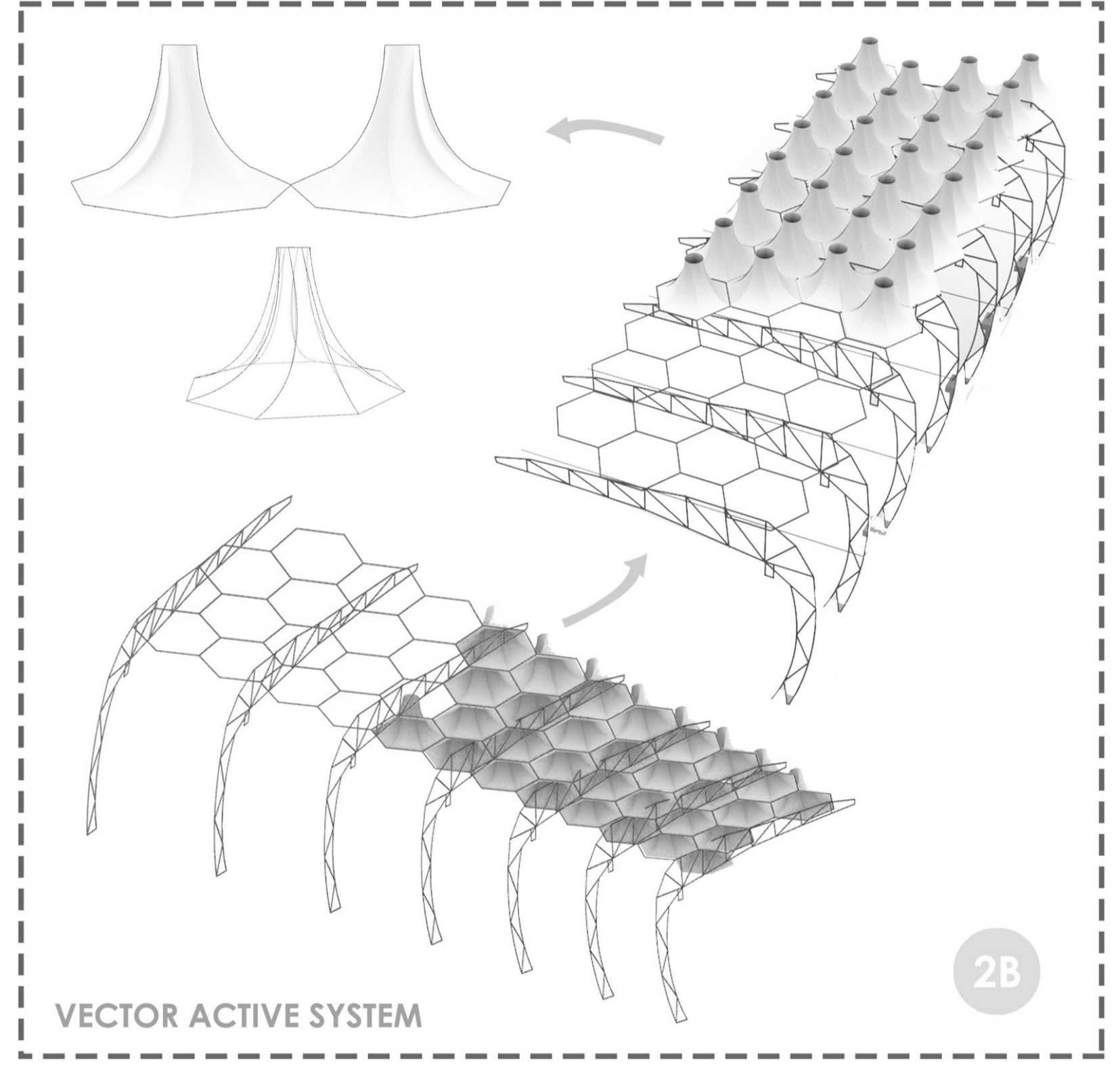
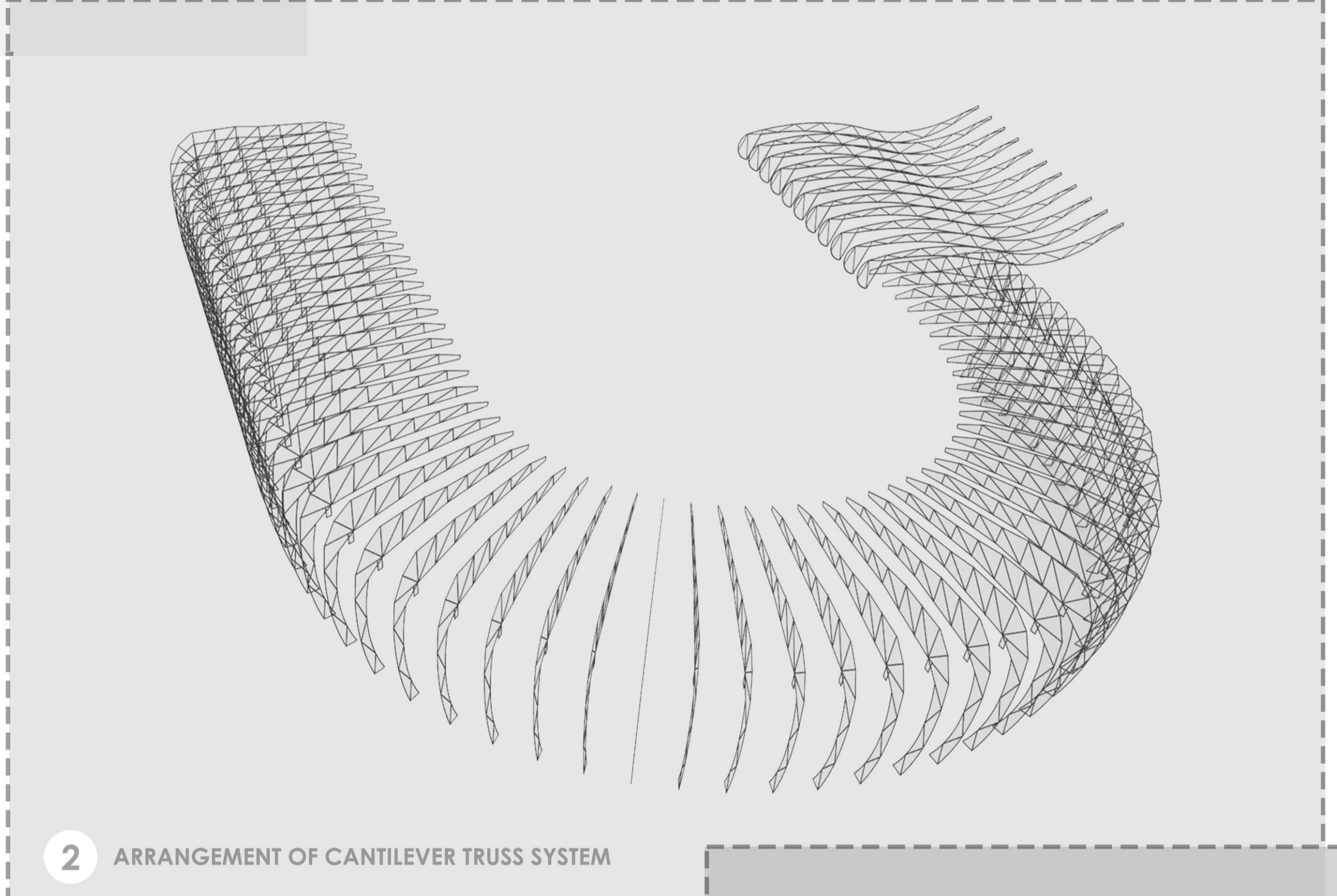
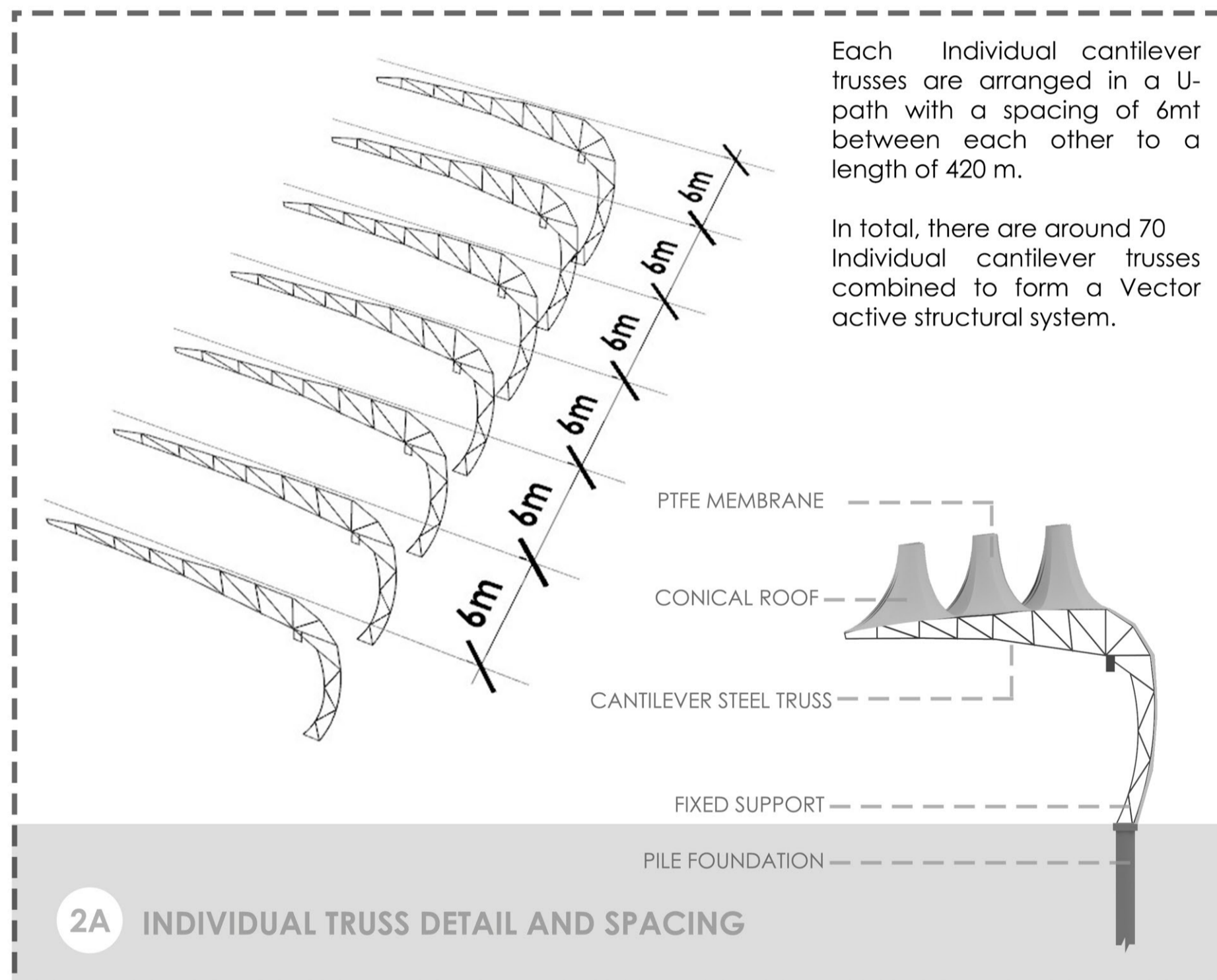




1 ROOF FORM & SKIN

4 VIEW FROM PLAYFIELD

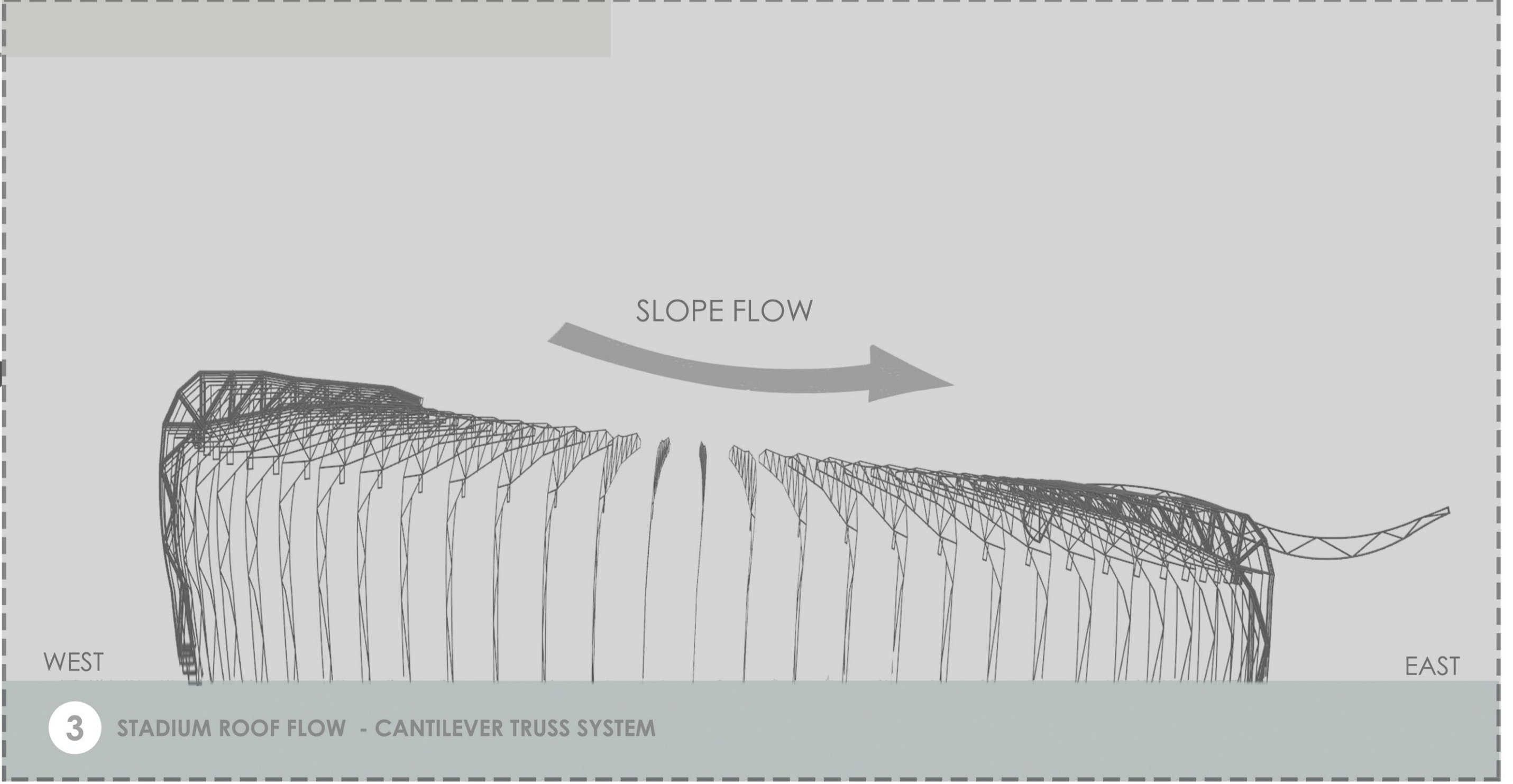
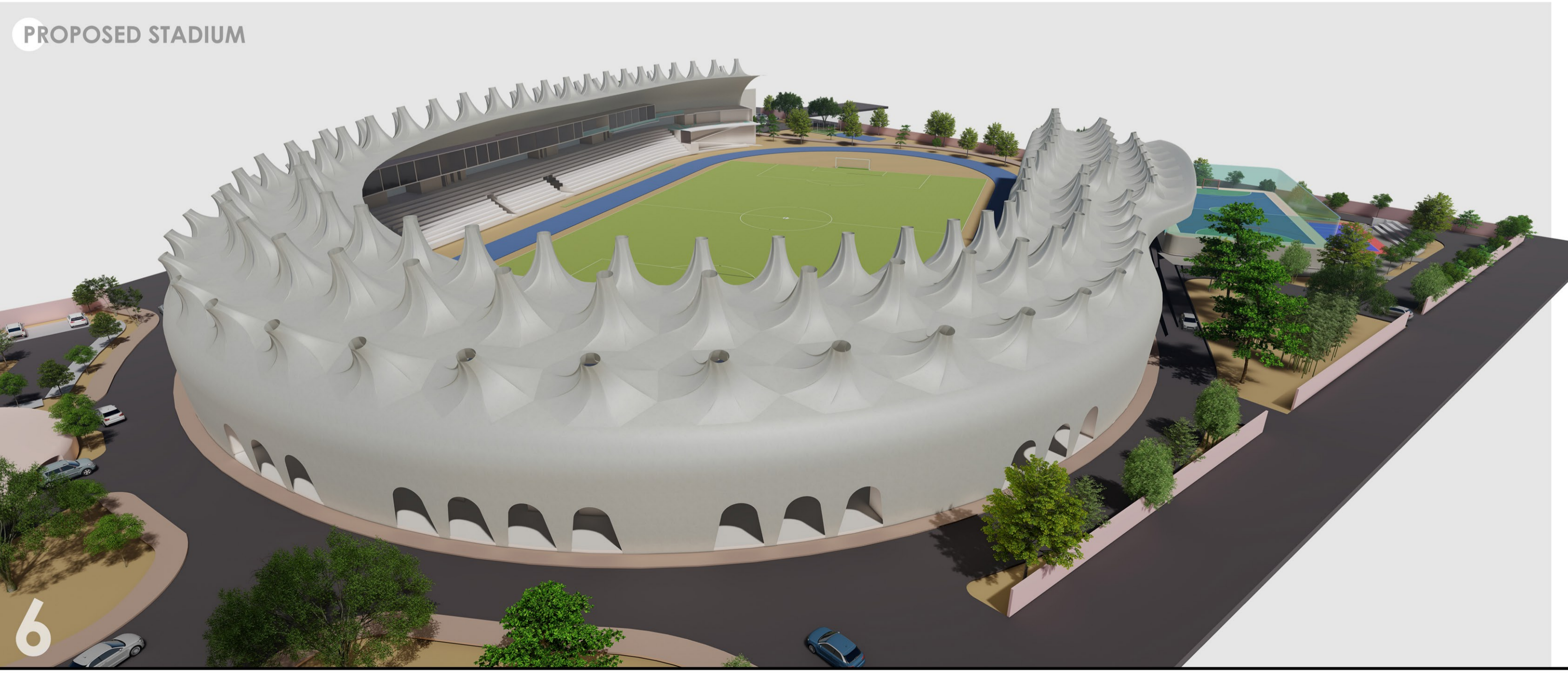
5 BIRDVIEW



2A INDIVIDUAL TRUSS DETAIL AND SPACING

2 ARRANGEMENT OF CANTILEVER TRUSS SYSTEM

2B



6

3 STADIUM ROOF FLOW - CANTILEVER TRUSS SYSTEM

WEST

EAST