THESIS REPORT ON

“SPORTS COMPLEX, NARELA, DELHI”

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE DEGREE OF:

BACHELOR OF ARCHITECTURE

BY

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LUCKNOW.

SCHOOL OF ARCHITECTURE AND PLANNING BABU BANARASI DAS UNIVERSITY, LUCKNOW (U.P.).

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I hereby recommend that the thesis entitled “SPORTS COMPLEX, NARELA, DELHI” under the supervision, is the bonafide work of the students and can be accepted as partial fulfillment of the requirement for the degree of Bachelor’s degree in architecture, school of Architecture and Planning, BBDU, Lucknow.

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ABSTRACT

Sport is all forms of usually competitive physical activity which, through casual or organized participation, aim to use, maintain or improve physical ability and skills while providing entertainment to participants, and in some cases, spectators.

According to the National Council of Youth Sports (NCYS), there were over 40 million boys and girls participating in organized sports in 2008. With numbers like these, which continue to rise every year, it would certainly be of benefit to highlight the positives behind all this participation. This becomes especially important with the seemingly heavy media concentration on the opposing side of the fence where the negative tends to make a better news story.

Participating in sports gives athletes the ability to develop tight and lasting friendships with others who have common interests. This is a valuable experience that usually leaves them with lasting life long memories. When one takes a good look at the wide range of benefits available to those who participate competitively in sports, one cannot help but see how comprehensive they could be in the development of a well-rounded individual. The application of these attributes to one's life outside of sports is something few can argue with. At least that would seem to be the case, right? Yet, this is not necessarily the perception of everyone, nor does what we see emphasized in the media support this view.

All the above facts shows that sporting culture is very important in todays life and upcoming generation. Keeping all these things in my mind I decided to design a ‘Sports Training Complex’.

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CHAPTER 1 : INTRODUCTION

1.1 BACKGROUND

Sport (or sports) is all forms of usually competitive physical activity which, through casual or organized participation, aim to use, maintain or improve physical ability and skills while providing entertainment to participants, and in some cases, spectators. Sport is generally recognized as activities which are based in physical athleticism or physical dexterity, with the largest major competitions such as the Olympic Games admitting only sports meeting this definition, and other organizations such as the Council of Europe using definitions precluding activities without a physical element from classification as sports. However, a number of competitive, but non-physical, activities claim recognition as mind sports. The International Olympic Committee (through ARISF) recognizes both chess and bridge as bona fide sports, and Sport Accord, the international sports federation association, recognizes five non- physical sports, although limits the amount of mind games which can be admitted as sports. Sports are usually governed by a set of rules or customs, which serve to ensure fair competition, and allow consistent adjudication of the winner.

In organized sport, records of performance are often kept, and for popular sports, this information may be widely announced or reported in sport news. In addition, sport is a major source of entertainment for non-participants, with spectator sports drawing large crowds to venues, and reaching wider audiences through sports broadcasting.

WHAT IS SPORTS ?

The word "sport" comes from the Old French desport meaning "leisure", with the oldest definition in English from around 1300 being "anything humans find amusing or entertaining".

HISTORY OF SPORTS

Most sports of today only developed in their current form in the 19th and 20th century, though many take their origins from more primitive sports and pastimes of ancient times. Although it is impossible to know for sure, it is usually considered that wrestling and boxing were the first sports every played. Competitions using the simple mode of human transport, running, would also have been among the first sports played. Competitions involving hitting, kicking, throwing a ball like object, as well as sports related to hunting and throwing would also be expected to have be played in early times. There are many sports that have developed as competitions from means of early transportation, such as horse riding and canoeing, and from military activities such as archery.

At the first recorded ancient Olympic Games in 760 BC, there was only one event, a footrace. Later Games included other events such as wrestling, boxing, equestrian, discus, javelin, and jumping. From around the same time, the only sport mentioned in the Bible is said to be wrestling.

Artifacts and structures suggest sport in China as early as 2000 BC. Gymnastics appears to have been popular in China's ancient past. Monuments to the Pharaohs indicate that a number of sports, including swimming and fishing, were well-developed and regulated several thousands of years ago in ancient Egypt. Other Egyptian sports included javelin throwing, high jump, and wrestling. Ancient Persian sports such as the traditional Iranian martial art of Zourkhaneh had a close connection to warfare skills. Among other sports that originated in ancient Persia are polo and jousting.

A wide range of sports were already established by the time of Ancient Greece and the military culture and the development of sport in Greece influenced one another considerably. Sport became such a prominent part of their culture that the Greeks created the Olympic Games, which in ancient times were held every four years in a small village in the Peloponnesus called Olympia.

EVOLUTION OF SPORTS

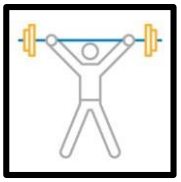
Activities of the present are the ones being inherited from our ancestors and being modified from time to time. Before civilization had ushered into the historic arena and before the onset of the machine age, man led a hard and robust life in contrast to the soft and luxurious life of today the hard work for surviving done by the primitives contributed to the physical perfection and there was no necessity for organized system to physical education

exertion in the machine age life. Thus, the need is felt for body development

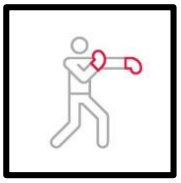
Human body has not indeed and cannot have altered greatly. Habits and living have altered beyond recognition and the strain of modern life needs correction, if balance is to be presser end and true functions of life achieved. Hence the need for an organized system of physical education is needed to compensate the loss sustained by man. The desire to pay is one of the strongest instincts of the human race.it is the easiest way to express to one's natural emotions. Even the king displayed their hammer throwing power with a blacks tossed great stones like present day .open spaces are essential for living. Encroachment of civilization has robbed us of our natural play fields and grounds. Towns had central open spaces between clusters of houses for gains and to be express their playing instincts which are essential and inherent. disappearance of gardens has largely been the construction of factories and houses. Different kinds of sports and open spaces are both very important in the life and welfare of mankind, today people flock to watch matches not because they do not wish to play but to satisfy these instincts of facilities keep them away from their love for sports. They love sports and derive benefits from open air excitement, tensing of muscles as they watch and cheer makes them use their lungs.

Thus sports filed provide fresh air and act as communal centre. They therefore are nation assists. Thus they are not just Victorian parks with bands or well-equipped recreation club but place designed for recreation with people with people instruct, supervise and improve physical fitness of people and encourage them with knowledge. Due to acute shortage of genuine playing facilities and management, the sporting talent of the youngsters is more or less getting suppressed Lack of sporting facilities may divert the talent energies of the youth to unsultry activities, Sports and games have very important role in the growth and development of mind and body.it also provide a ladder of fulfilment and success to youngsters who may otherwise be crowded in uncomfortable housing or tempted to a wayward life on the streets. Hence, the need for an organized system physical education is needed to compensate the loss sustained by man. People all over the world are showing kin interest in the international sporting events like the Olympics Asian games and commonwealth games winning medals in such events has become a prestige issue for both individuals and nation. Different kinds of sports and open spaces are both very important in the life and welfare of mankind. today, people flock to watch matches not because they do not wish to play but to satisfy their instincts Contribute to greater fitness, better health and sense of personal well being

1.2 NEED OF STUDY




The history of sports in India dates back to the Vedic era. Physical culture in ancient India was fed by a powerful fuel--religious rites. For the Honour of my Country and the Glory of Sport." There is a fascinating link between Greece and India which stretches back to 975 B.C. The zest for chariot-racing and wrestling was common to both the countries. In India, dehvada or the body-way is defined as "one of the ways to full realisation." In the day and age of the Rig-Veda, Ramayana and Mahabharata men of stature and circumstance were expected to be competent in chariot-racing, archery, horsemanship, military tactics, wrestling, weight-lifting, swimming and hunting The guru-shishya (teacher-pupil) relationship has always been an integral part of Indian sport from time immemorial. Indian sport reached a peak of excellence when Buddhism held sway here. In Villas Mani Majra, Tiruvedacharya describes many fascinating games, namely, archery, equitation, hammer-throwing and chariot-racing. In Manas Olhas (1135 A.D.), Someshwar writes about bhrashram (weight-lifting), bhramanshram (walking) and also about Mall-Stambha (wrestling).lt is more than likely that many of today's Olympic disciplines are sophisticated versions of the games of strength and speed that flourished in ancient India and Greece. Chess, wrestling, polo, archery and hockey (possibly a fall-out from polo) are some of the games believed to have originated in India.

1.3 REASON FOR SELECTION OF TOPIC

Why is a sports training complex needed ?

India ranks among the top in nations with larger population. But sadly the expected outcome of athletes on international platform except for cricket hasn't been achieved. The medals tally has been very minimal. In addition India lacks the adequate number of coaches. In order to increase the number of achievements, an institute with training facilities and infrastructure is needed which specializes in training athletes and coaches. Most of the schools are academic oriented where sports is just an extracurricular activity.

My aim is to create that option for players where sports can be taken up as a career, not just as an athlete but also as a coach. Their time wouldn't be wasted as there would be a number of options to be pursued as an athlete is made by the hard work of his support staff, his physiologist, psychologist etc.

Using sport as a fundamental part of the planning and delivery of knowledge and importance of games which are included in Olympics and commonwealth games.

It will help create a huge number of dedicated sportsmen in different sports. It will also help in searching talent in those rural areas where dreams live and die working for supporting the family

1.4 AIM AND OBJECTIVE

AIM-

To design a sports complex which will serve all sporting facilities and knowledge regarding Olympics and commonwealth games to the upcoming generation interested in sports field and motivating them to rise nations pride across the world.

OBJECTIVE-

- Recognizing and taking full advantage of the unique role of sport in contributing to a wide array of policy and community aspirations, including leisure, health, and education.
- Using sport as a fundamental part of the planning and delivery of knowledge and importance of games which are included in Olympics and commonwealth games.
- The development of such a complex to provide necessary facilities to the players from the rural areas also and rising the name of nation in all over the world.
- Providing the indoor as well as outdoor games together and making a complex as landmark of the city.

1.5 SUMMARY

WHY INDIA FAILS AT OLYMPICS -

The Chinese state media has listed out the reasons it believes are behind the poor show. These are: lack of infrastructure, poor health, poverty, girls not being allowed to participate in sports, boys being coaxed into becoming doctors and engineers, the popularity of cricket over other sports, India's fading hockey glory and lack of information about the Olympics in rural areas.

"India has 1,200,000,000 people, and is the second populous country following China. But India's getting scarce medals in the Olympic Games. Why? Counting by population, India ranks the last in Olympic medal number, India got only six medals in the 2012 Olympics, while none were gold," said an article on the website Toutiao.com.

"Counting the recent three (2004 Athens, 2008 Beijing, 2012 London) Olympics, if the medals were given equally to the whole population, India ranks last."

It added: "Large gap between rich and poor has made it hard for the poor people even to make a living, let along saving the energy for sports practice. Adding that the government has only little investment on the sports infrastructure, the mass sports and competitive sports are both lagging behind in India."

The lack of a sports culture in India has contributed to the lack of Olympic success. The Indian culture has hindered local sports development. Most families want their children to become doctors or accountants. Sports talents would be persuaded by family and even neighbours, stopping them from taking part in high-level competitions.

1.5 SUMMARY

SPORTS REDUCES STRESS AND TENSION

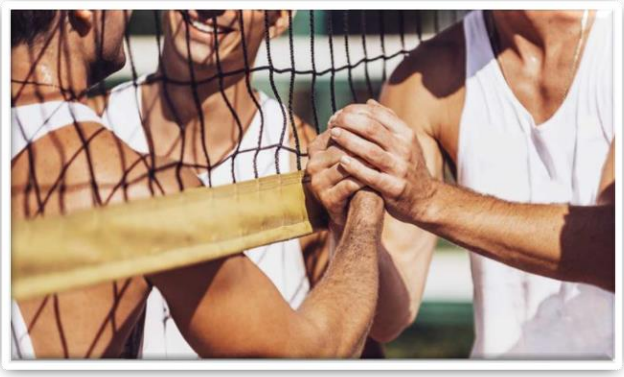
When you are physically active, your mind is distracted from daily stressors. This can help you avoid getting bogged down by negative thoughts. Exercise reduces the levels of stress hormones in your body. At the same time, it stimulates production of endorphins. These are natural mood lifters that can keep stress and depression at bay. Endorphins may even leave you feeling more relaxed and optimistic after a hard workout. Experts agree that more quality research is needed to determine the relationship between sports and depression.

SPORTS HELPS US TO MAINTAIN OVERALL FITNESS

The Centre for Disease Control and Prevention (CDC) recommend sports participation as a healthy way to maintain weight. Individual sports, such as running, cycling, and weightlifting, are all particularly effective ways to burn calories and/or build muscle. Staying within a recommended weight range reduces the likelihood of developing diabetes, high cholesterol, and hypertension.

SPORTS BOOSTS OUR SELF-CONFIDENCE

The regular exercise that comes with playing sports can boost your confidence and improve your self-esteem. As your strength, skills, and stamina increase through playing sports, your self-image will improve as well. With the renewed vigor and energy that comes from physical activity, you may be more likely to succeed in tasks off the playing field as well as on it.



SPORTS HAVE BEEN LINKED TO LEADERSHIP TRAITS

Team sports such as soccer, baseball, and basketball are breeding grounds for leadership traits. Studies done in high schools reveal a correlation between sports participation and leadership qualities. Because of the opportunity to train, try, win, or lose together, people involved in sports are naturally more inclined to adopt a “team mindset” in the workplace and in social situations. The team mindset leads to strong leadership qualities over time.

SPORTS IMPROVES OUR MOOD

Want a burst of happiness and relaxation? Get involved in a physical activity. Whether you are playing sports, working out at a gym, or taking a brisk walk, physical activity triggers brain chemicals that make you feel happier and more relaxed. Team sports in particular provide a chance to unwind and engage in a satisfying challenge that improves your fitness. They also provide social benefits by allowing you to connect with teammates and friends in a recreational setting.

SPORTS IMPROVES OUR CONCENTRATION

Regular physical activity helps keep your key mental skills sharp as you age. This includes critical thinking, learning, and using good judgment. Research has shown that doing a mix of aerobic and muscle- strengthening activities is especially helpful. Participating in this kind of activity three to five times a week for at least 30 minutes can provide these mental health benefits.

SCOPE OF THE TOPIC

Sports have been given secondary importance and are quite a neglected aspect, particularly in huge metropolitan cities. This is due to the lack of sufficient and proper facilities and due to the hectic lives that we all are living. Increase in migration rate causes overcrowding and reduction in open spaces. There is an acute shortage of playing facilities. Reasons behind this are:

- Encroachment of civilization which have robbed us of our natural playing fields.
- Shortages of funds as the people have still not realized the importance of sports in their lives and hence no initiative is taken by them. While other countries have progressed by leaps and bounds, Indian sports are still far behind.
- The scope can be defined in terms of utility and the user of the particular space, the age groups varies from young to old, working population to kids.
- Getting them together can promote an interaction which means constructive utilization of people's time.
- Making people understand the importance of physical and psychological wellbeing through sports facilities.
- The recreation hub is a lively space and a happening place dealing with spreading positive energy by promoting overall well-being of the public, and hence the society.

CHAPTER 2 : RESEARCH

2.1 LITRATURE STUDY

Printed from
THE TIMES OF INDIA

Delhi Development Authority plans two more sports complexes in Rohini, Narela

TNN | Sep 18, 2022, 05.53 AM IST

NEW DELHI: While the foundation stone for Delhi Development Authority's (DDA) first sports complex to be built under public-private partnership (PPP) was laid on Saturday, the land development agency is already planning to develop two more such sports complexes in the city. They will come up in Rohini and Narela.

An official said that the plot identified at Rohini Sector-34 measures approximately 53.6 acres and the project cost is estimated at Rs 150 crore. The plot at Narela Sector- A7 is much smaller at 18 acres and the project cost is estimated to be around Rs 57 crore.

OLYMPIC MEDALS WIN BY INDIAN ATHLETS FROM 1896

Games	1 Gold	2 Silver	3 Bronze	Total	Rank
1896 Athens	*did not participate*				
1900 Paris	0	2	0	2[1]	17
1904 St. Louis	*did not participate*				
1908 London					
1912 Stockholm					
1920 Antwerp	0	0	0	0	-
1924 Paris	0	0	0	0	-
1928 Amsterdam	1	0	0	1[2]	23
1932 Los Angeles	1	0	0	1[3]	19
1936 Berlin	1	0	0	1[4]	20
1948 London	1	0	0	1[5]	22
1952 Helsinki	1	0	1	2[5]	26
1956 Melbourne	1	0	0	1[5]	24
1960 Rome	0	1	0	1[6]	32
1964 Tokyo	1	0	0	1[7]	24
1968 Mexico City	0	0	1	1[8]	42
1972 Munich	0	0	1	1[9]	43
1976 Montreal	0	0	0	0	-
1980 Moscow	1	0	0	1[10]	23
1984 Los Angeles	0	0	0	0	-
1988 Seoul	0	0	0	0	-
1992 Barcelona	0	0	0	0	-
1996 Atlanta	0	0	1	1[11]	71
2000 Sydney	0	0	1	1[12]	71
2004 Athens	0	1	0	1[13]	65
2008 Beijing	1	0	2	3[13]	50
2012 London	0	2	4	6[13]	55
2016 Rio de Janeiro	0	1[14]	1[15]	2[16]	67
Total	**9**	**7**	**12**	**28**	

SPORTS IN INDIA

There are a number of popular sports in India, but cricket is the most popular. The country also has won eight Olympic gold medals in field hockey. India has hosted and co-hosted several international sporting events, including the1951 and 1982 Asian Games, the 1987, 1996 and 2011 Cricket World Cup, the 2003 Afro-Asian Games, the 2010 Hockey World Cup and the 2010 Commonwealth Games. Major international sporting events annually held in India include the Chennai Open, Mumbai Marathon, Delhi Half Marathon, and the Indian Masters. In 2011, India hosted its first Indian Grand Prix at the Buddh InternationaL Circuit, an Indian motor racing circuit in Greater Noida India.

India first participated at the Olympic Games in 1900, with an athlete (Norman Pritchard) winning two medals in athletics. The nation first sent a team to the Summer Olympic Games in 1920, and has participated in every Summer Olympic Games ever since. India has also competed at several Winter Olympic Games since 1964. India has won a total of 20 Olympic medals. India won its first gold medal in men's field hockey in the 1928 Olympic Games. Abhinav Bindra became the first Indian to win an individual gold medal at the Olympic Games, and India's first gold medal since 1980, when the men's field hockey team won the gold. India is remarkable among nations for having won very few Olympic medals, despite a population exceeding one billion, around half of them under the age of 25.

2.2 STANDARDS

TENNIS

The dimensions of a singles and doubles tennis courts are defined in the Rules of Tennis by the International Tennis Federation (ITF). For practical purposes the vast majority of tennis courts are built to doubles dimensions, which allows for both singles and doubles.

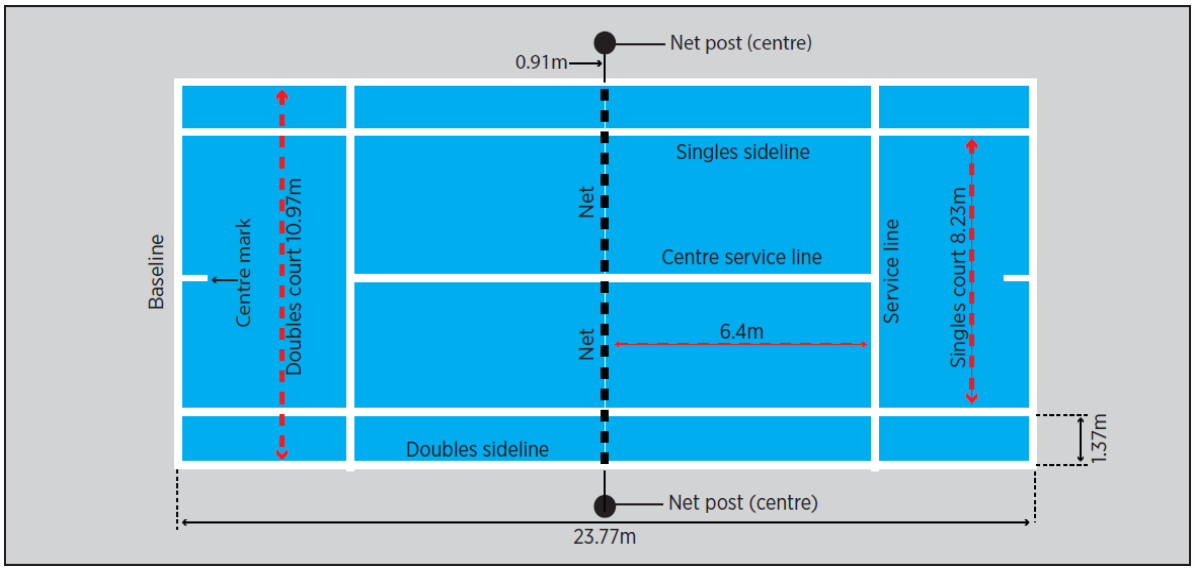
The court

The court is 23.77m long and for singles matches, 8.23m wide. For doubles matches the court is 10.97m wide.

The court is divided into two equal areas by a net suspended by a cord or metal cable attached to two net posts. The net is 1.07m high and is fully extended to that it fills the space between the two nets posts. The net is 0.914m high at the centre, where is held down tightly by a white strap. A white band covers the cord or metal cable and the top of the net.

For doubles matches the centre of the net posts are 0.914m outside the doubles court on each side.

For singles matches the centres of the net posts are 0.914m outside the singles court on each side.



Playing area

The overall playing area including run-off depends on the type of event. A guide to minimum court area requirements (single courts) is outlined in the table below.

With indoor courts the recommended height measured at the net from the court surface to the ceiling is 9.14m.

Line markings

The lines at the end of the court are baselines and the lines at the sides of the court are side lines. The baseline is up to 10cm wide.

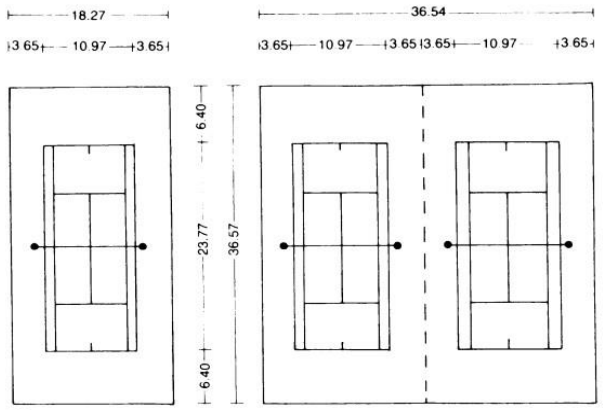
Service lines are two lines between the singles side lines, 6.40m from each side of the net, parallel with the net.

On each side of the net the area between the service line and the net are divided into two equal parts called the service courts. The line dividing the service courts is the center service line and is drawn parallel with the singles side lines and half way between them. The center service line is 5cm wide.

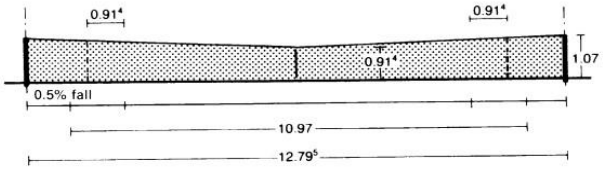
All other lines on the court are between 2.5cm and 5cm wide.

All court measurements are made to the outside of the lines and are all the same colour, contrasting with the colour of the surface.

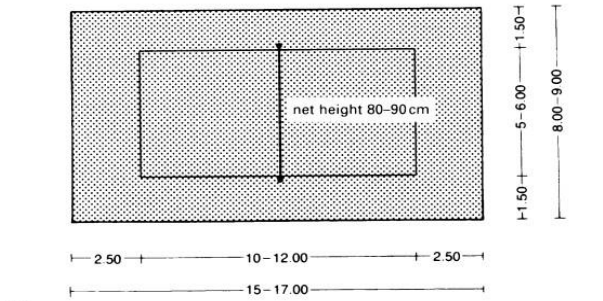
Court Dimensions	Club/ recreation	ITF (pro tour)	Stadium court
Total area	34.77m x 17.07m	36.6m x 18.3m	40.23m x 20.11m
Run-off back of court	5.48m	6.4m	8.23m
Run-off at side of court to fence	3.05m	3.66m	4.57m
Min distance between 2 courts (unfenced)	3.66m	5.48m	N/A
Recommended distance between two courts (unfenced)	4.27m	N/A	N/A



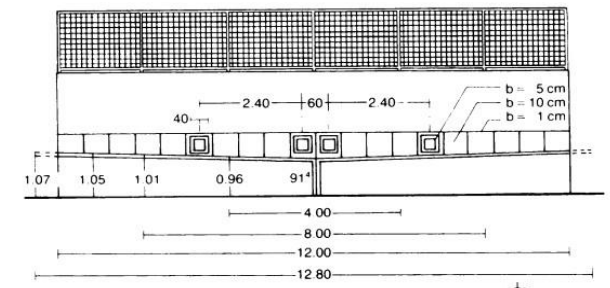
① **Court dimensions**



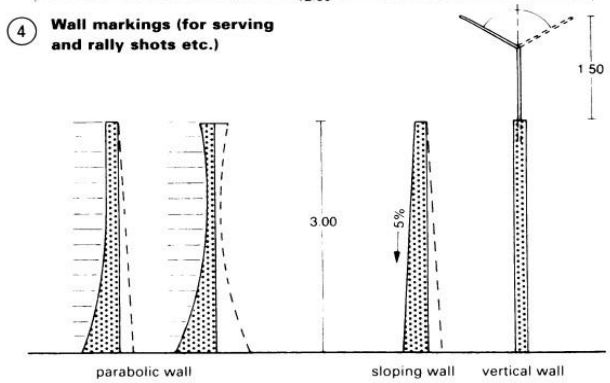
② **Net**



③ **Children's tennis court**



④ **Wall markings (for serving and rally shots etc.)**



⑤ **Forms of tennis walls**

doubles court → ① – ②	10.97 × 23.77 m
singles court	8.23 × 23.77 m
side margin	≥3.65 m
side margin for competitions	4.00 m
end margin	≥6.40 m
end margin for competitions	8.00 m
between two courts	7.30 m
net height in the middle	0.915 m
net height at the posts	1.07 m
height of surround netting	4.00 m

Use 2.5 mm thick wire net, with a 4 cm mesh width, for surround netting.

The number of active tennis players at present is between 1.6% and 3% of the total population. Use a 1:30 court:player ratio as a rule of thumb for the calculation of the number of courts needed in new developments.

$$\text{necessary courts (T)} = \frac{\text{population} \times 3}{100 \times 30}$$

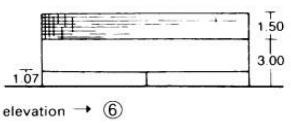
The area needed for tennis courts in children's facilities is between 120 and 153 m² → ③.

For recreational tennis courts (i.e. where there are no spectators) four car parking spaces should be provided per court.

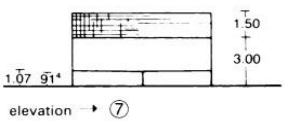
To calculate the size of plot required, add the net areas ('usable sports areas') needed for the planned number of tennis courts, training walls and children's facilities. To this add an additional 60–80% of the total net area to give the overall plot size.

Outdoor courts should, as near as possible, be orientated in the north–south direction. It is recommended that no more than two courts should be immediately next to one another and if they are behind each other a sight screen must be used to separate them. Artificial lighting should be at least 10 m high and along the sides of the court.

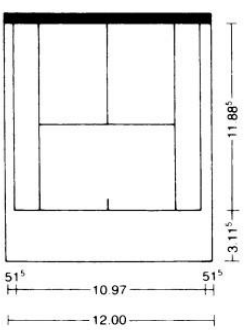
The layout should be designed so as to allow adaptation to meet future needs and planned so that any future building activity can take place without interrupting the playing activities. Potential future needs for accommodation (groundsman, trainer, tenant) and garages should be anticipated in the plans from the beginning. Tennis courts should not be 'foreign bodies' in the environment: they should fit in with their surroundings.



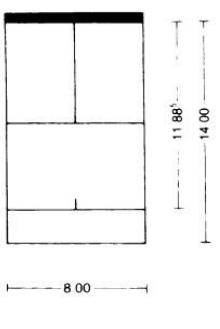
elevation → ⑥



elevation → ⑦



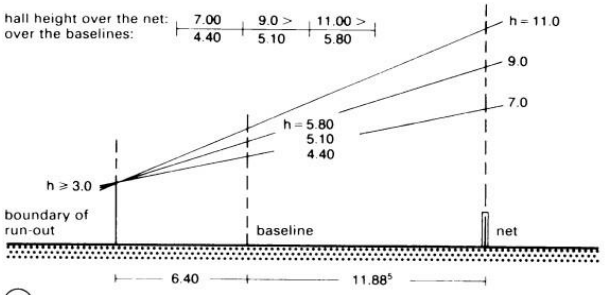
⑥ **Training wall: doubles**



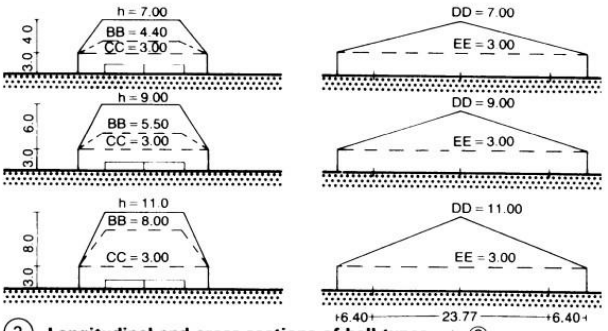
⑦ **Training wall: singles**

recommended dimensions for tennis walls and the playing areas in front

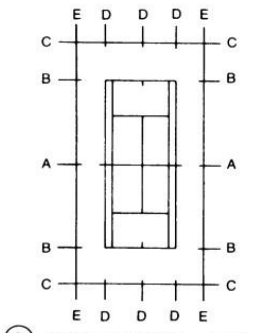
TENNIS FACILITIES



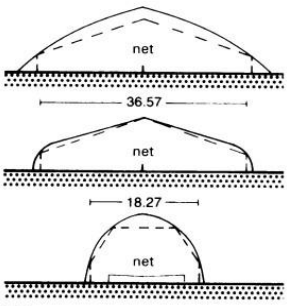
① **Hall heights**



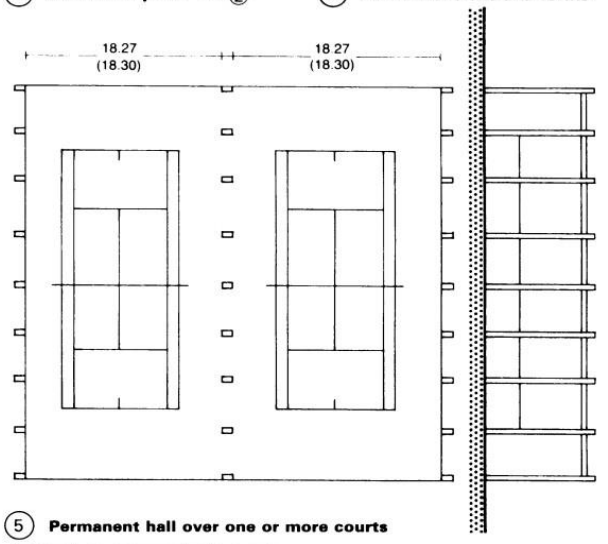
② **Longitudinal and cross-sections of hall types** → ③



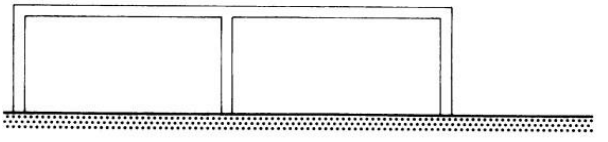
③ **Schematic plans** → ②



④ **Hall dimensions and forms**



⑤ **Permanent hall over one or more courts**



section → ⑤

Ceiling heights of halls for indoor competition tennis courts are internationally fixed. A height of 10.67 m is required by the regulations of the Davis Cup. For leisure facilities, a height of 9–11 m is recommended; 9 m is generally sufficient → ①. In gymnasiums and sports centres, it is possible to play tennis with hall heights as low as 7 m. The applicable height of a hall is measured at the net from the floor to the underside of the roof truss. The same height is needed over the full 10.97 m width of the court. The height at the outer limit of the run-out area should be at least 3 m. For a summary of end- and side-section elevations of the different hall types see → ② – ④.

Halls may be permanent → ⑤ – ⑥, demountable or multipurpose. Based on the court and run-out measurements prescribed in the international regulations for competition-standard facilities, one court requires a hall size of 18.30 m × 36.60 m. Therefore, use the following hall areas:

two courts = $(2 \times 18.30) \times (1 \times 36.60) = 36.60 \times 36.60$
three courts = $(3 \times 18.30) \times (1 \times 36.60) = 54.90 \times 36.60$

These dimensions make the facilities suitable for both leisure and competition use. The possible uses are:

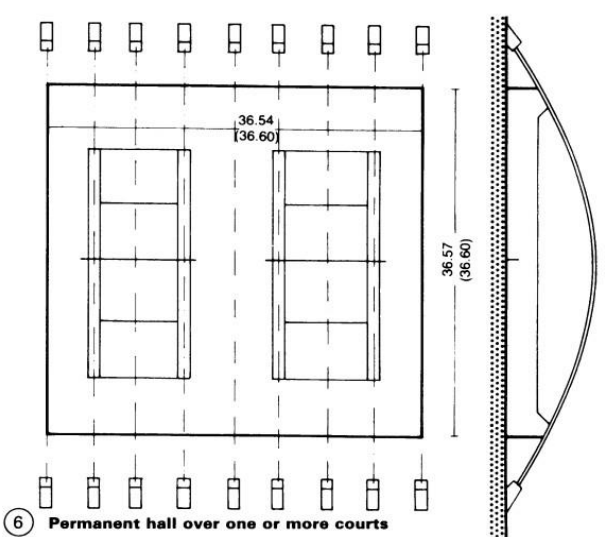
1. courts are competition-level 'singles'
2. courts are competition-level 'doubles'
3. courts are for training/leisure use, singles and/or doubles

If the tennis courts are for recreational use only, it is possible to use a reduced width to make space savings. The minimum size of hall for a two-court recreational facility is 32.40 m × 36.60 m.

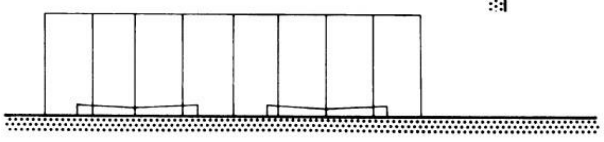
The table below shows some of the possible options.

hall type	courts	S (single)	D (double)	width	length	use C*	use not C*
1	1	1	1	18.30	36.60	S/D	–
2	2	2	2	36.60	36.60	2S/2D	–
2 single span	2	2	2	33.90	36.60	2S/1 S/1D	2D or 2S
3	3	3	3	54.90	36.60	3S/3D	–
3 single span	3	3	3	49.50	36.60	3S/2D	3D or 3S
2a	2	1	1	33.90	36.60	1S/1D	–
2a single span	2	1	1	32.40	36.60	1S/1D	–

* competition level



⑥ **Permanent hall over one or more courts**



section → ⑥

SWIMMING

The Federation Internationale de Natation (FINA) is the world governing body for aquatic sports such as swimming, diving, water polo, synchronized and open water swimming. FINA rules are used to manage state, national and international events such as the World Championships and the Olympics. The FINA Facilities Rules provide the best possible environment for competitive use and training.

Dimensions

Standard pools are either 25m or 50m long.

Depth

For pools with starting blocks, the minimum depth is 1.35m, extending to at least 6.0m. A minimum depth of 1.0 meter is required for pools without starting blocks.

Walls

The end walls are at right angles to the swimming course and surface of the water. They are made of a solid material, with a non–slip surface extending 0.8m below the water surface, to allow competitors to touch and push off in turning without hazard.

Rest ledges along the pool walls are permitted. They are located at least 1.2m below the water surface, and are up to 0.15m wide. Both internal and external ledges are acceptable, however internal ledges are preferred.

Gutters are placed on all four walls of the pool. If end wall gutters are installed, they must allow for attachment of touch panels to the required 0.3 metre above the water surface.

They are covered with a suitable grill or screen.

Water temperature

The water temperature is between 250 and 28° celsuis. During competition the water is kept at a constant level, with very little movement. Inflow and outflow is allowed as long as no appreciable current or turbulence is created.

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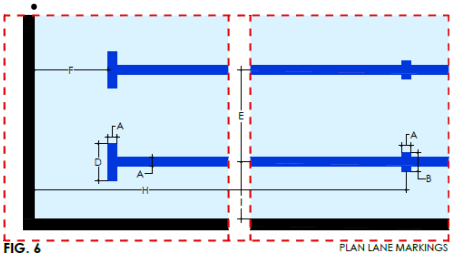

FIG. 6 PLAN LANE MARKINGS

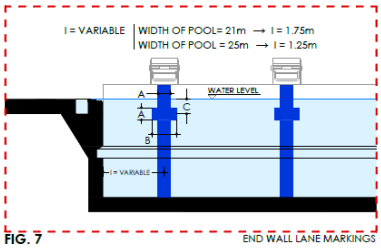

FIG. 7 END WALL LANE MARKINGS

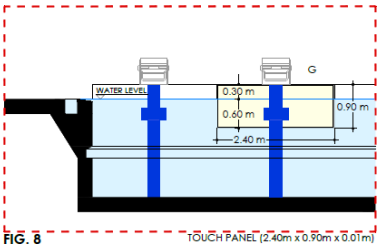

FIG. 8 TOUCH PANEL (2.40m x 0.90m x 0.01m)

Lanes

According to FINA rules World Championships require 8 lanes and Olympic Games require 10 lanes. The lanes are a minimum of 2.5m wide, with two spaces of at least 2.5m wide outside of the first and last lanes.

Lane ropes

In an 8 lane pool, lane ropes extend the full length of the course and are secured at each end wall to anchor brackets recessed into the end walls. The anchors are positioned so that the floats at each end wall of the pool are on the surface of the water. Each lane rope consists of floats placed end to end. The floats have a minimum diameter of 0.10m-0.15 meter.

In a swimming pool the colour of the lane ropes is as follows:

- Two green ropes for lanes 1 and 8.
- Four blue ropes for lanes 2,3,6 and 7.
- Three yellow ropes for lanes 4 and 5.

The floats that extend for a distance of 5m from each end of the pool are red. At the 15m mark from each end wall of the pool the floats are distinct. In 50 metre pools the floats are distinct at 25m. There is only one firmly stretched lane rope between each lane.

Starting platforms

Starting platforms are from 0.5m-0.75m high above the water surface. The surface area is at least 1.5m square and covered with a non-slip material. The maximum slope is 10 degrees. The platforms are firm and are without a springing effect

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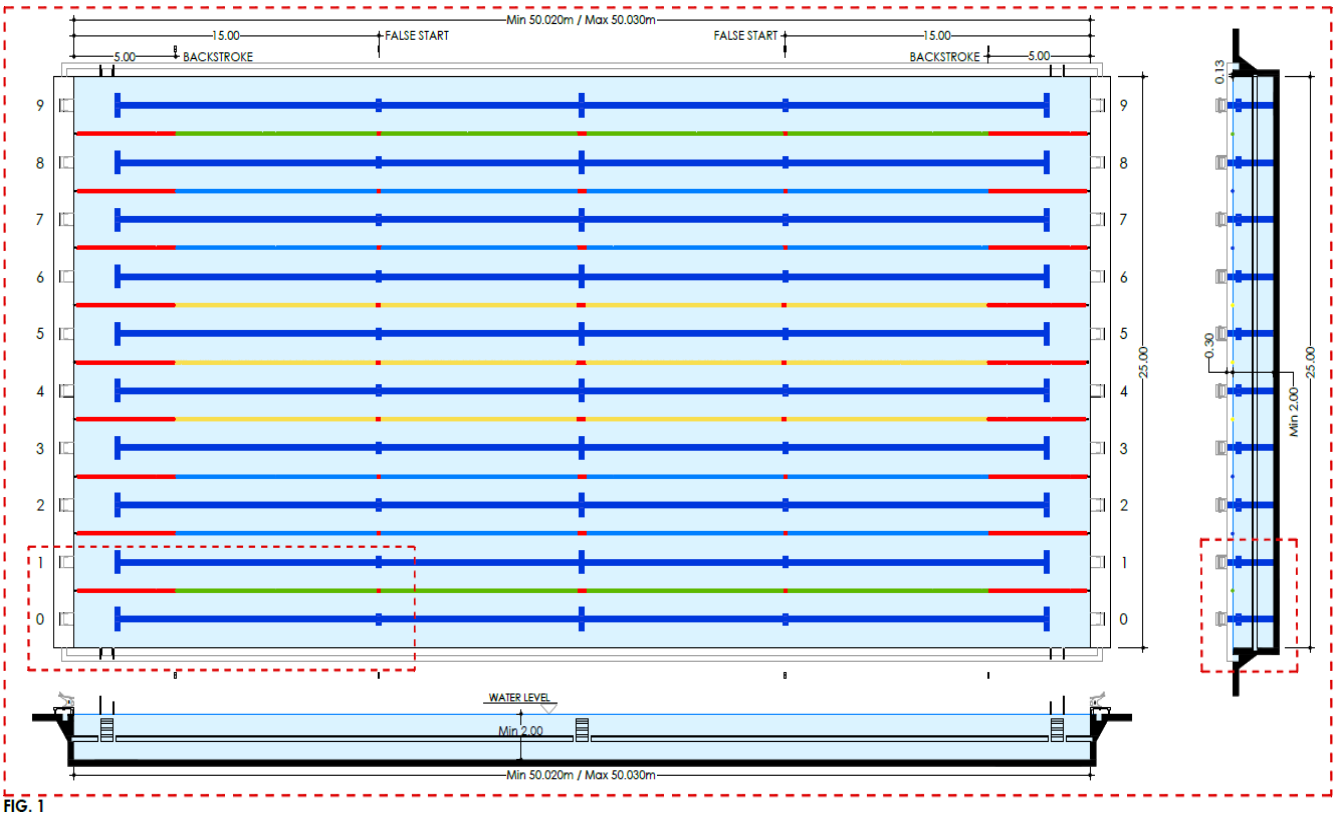


FIG. 1

DIVING

Diving installations are located either indoor or outdoor in aquatic facilities and are generally separated from the swimming area.

The minimum size for a diving pool is 25m wide and 20m long. The overall dimensions can be increased to suit other activities such as synchronised swimming and water polo.

A competition pool is equipped with two 1m and two 3m springboards and a diving tower with take-off platforms at 5m, 7.5m and 10m. Platforms also exist at 1m and 3m heights as training tools. The basic measuring point used is the plummet line.

This is a vertical line extending through the centre point of the front edge of the diving springboard.

The water temperature is a minimum of 26° celsius. The colour of the walls are white or pale blue. A dark blue floor, in conjunction with agitation of the water surface by water sprays, assists divers in seeing the water surface and reduces the risk of an accident.

Platform	Width	Length
0.6m-1.0m	1.0m min (2.9m pref)	5.0m
2.6m-3.0m	1.0m (2.0m preferred)	5.0m
5.0m	2.9m	6.0m
7.5m	2.0m	6.0m
10.0m	3.0m	6.0m

Springboard diving

The springboards are at least 4.8m long and 0.5 metre wide and provided with moveable fulcrums easily adjusted by the diver.

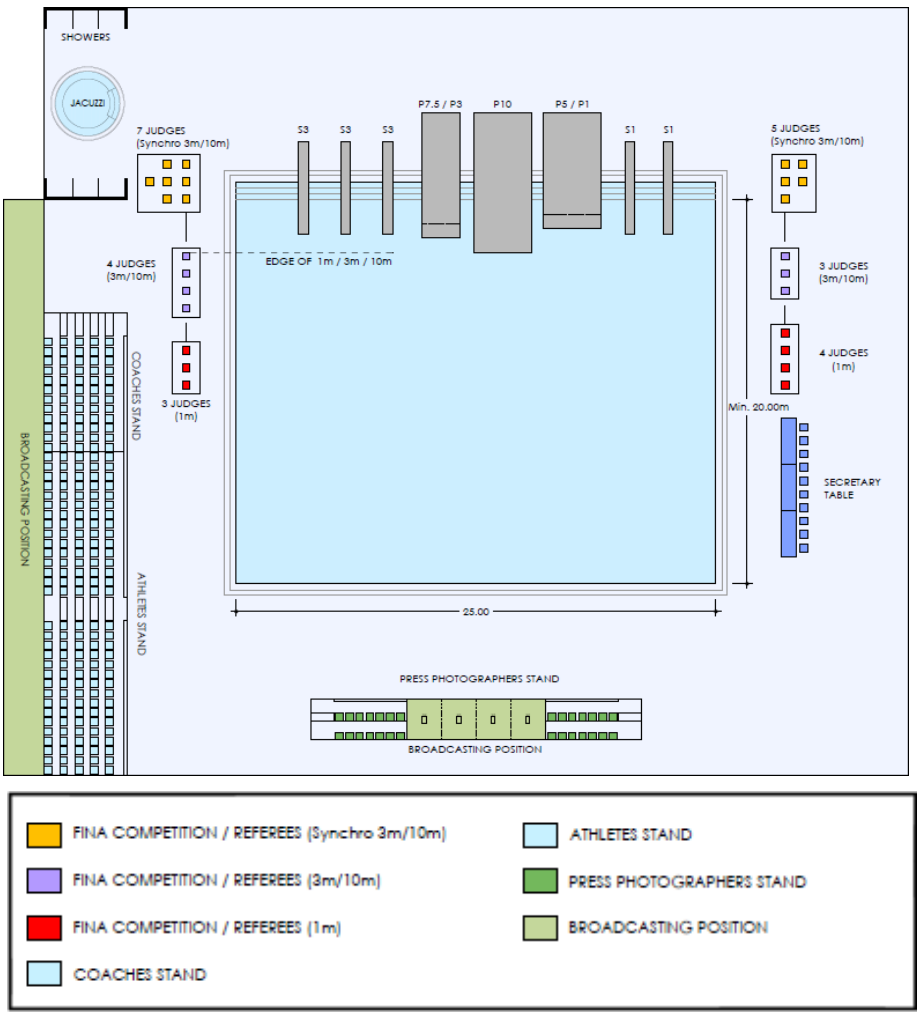
For springboard diving facilities constructed on concrete platforms, the following applies:

The vertical distance from the level of the platform, which supports the fulcrum

assembly, to the level of the top of the springboard, is 0.35m.

The distance from the front edge of the fulcrum assembly (which is 0.741m) to the front edge of the supporting platform, is a maximum of 0.44m.

25 X 20M STANDARD DIVING POOL



OLYMPIC WEIGHTLIFTING

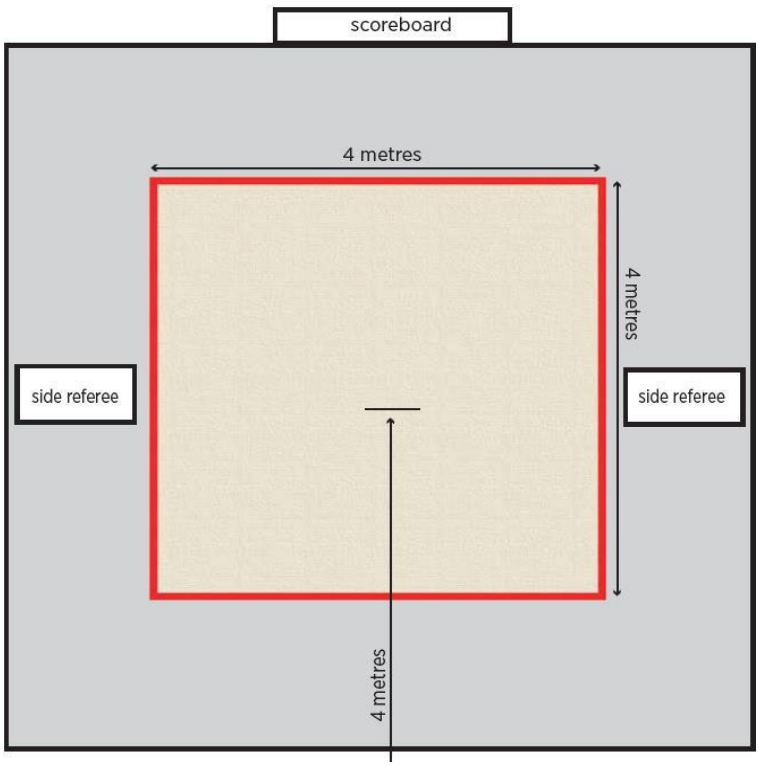
For the sport of weightlifting the field of play relates to the area of competition which contains: Competition platform and stage Technical Officials' and Competition Management tables Warm-up area.

Platform

Two types of platforms are authorised for use by the IWF— Competition and training/ warmup
platforms. Both types of platforms must meet the authorised specifications.

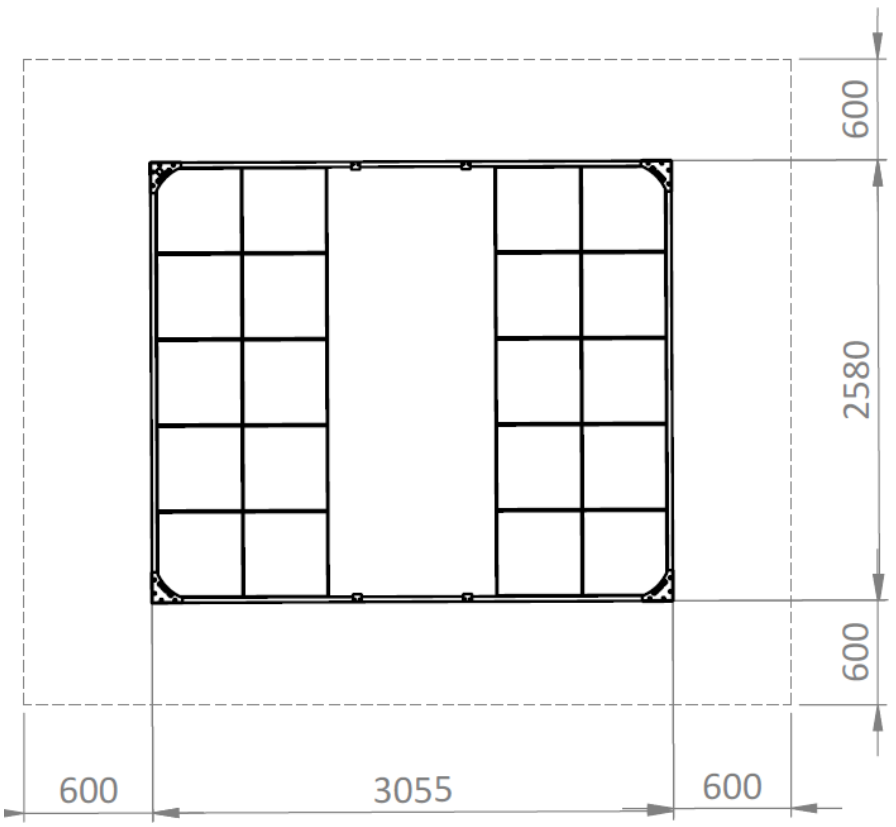
Competition platform

The platform is a 4m square and made of wood, plastic or any solid material and covered with a non-slip material. The height of the platform is between 50mm and 150mm. If the floor surrounding the platform is the same or similar colour, the top edge of the platform must have a different coloured 150mm line.



A clear one metre area surrounding the platform is compulsory. This area must be flat and free from any obstacles.

If the platform is above ground level, a restraining bar at least the width of the platform must be fixed to the stage, at least one metre in front of the platform.



Warm-up platform

The warm-up platform is 3m wide and 2.5-3m long.

Technical officials' and competition management tables

The jury table is situated 10m from the centre of the platform, between the centre and the side referee's tables and located on the side of the athlete's point of entry.

Referees Tables

The centre referee is located 4m from the middle of the competition platform.

The side referees are seated on the same line as and parallel with the centre referee, 3m-4m from the centre referee. Reserve referees are in a designated area on the field of play.

TABLE TENNIS

The Table

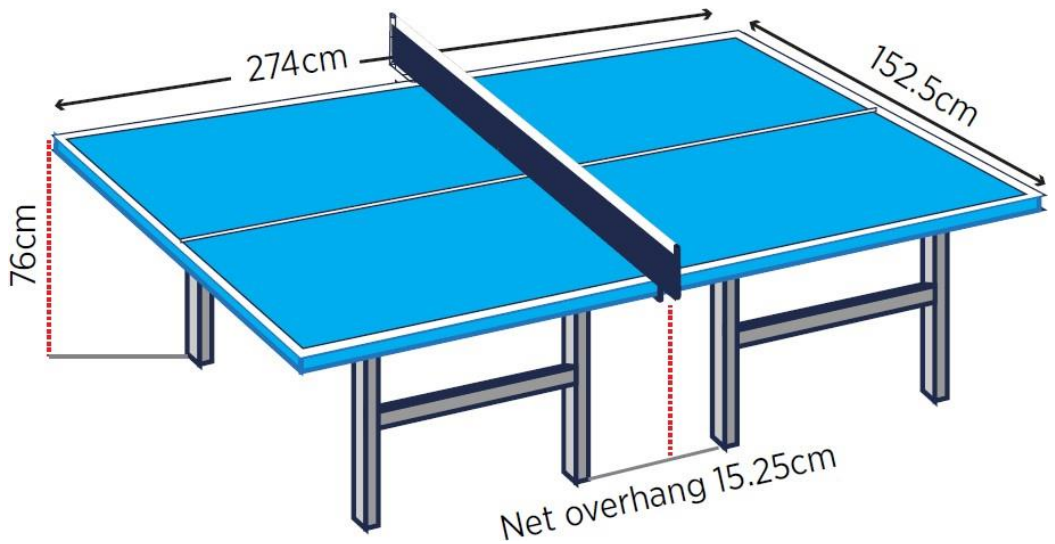
The upper surface of the table, known as the playing surface, is 2.74m long and 1.525m wide and is horizontal 76cm above the floor.

The playing surface does not include the vertical sides of the tabletop.

The playing surface yields a uniform bounce of about 23cm when a standard ball is dropped on to it from a height of 30cm.

The playing surface is a matte surface and dark coloured. There is a white side line, 2cm wide, along each 2.74m edge and a white end line, 2cm wide, along each 1.525m edge.

The playing surface is divided into two equal courts by a vertical net parallel to the end lines. For doubles, each court is divided into two equal half courts by a white centre line, 3mm wide, running parallel with the side lines. The centre line forms part of each right half court.



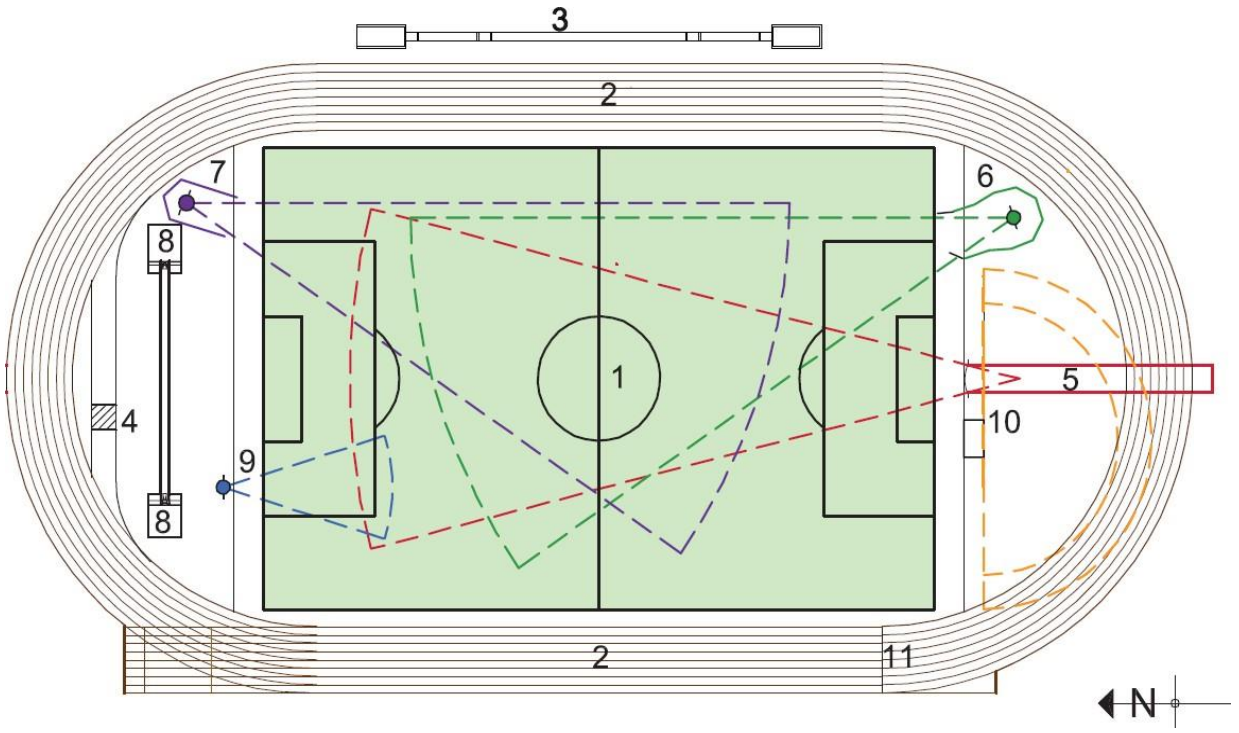
The net assembly includes the net, its suspension and the supporting posts, including the clamps attaching them to the table.
The net is suspended by a cord attached at each end to an upright post 15.25cm high. The outside limits of the post are 15.25cm outside the side line.
The top of the net is 15.25cm above the playing surface. The bottom of the net, along its whole length, is as close as possible to the playing surface. The ends of the net are attached to the supporting posts from top to bottom.

TRACK ATHLETICS

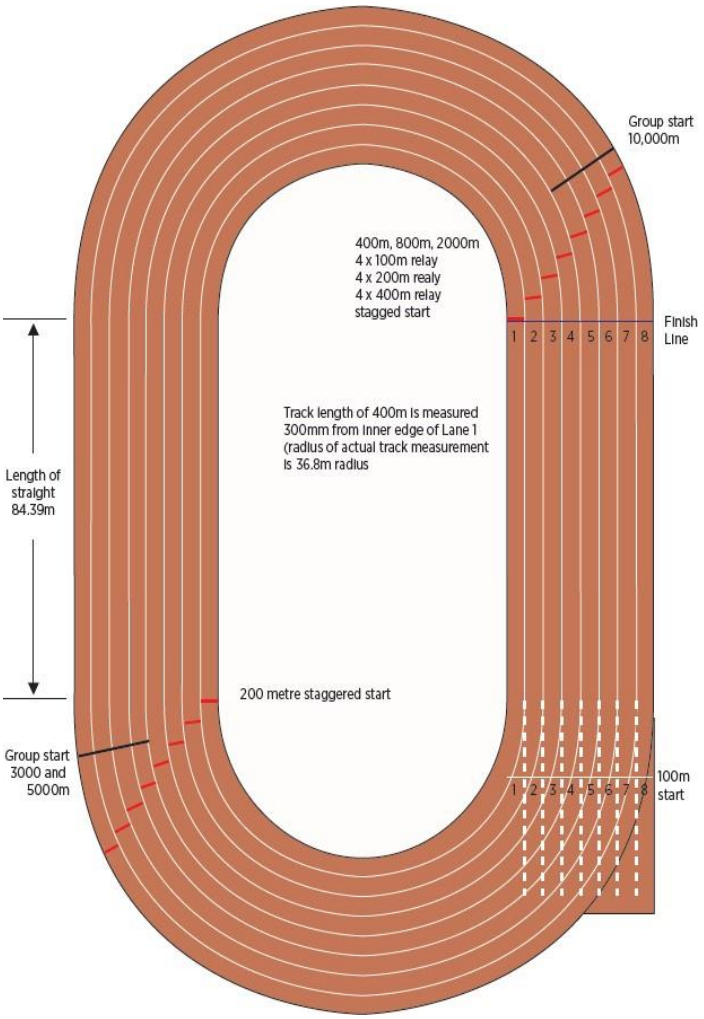
Sports facilities for track and field athletics are generally used for daily training as well as for staging regional or local competitions. The staging of competitions at higher levels normally entails more extensive requirements for the sports facility, particularly in respect of the infrastructure.
Generally athletics tracks are multi-purpose with the interior of the 400m track used as a pitch for soccer, gridiron and rugby. These tracks are also used for non-sporting events such as concerts and public assemblies.

400m Standard track

The 400m Standard Track (the Track) has straight and curved sections of almost equal length and uniform bends which are most suitable to the running rhythm of athletes. Furthermore, the area inside the track is large enough to accommodate all throwing events and also a standard football (soccer) pitch (68m x 105m).



1. Football (soccer) pitch
2. Standard track
3. Long and triple jump facility
4. Water jump
5. Javelin throw facility
6. Discus and hammer throw facility
7. Discus throw facility
8. Pole vault facility
9. Shot put facility
10. 10 High jump facility
11. Finish line
12. High jump facility



400m Standard track

The Track comprises 2 semicircles, each with a radius of 36.50m, which are joined by two straights, each 84.39m in length.
The Track has 8, 6 or occasionally 4 lanes but the last is not used for international running competition. All lanes have a width of 1.22m ± 0.01m.

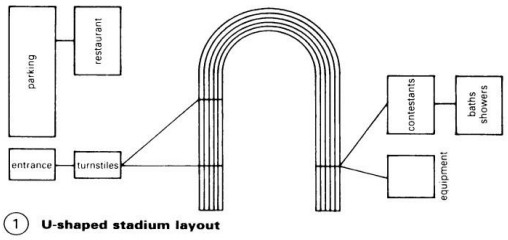
Marking of the 400m standard track

All track markings must be in accordance with the IAAF 400m Standard Track Marking Plan (Figure 2.2.1.6a attached in the Manual).
All lanes are marked by white lines. The line on the right hand side of each lane, in the direction of running, is included in the measurement of the width of each lane.
All start lines (except for curved start lines) and the finish line are marked at right angles to the lane lines. Immediately before the finish line, the lanes are marked with numbers with a minimum height of 0.50m.
All markings are 0.05m wide.
All distances are measured in a clockwise direction from the edge of the finish line nearer to the start to the edge of the start line farther from the finish.
The data for staggered starts for the Track (constant lane width of 1.22m) is shown in the table below.

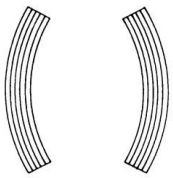
Data for staggered starts for 400m Standard Track

Distance	Bend	Lane 2	Lane 3	Lane 4	Lane 5	Lane 6	Lane 7	Lane 8
200m	1	3.519	7.352	11.185	15.017	18.850	22.683	26.516
400m	2	7.038	14.704	22.370	30.034	37.700	45.366	53.032
800m	1	3.526	7.384	11.260	15.151	19.061	22.989	26.933
4 x 400	3	10.564	22.088	33.630	45.185	56.761	68.355	79.965

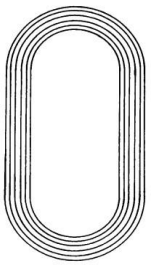
SPECTATOR STAND



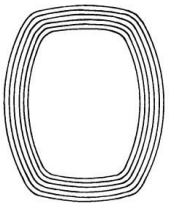
① U-shaped stadium layout



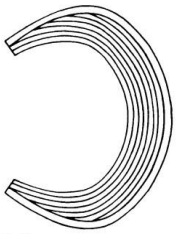
② USA: segmented layout



③ Amsterdam: semicircular ends



④ Rotterdam: curved sides and corners



⑤ Budapest: horseshoe around long axis

SPECTATOR FACILITIES

All planning must be done in accordance with national 'regulations for the construction and management of meeting places', in which the requirements for access ways, stairways, ramps and spectator accommodation are set out.

Depending upon the planned capacity, seating is provided either along the long side of the ground (to take advantage of the shortest viewing distance) or, for capacities above 10000, around the whole ground. As most events take place in the afternoon, the best position for spectators is on the west side so that the sun is at their backs.

To improve viewing conditions in the multi-row layout, there has to be sufficient super-elevation. In smaller grounds with up to 20 rows of terracing or 10 rows of seats, a linear gradient of 1:2 can be taken as a basis. In all other grounds the linear gradient should ideally be replaced with one which is parabolic. In this case the gradient for seating and standing places is to be set using a construction based on the spectators' line of sight. In terracing stands the super-elevation should be 12cm and in rows of seating it should be 15cm → ①.

Seating Areas

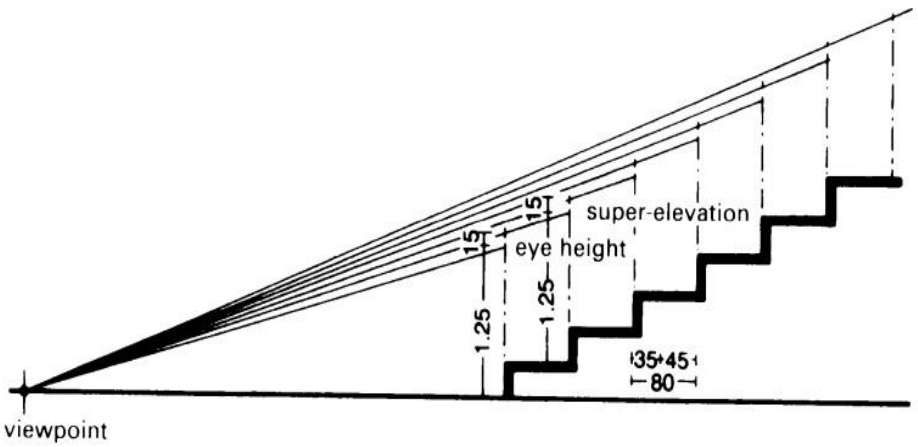
The necessary space for seating areas is calculated as follows:

width of seat	0.5 m
overall depth	0.8 m
of which:	
seat depth	0.35 m
circulation	0.45 m

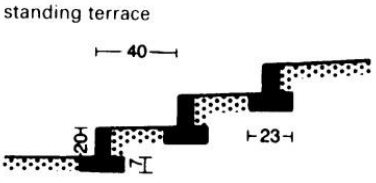
Rows of seats (benches) as well as single seats can be planned. Seats with back rests offer greater comfort. Depending on the arrangement of entrances and exits, each row can comprise:

on each side of a passage	
in shallow rising rows	48 places
in steeply rising rows	36 places

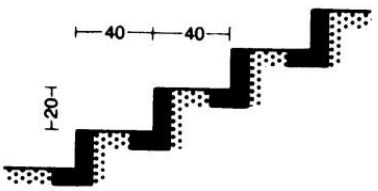
Seating and standing areas must be separated by fences. For every 750 seats an escape route (stairway, ramp, flat surface) with a minimum width of 1.00 m must be provided.



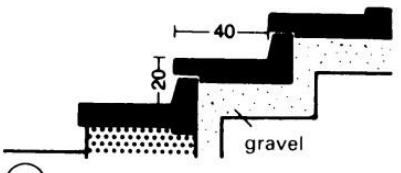
① Construction of sightlines



② Movable concrete units



④ Angle steps



③ Angle steps

FIELD ATHLETICS

The Jumping events are long jump, triple jump, high jump and pole vault.

Long jump

The long jump facility includes a runway, a take-off board and a landing area. Usually, it is placed outside the track along one of the straights with two adjacent runways with a landing area at each end. This allows competition in either direction by two groups of athletes simultaneously.

- **Runaway**

The runway is 40m minimum long, 1.22m ± 0.01m wide and is measured from the beginning of the runway to the take-off line. It is marked by white lines 0.05m wide or broken lines 0.05m wide, 0.10m long and 0.50m apart. The runway is usually covered with the same surface as the track.

- **Take-off board**

The take-off board is a white rectangle and measures 1.22m ± 0.01m long and 0.20m ± 0.002m wide and not more than 0.10m deep. The surface of the take-off board must be flush with the surface of the runway.

In the case of a runway with a permanent surface, this requires a built-in installation tray made of corrosion protected metal in which the take-off board is correctly positioned. During sport free periods, the take-off board can be removed. If it has a track surface on its reverse side, it can be turned over and used as part of the runway. This makes it possible to combine the long and triple jump with two or three take-off boards (which can be used on both sides) on a triple jump runway.

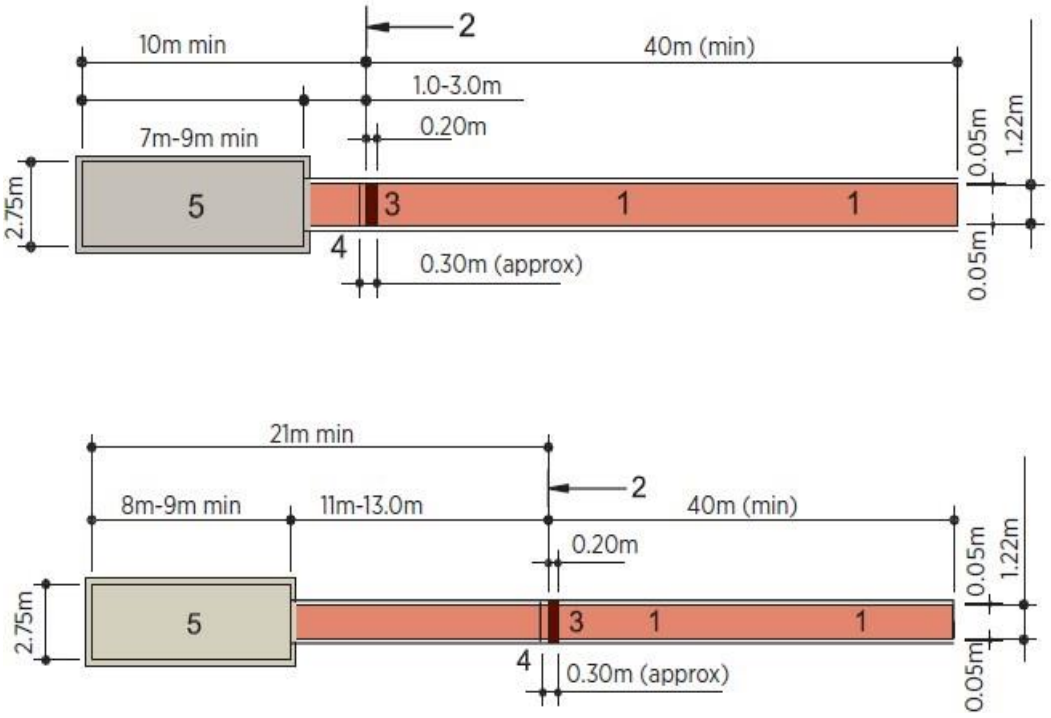
- **Landing area**

The landing area is 7-9m long depending on the distance between its nearest end and the take-off line. It is 2.75m wide. Generally, a landing area 8m long placed 2m from the take-off line is recommended. The landing area is placed so that the middle of the runway coincides with the middle of the landing area. If two landing areas are situated parallel side by side or staggered, the distance between them is at least 0.30m

Triple jump

With the exception of the placement of the take-off board, the same facilities are used for triple jump as for long jump. For international competition, it is recommended that the take-off board is not less than 13m for men and 11m for women from the nearer end of the landing area. For other competitions, this distance is appropriate for the level of competition

Long jump and triple jump facility



1 Runway
2 Take-off line
3 Take-off board
4 Built-in tray
5 Landing area

Pole vault facility

- **Layout**

The pole vault facility includes a runway, a box for inserting the pole, two uprights with crossbar and a landing area. It can be located either outside the track, parallel to one of the straights or within one of the segments.

When located outside the track, it is usually constructed as a symmetrical facility with one landing area in the middle of two runways. When located within a segment, it is usually constructed with two parallel runways with positions for landing areas at each end.

- **Runway for pole vault with box**

The runway is a minimum of 40m long and is measured from beginning of the

runway to the 0-line. The runway is 1.22m ± 0.01m wide.

It is marked by white lines 0.05m wide or broken lines 0.05m wide with a length of 0.1m and a distance of 0.5m. At the end of the runway, the box is mounted flush with the runway and installed such that the top inside edge of its end board lies on the 0-line and at the same height. The 0-line is marked by a white line, 0.01m wide which extends beyond the outside edges of the uprights.

- **Uprights**

The two uprights must be installed on horizontal bases, level with the 0-line, such that each can be moved from the 0-line not less than 0.80m towards the landing area (eg on a built-in double rail) or in fixed sockets with movable cross bar supports.

They are not less than 5.20m apart with approximately 0.10m between each upright and the landing mat. The lower part of the uprights are covered with appropriate padding to protect the athletes and their poles. The landing mats are recessed to take the uprights and any horizontal bases.

- **Landing mats**

The landing mats are the same as for the high jump, except for the dimensions. For major international competitions, the landing area is a minimum of 6m long (excluding the front pieces), 6m wide and 0.80m high. The front pieces must be at least 2m long. The sides of the landing area nearest to the box are 0.10m-0.15m from the box and slope away from the box at an angle of approximately 45°. For other competitions, the landing area is not less than 5m long (excluding the front pieces) x 5m wide.

High jump facility

- **Layout**

The high jump facility includes a semicircular runway, a take-off area, two uprights with cross bar and a landing area. By temporarily removing sections of the kerb, it is possible to use the oval track as part of the runway. For major championships, the high jump facility must be large enough so that two high jumps can be conducted simultaneously.

- **Runway**

The semicircular runway, with a radius of at least 20m, will permit approaches from every direction. If it is necessary to remove the kerb temporarily in order to be able to use the oval track as a runway, care must be taken to ensure that the heights

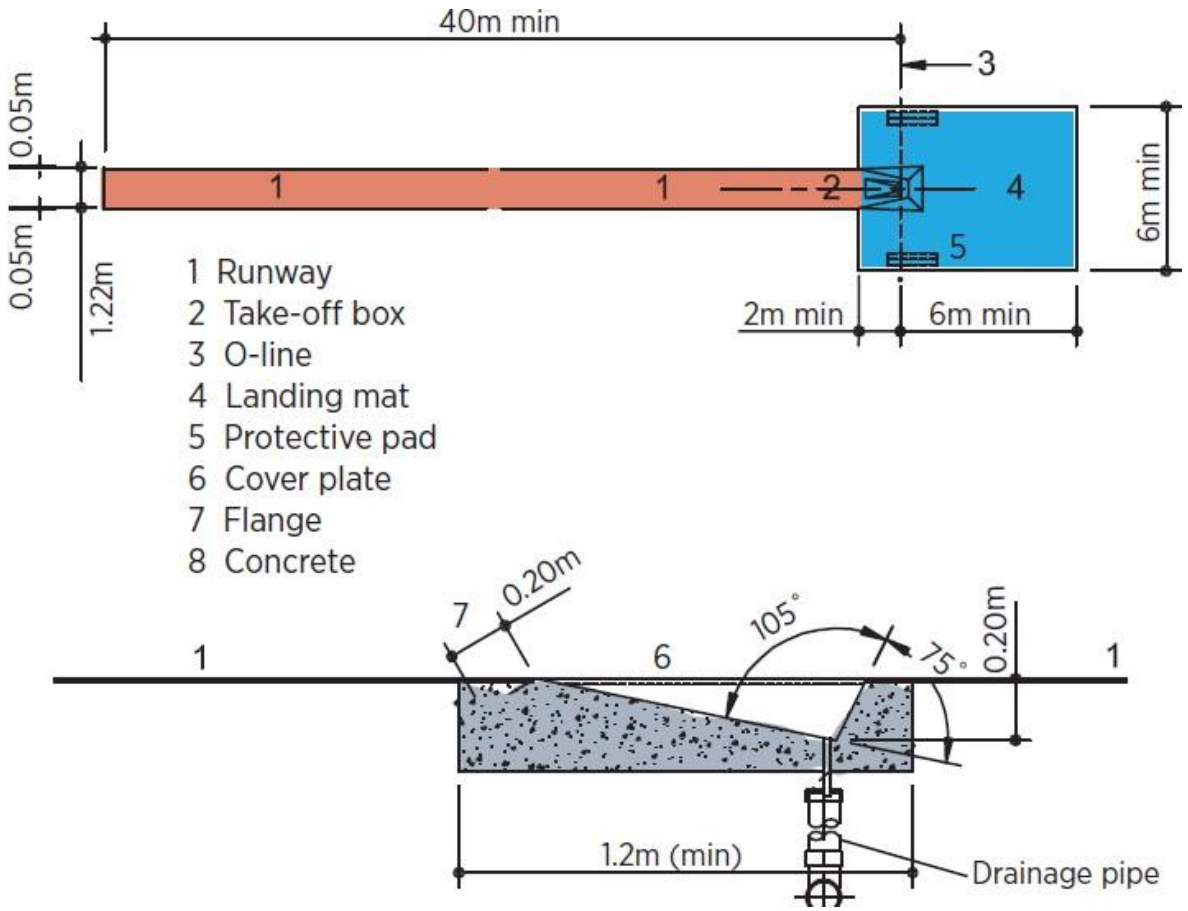
of the surfaces of the oval track and the segment are the same along the track border. The runway and take-off areas are usually covered with the same surface as the track.

- **Uprights**

They must be 4.02m ± 0.02m apart.

- **Landing area**

The landing mats measure not less than 6m x 4m and are covered by a spike proof protective mat. The overall height is a minimum 0.70m.



Throwing events

The throwing events are discus, hammer, javelin and shot put.

Discus throw

- **Layout**

The discus throw includes a throwing circle, protective cage and landing sector. They are located near the ends of the back straight and the landing sector is located in the grass area inside the track.

The facility for discus throw, near the 1500m start, is usually combined with a facility for hammer throw. The only difference is the diameter of the throwing circle is 2.50m for discus throw and 2.135m for hammer throw. The protective cage must meet the more stringent requirements for hammer throwing. If two separate discus and hammer circles are placed within the hammer protective cage then the discus throw circle is the circle closer to the landing sector.

- **Throwing circle**

The throwing circle is made of band iron, steel or other suitable material, the top of which is flush with the ground outside or the synthetic surface or concrete surround. The interior of the circle is constructed of concrete and must not be slippery.

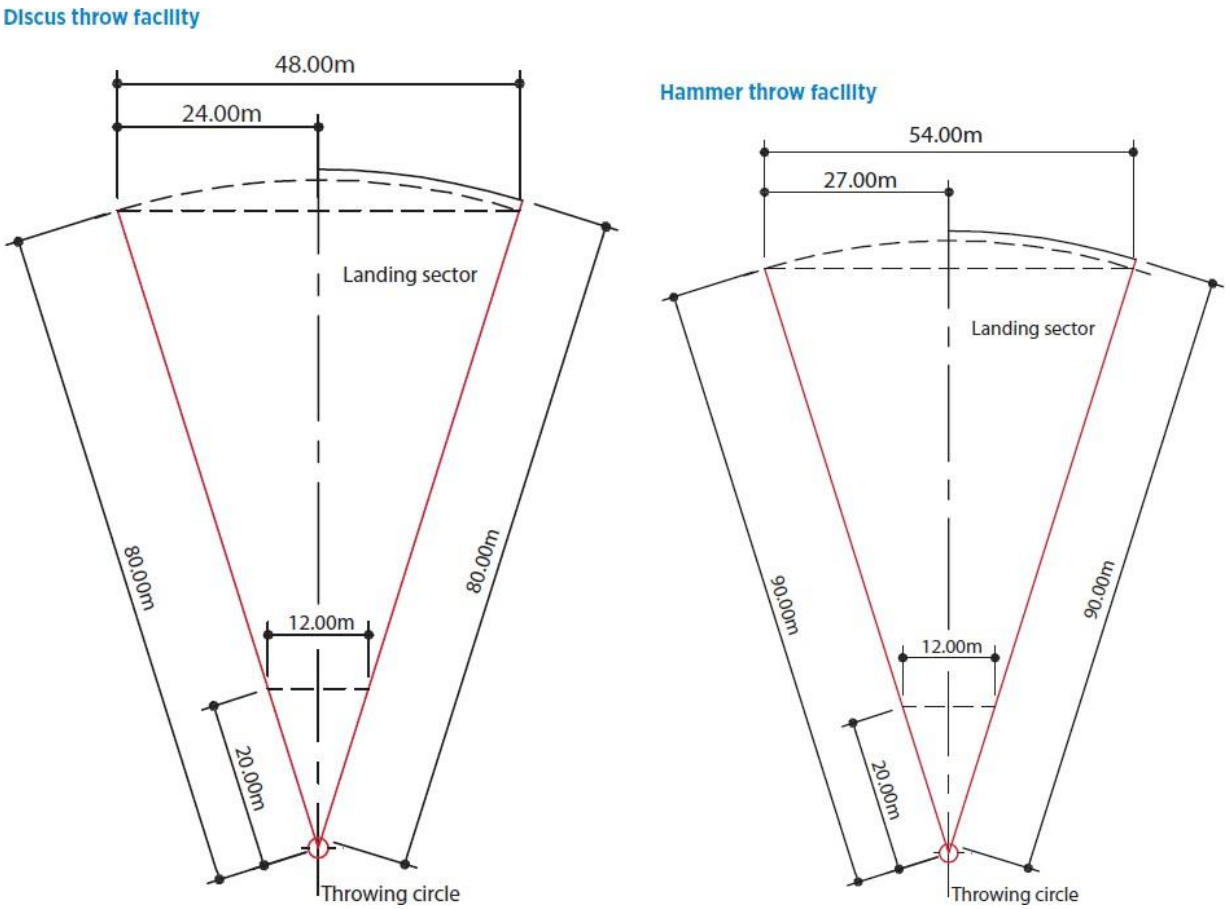
- **Safety cage**

Frequently discus and hammer are thrown from a combined facility. In those instances the higher standards required for hammer throwing apply to the protective cage design. To provide greater safety it is desirable to extend the netting on the side of the cage nearer to the track further than 7m from the centre of the circle and/or increase the height of the netting for the last 2m.

- **Landing sector**

The landing sector consists of cinders or grass or other suitable material with an even surface soft enough to ensure that the place of the initial fall of the implement can be clearly established by the judges. The landing surface must not allow the implement to bounce backwards, thus creating a risk that the measuring point is obliterated.

The landing sector is laid from the middle of the circle with an angle of 34.92 degrees and marked by 0.05m wide white lines, the inside edges which form the boundary of the sector. The length of the sector is 80m. Its angle of 34.92 degrees will be attained if the two sector lines at a distance of 80m are spaced 48m apart



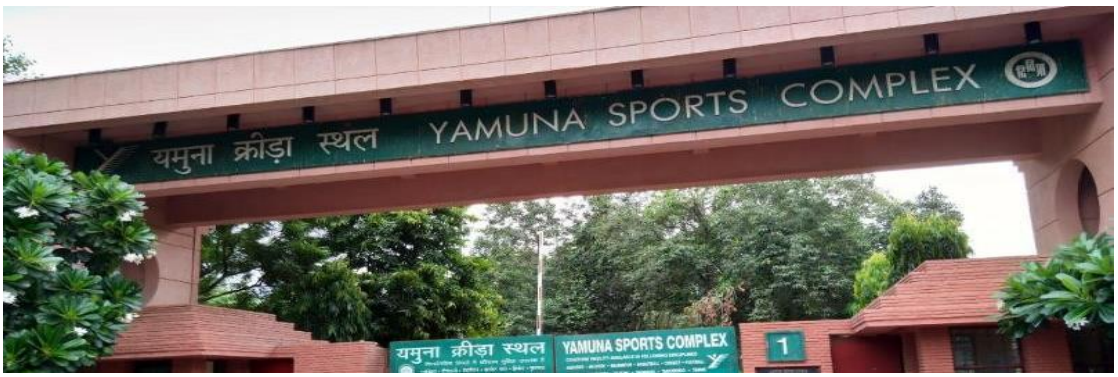
CHAPTER 3 : CASE STUDIES

3.1 LIVE CASE STUDY

YAMUNA SPORTS COMPLEX, DELHI

INTRODUCTION

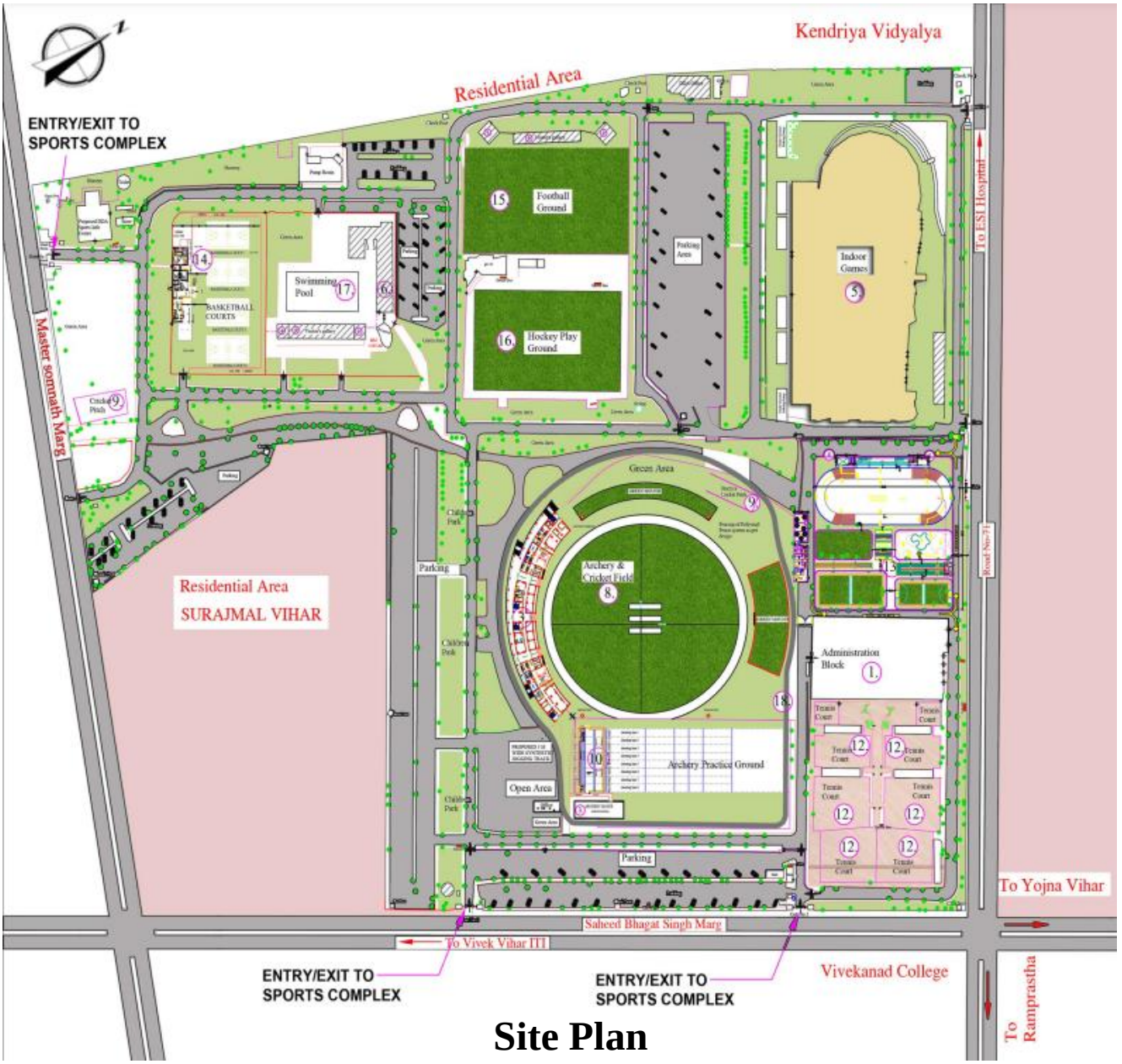
- Yamuna sports complex has been set up by the Delhi development authority as a part of development as a part of development of sports in Delhi.
- **LOCATION:** Surajmal Vihar, Delhi-92
- **ARCHITECT:** Peddle throp Architect.
- The Yamuna Sports complex was inaugurated in 1999.
- Total site area 62.7 Acre.
- **Owner :** Delhi development authority
- **Surrounding:**
    1. Yamuna sports Complex surrounded by road 71-a(on north)
    2. Master somnath marg (south)
    3. Shahid bhagat singh marg and residential Area(East)
    4. Kendriya Vidyalaya ,Vigyan Vihar and residential area(West)
- Distance from the Sports Complex :
    1. Kakardooma Metro Station : 2.2Km.
    2. Delhi metro station : 12 Km.
    3. Rajiv Chouk : 13 Km.
    4. ISBT bus stand : 5 Km.



Foundation stone of this complex was laid by Late Shri Rajiv Gandhi, Honorable Ex- Prime Minister of India on 13th Jun, 1989. Partially opened on "pay & play" basis since 1994. Inaugurated on 20th July 1999 , It also hosted Table tennis .

It is owned by the Delhi Development Authority (DDA).

It was the venue for Archery at the 2010 Commonwealth Games as well as Lawn bowls at the 2010 Commonwealth Games.



Site Plan

LEGEND OF OUTDOOR PLAY FACILITY

S.No	OUTDOOR PLAY FACILITIES
8.	PROPOSED ARCHERY CUM CRICKET GROUND
9.	CRICKET PRACTICE PITCH / COACHING AREA
10.	PROPOSED SHED IN ARCHERY PRACTICE GROUND
11.	CHILDREN PARK
12.	LAWN TENNIS
13.	PROPOSED SKATE PARK
14.	PROPOSED BASKETBALL ACADEMY
15.	FOOTBALL GROUND
16.	HOCKEY PLAY FIELD
17.	SWIMMING POOL / TODDLER POOL
18.	PROPOSED JOGGING TRACK

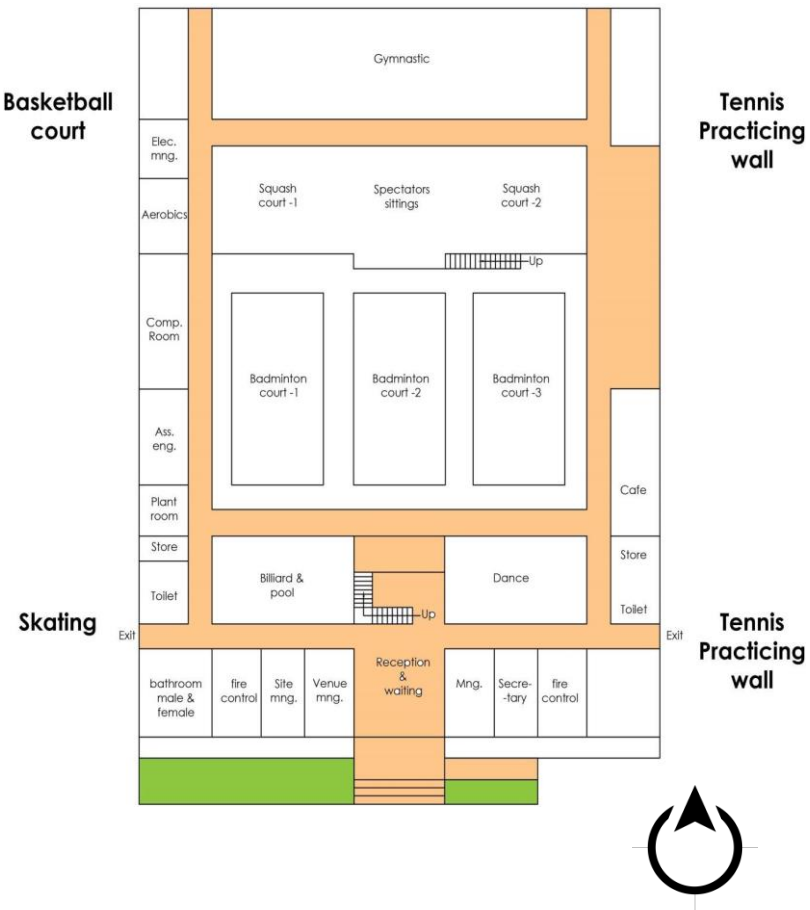
LEGEND OF INDOOR PLAY FACILITY

S.No	BUILDINGS
1.	ADMINISTRATIVE BUILDING
2.	ARCHERY TRAINING VENUE
3.	PAVILION BUILDING
4.	VISITOR GALLERY/ KIOSKS
5.	INDOOR STADIUM
6.	SWIMMING POOL BUILDING
7.	LAWN BALL TRAINING VENUE

Trees planted along the road sides. Water hydrants provided. Proper road turns provided. Road lights provided.

Proper ramps provided for every building. Proper signage for every block and building.

ADMIN BLOCK



TENNIS GROUND

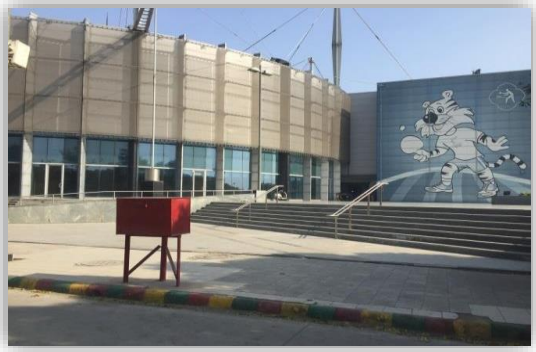
There were total 10 Tennis courts in YSC, in which 2 are synthetic court & 5 are sand court & 3 are concrete courts .
There is also 2 practicing walls between admin block & tennis courts .
1 synthetic & 1 clay court is provided with seating on both side for specatators .

INDOOR STADIUM BLOCK

This structure is constructed for COMMONWEALTH XI , INDIA held in 2010 .
After commonwealth this structure is not in used accept the badminton & tennis court & the show court which is even used for temporary social function bookings .

Way towards Basement parking

Area : 6.5 acres approx.
Basement has a car parking facility for 500 cars.



STRUCTURE VIEW FOCUSING ON THE FORM OF BUILDING

The show court is used for competitions of various games like wrestling , boxing and all.
The show court had a seating capacity for around 3000-3500 spectators in which 1600 sitting are permanent & rest of the are retractable.
It has a Vip & media lounge at the first floor level.

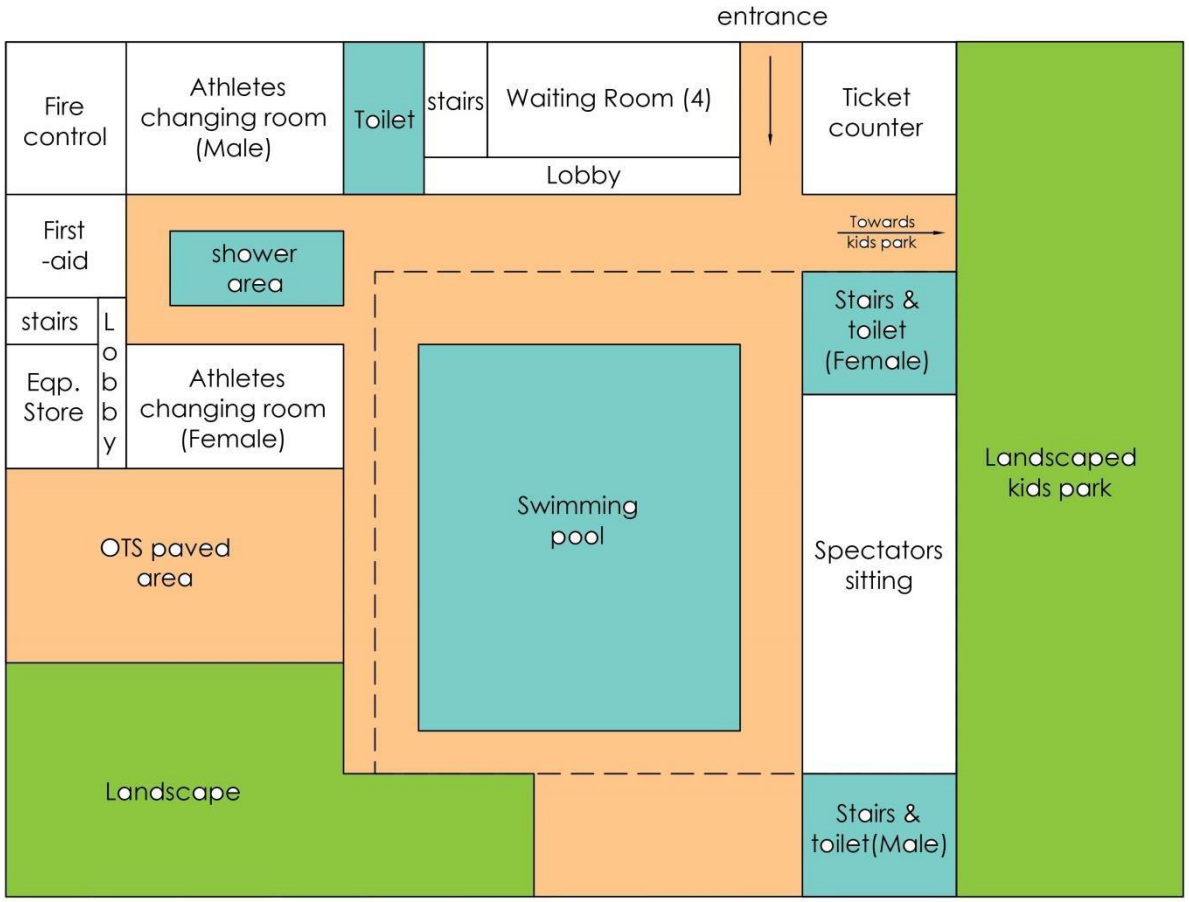
SHOW COURT

VIP LOUNGE

There are 7 entrance for spectators & 3 hose reels in badminton/tennis area.
6 bathrooms - 2 male(7 Basin , 3WC& 10 U), 2 Female & 2 Accessible

SWIMMING POOL BLOCK

The Swimming pool block area is 1.9 acre approx.
It is provided with seatings for 350 Spectators.
It has toilets for both male & female & accessibles.
It is a olympic size swimming pool .



GROUND FLOOR PLAN

SHOWER AREA

SPECTATORS SITTINGS

CRICKET STADIUM

The area of the ground is 4 acre approx.
It is surrounded by Jogging tracks .
There is stadium in its south side with avg. sitting for around 2000 spectators .

3.2 LIVE CASE STUDY

SIRI FORT SPORTS COMPLEX, DELHI

INTRODUCTION

Location : Siri Fort Institutional Area, Siri Fort, New Delhi
Building type : Sports complex
Area : 71 acre .
Distance from the Sports Complex:
Nearest metro station **" Green Park "** =1.5 km
Railway station **" Sewa Nagar "** =5.0 km
Airport **"Indira Gandhi International Airport"** = 15 km

The complex was built for the 1982 Asian Games, next to the Asian Games village by the Delhi Development Authority (DDA).
The stadium hosted badminton and squash for the 2010 Commonwealth Games.
The stadium for badminton had five match courts and three warm-up courts, and the stadium for squash had11 singles courts convertible to five doubles courts.

Site Plan

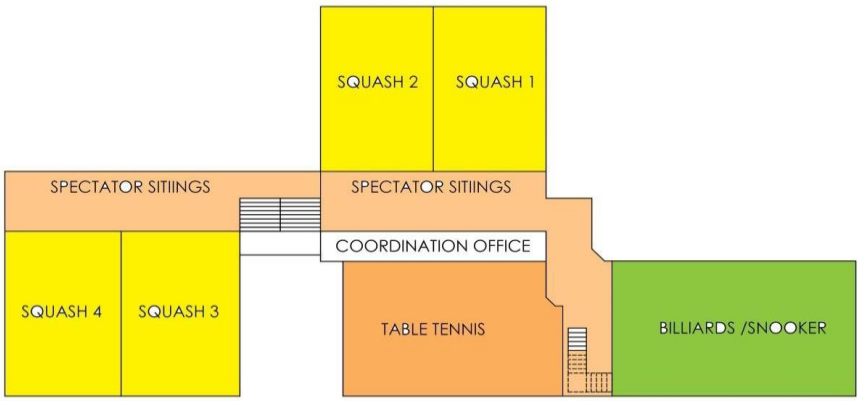
LEGEND OF INDOOR PLAY FACILITIES

S.No	BUILDINGS
1.	ADMINISTRATIVE BUILDING
2.	INDOOR BADMINTON BUILDING
3.	SHOOTING RANGE BUILDING
4.	SWIMMING POOL BUILDING
5.	GOLF DRIVING BAY BUILDING
6.	PROSHOP AND CAFETERIA
6A.	TENNIS OFFICE BUILDING

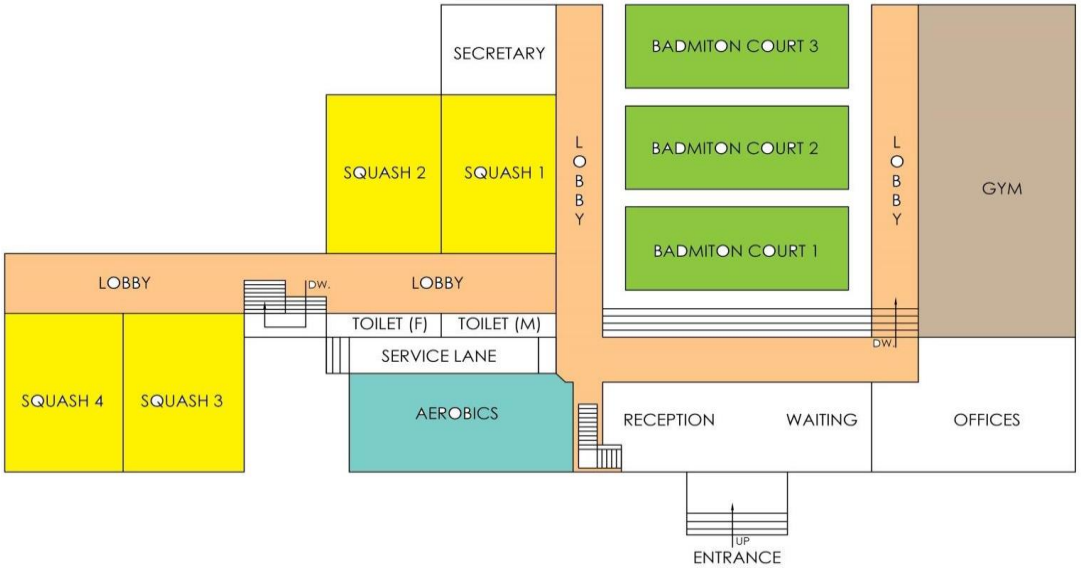
LEGEND OF OUTDOOR PLAY FACILITIES

S.No	OUTDOOR PLAY FACILITIES
7.	GOLF DRIVING RANGE
8.	CRICKET GROUND
9.	HOCKEY PLAY FIELD
10.	FOOTBALL GROUND
11.	MINI GOLFCOURSE
12.	LAWN TENNIS
13.	SKATING RINK
14.	SWIMMING POOL
15.	BADMINTON COURTS
16.	BASKETBALL COURTS
17.	CHILDREN PARK
18.	YOGA

ADMIN BLOCK



BASEMENT FLOOR PLAN

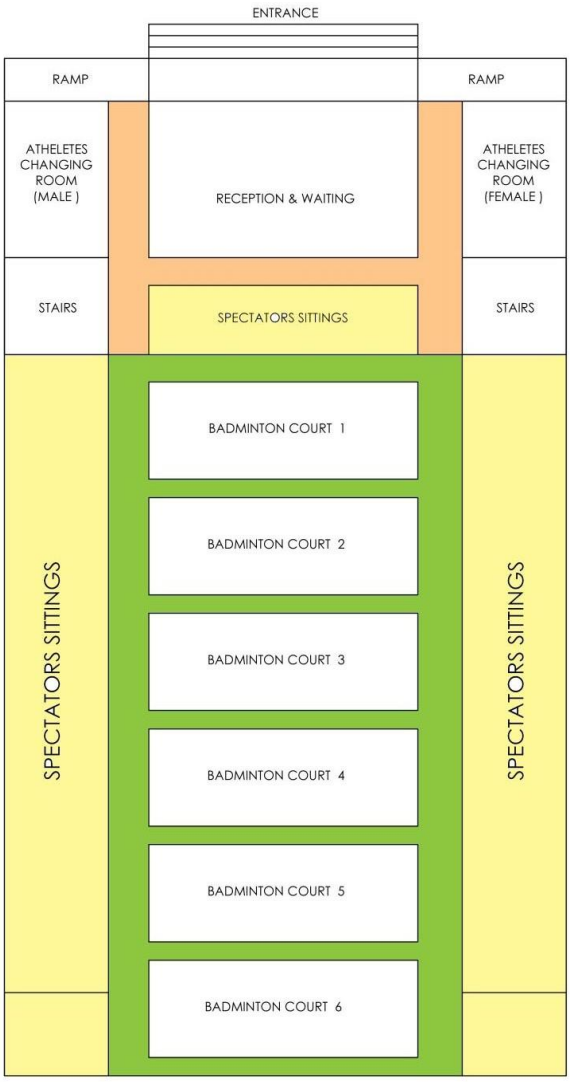


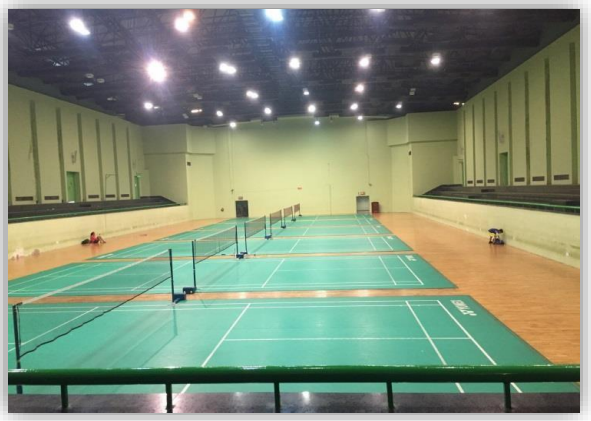
GROUND FLOOR PLAN

COURTYARD HAVING THREE BADMIINTON COURT

GYMNASIUM

INDOOR BADMINTON STADIUM





TENNIS GROUNDS

There are total 12 Tennis courts in Siri fort , in which 9 are synthetic court & 3 are sand court.

There is a vip lounge over the admin block of tennis court which is attached to a spectators sitting of 100 capacity.

CRICKET GROUND

The total Cricket ground is covering around 7acre of land.
IT has two practicing pitch also.

GOLF DRIVING RANGE

The field of driving range is approx. 4 acres with a shooting range of 250 yards max .
22 persons can play at a time. There is also a miniature golf for practicing golf swings.

HOCKEY GROUND

The ground is 1.5 acre approx.
It is also surrounded by Jogging tracks.

3.3 DEAD CASE STUDY

HJØRRING ARENA

INTRODUCTION

Site location : Femhøje, 9800 Hjørring, Denmark
Distance : Airport – 10 k.m. | railway station- 1 k.m.
Facilities available : Skating, climbing . parkour.cross-fit, yoga and raw fitness, sports halls locker rooms, classrooms, cafe , grandstand
Main social activities : Dana cup
Project year : 2015
Architect : LUMO Architect
Site area : 12500 sq. m.
Built up area : 3500 sq.m.

Hjørring arena is designed in an extended client cooperation consisting of hjørring municipality,VUC nordyjlland and Hjørring private realskole.

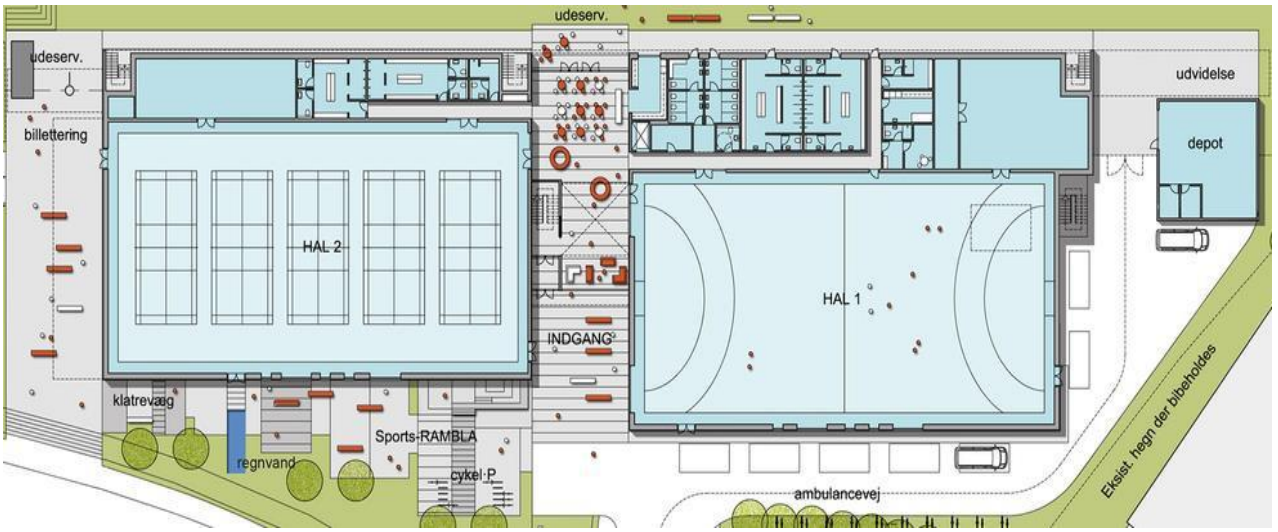
The Hjørring arena provides a magnificent backup for the settlement of football matches and indoor sports facilities.

Site Plan

Arena is situated in the centre of the city and surrounded by Femhoje barrow and several education institutions.
Next to extended gym, commercial complexes, shopping mall and museum.
The club is surrounded by residential only bungalows.

ACCESS AND PARKING

Access from 3 meter wide road.
There are 3 entries to the site.
One being main pedestrian entry and other two are after parking the vehicle.
Cycle parking allowed within the premises for members.
The central pedestrian entry leads to both the sports halls.
The central staircase gives way to meeting rooms on the first floor.
All the administration in done in a separate block with attached staff toilets



Concrete is a pleasant material, which becomes nicer, the more it wears. It is neither ugly scratches or impact damage, minimizing maintenance and increase longevity. It is quite ideal for a building like this, where there is great activity. Combined with the warm glowing wood surface to have a robust stadium construction with an aesthetic expression.

Fiber cement from abrasion and sunlight. As part of stadium construction have built a new main grandstand with about 600 seats under roof. Here, too, concrete and wood in focus, but in order to make the stand extra tough wood is replaced with fiber cement boards of the stand under the eves, which is one of the most vulnerable areas.

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3.4 DEAD CASE STUDY

SAN WAYAO RECREATION CLUB / CSWADI

INTRODUCTION

Architects - CSWADI
Location - Jin Gui Lu, Wuhou Qu, Chengdu Shi, Sichuan Sheng, China
Architect in Charge - Liu YiDesign
Area - 11936.0 sq.m.
Project Year – 2015

Located in DongYuan residential district of Chengdu, the site of SanWaYao community sports facilities is surrounded with aged housing, intensive high-rise residential buildings which were built recently and a primary school. Challenging the limited site and building area, designers created an energetic public space in community, offering numerous kinds of sports facilities for people living around including swimming pool, fitness centre, tennis court, basketball court, squash court, ping pong table, billiards table, gate ball court, outdoor fitness centre , playground for kids and so on.

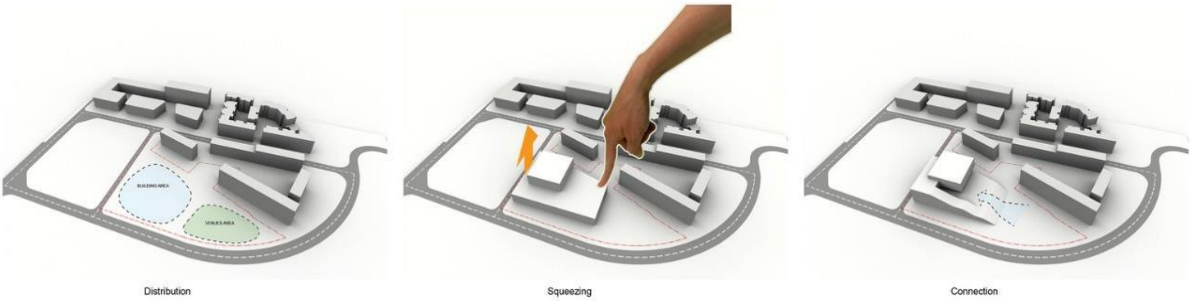
The large sports complex is tightly tucked in a highrise-residential community. Its soft appearance provides a comfortable experience that is well-lit within, and equally striking out. The building takes what little footprint it has and is able to create both a fi tness center and greenspace that functions as one.

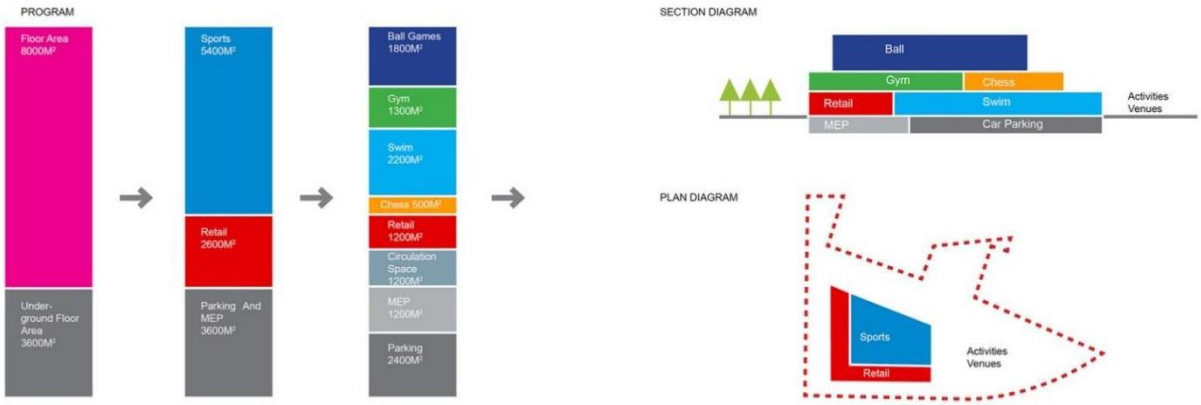
Continuous sloping roof is an open public space with big steps acting as a walking route and bleaches for the east ground in the same time. Moreover lawn roof provides spaces for grass skating ,yoga, picnic and more for the community without charging a fee. People could walk slowly up to roof deck on 4th floor along the slope and down through a cantilever stairway on the north. These from a route in an “artificial hill" bringing the pleasure of climbing a real mountain into the crowded city town

INSPIRATION

Having the idea of literally pushing more space out of the building and site create a unique cohesiveness between the

CONCEPT

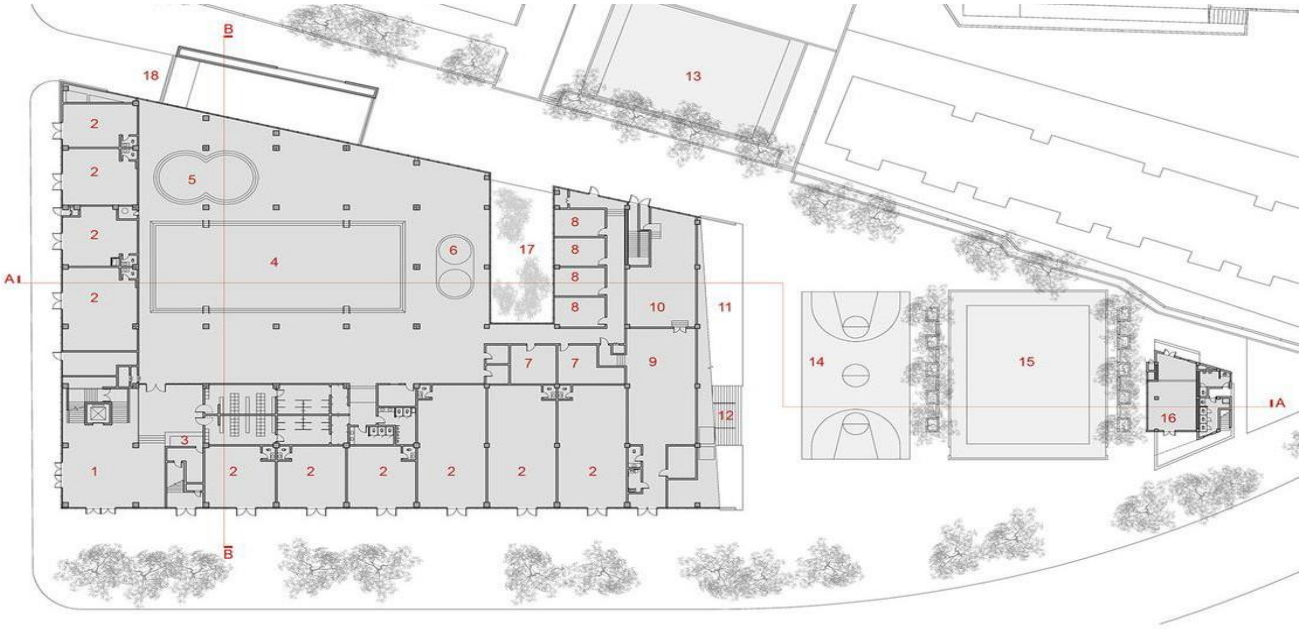




ORIENTATION

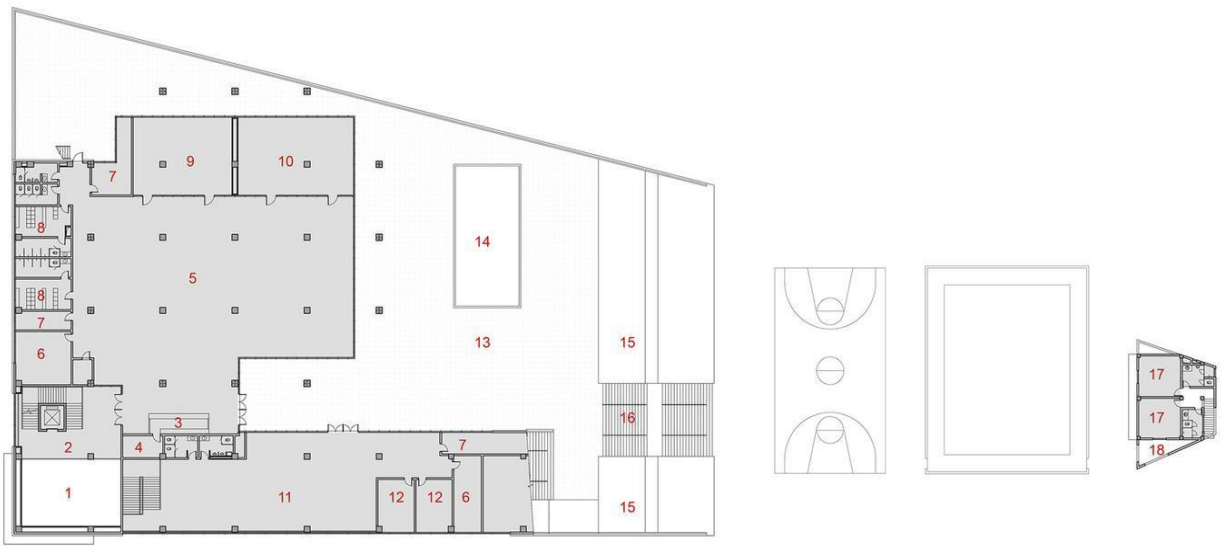
The south facade allows for optimal solar gain and views, while still allowing the tiered effect on the stepped greenspace. The building funnels its shape to the East exterior focal point

FLOOR PLANS



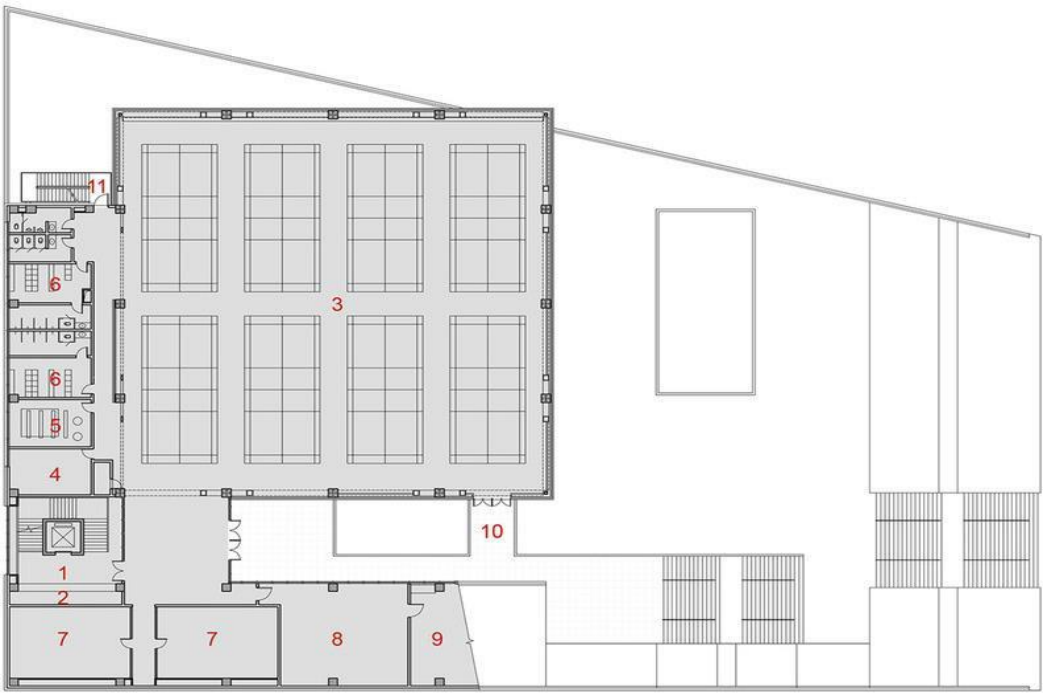
GROUND FLOOR PLAN N 0 1 5 10m

1 Lobby
2 Retail
3 Reception
4 Swimming Pool
5 Padding Pool
6 Spa
7 Sauna
8 Massage
9 Bicycle Parking
10 MEP Room
11 Artificial Grass Slope
12 Grand Terrace
13 Gate Ball Practice Range
14 Basketball Court
15 Gate Ball Court
16 Cafe
17 Courtyard
18 Ramp



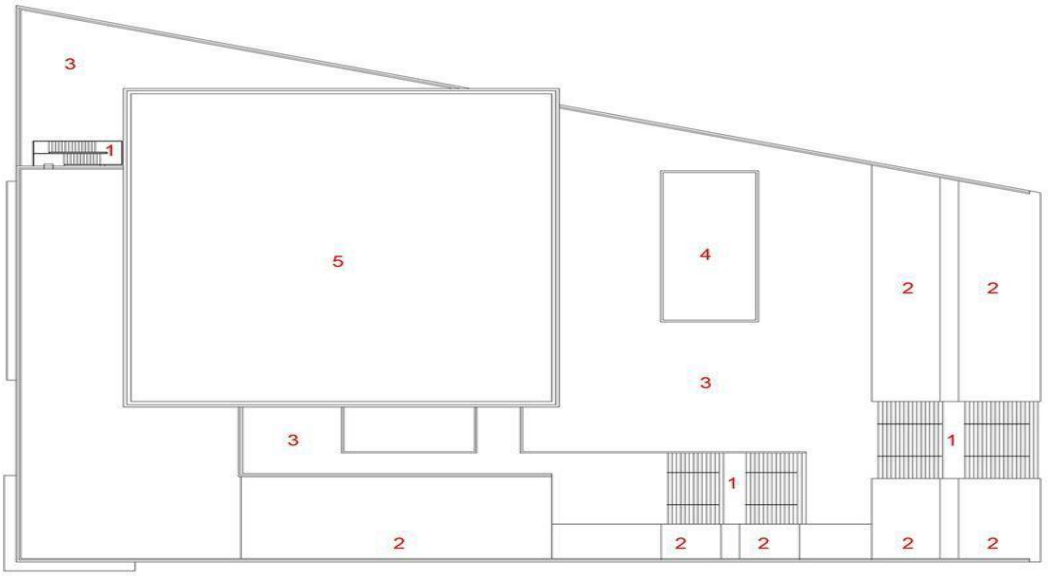
SECOND FLOOR PLAN 0 1 5 10m

1 Void
2 Lobby
3 Reception
4 Storage
5 Table Tennis
6 Office
7 MEP Room
8 Dressing Room
9 Gym
10 Billiards
11 Chess And Cards
12 Compartment
13 Platform
14 Courtyard Above
15 Artificial Grass Slope
16 Grand Stairs
17 Staff Dorm
18 Balcony



THIRD FLOOR PLAN 0 1 5 10m

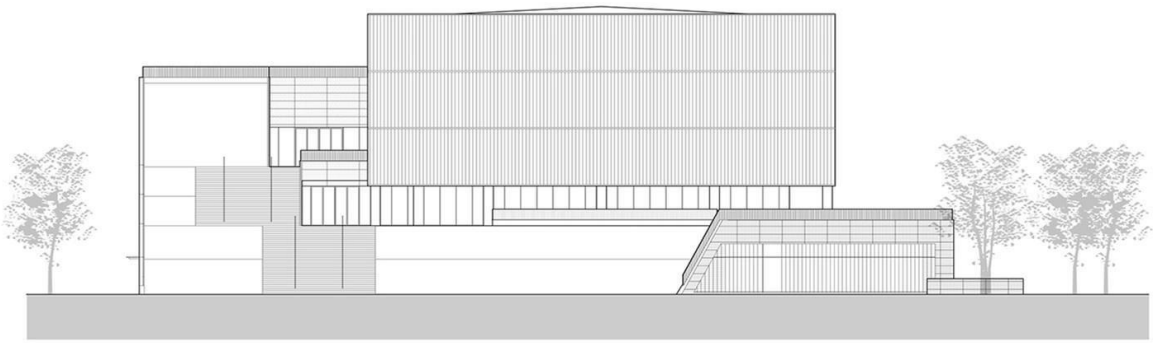
1 Lobby
2 Reception
3 Badminton Hall
4 Office
5 MEP Room
6 Dressing Room
7 Squash Court
8 Meeting Room
9 Storage
10 Bridge
11 Outdoor Stair
12 Roof



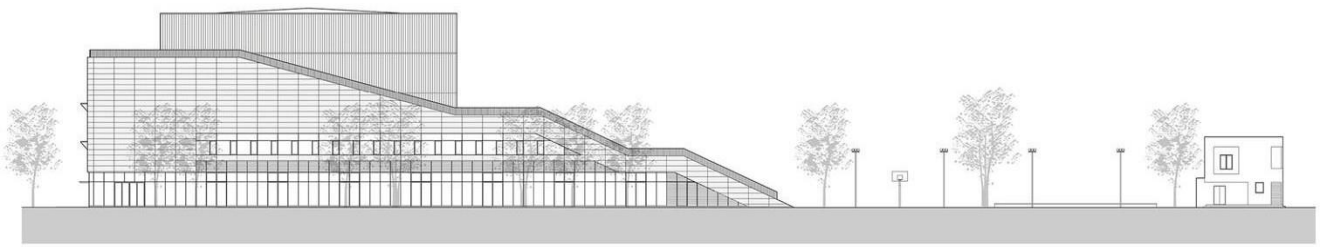
ROOF FLOOR PLAN 0 1 5 10m

1 Stairs
2 Artificial Grass Slope
3 Platform
4 Courtyard
5 Roof

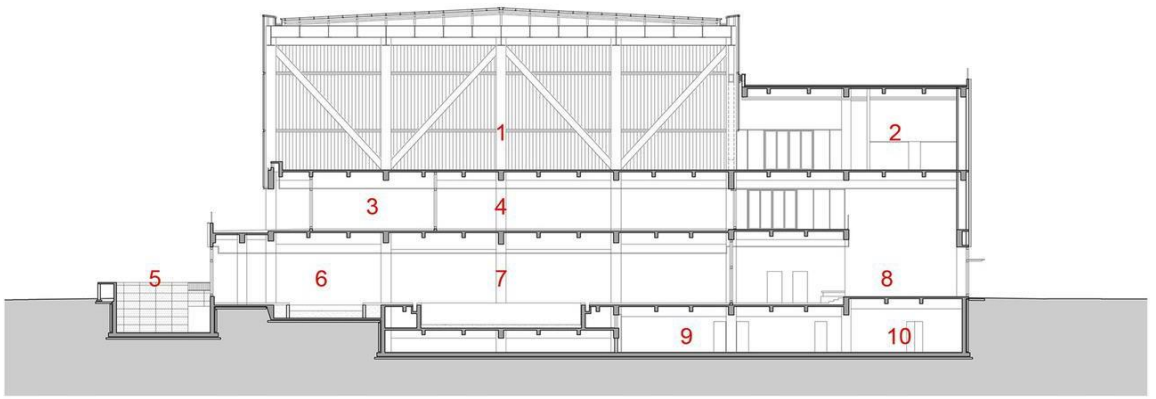
ELEVATIONS AND SECTIONS



EAST ELEVATION 0 1 5 10m



SOUTH ELEVATION 0 1 5 10m



SECTION B-B 0 1 5 10m

1 Badminton Hall
2 Squash Room
3 Gym
4 Table Tennis
5 Ramp
6 Padding Pool
7 Swimming Pool
8 Lobby
9 Car Parking
10 MEP Room

3.5 COMPARITIVE ANALYSIS CHART

	YAMUNA SPORTS COMPLEX	SIRI FORT SPORTS COMPELX	HJØRRING ARENA	SAN WAYAO RECREATION CLUB / CSWADI	INFERENCES
location	Surajmal vihar ,delhi- 92	Siri Fort Institutional Area	Femhøje, 9800 Hjørring, Denmark	Jin Gui Lu, Wuhou Qu, Chengdu Shi, Sichuan Sheng, China	
context	Located in core area of Delhi. Surrounded by commercial buildings	Located in commercial and core area of city	Located around residential housing complexes	Located in commercial complex area	
Site planning	Distributed planning with separate entrance to each sports area	Buildings surrounded around multipurpose ground. Single entrance to the site.	Formal planning with spaces distributed in single structure.	Formal planning with spaces distributed in single structure.	Planning according to contour and sports field requirement. The sun path and wind direction to be considered for every sports activity
Topography	Flat site	Flat site	Contour site	Contour site	
Setting of the building	Site is flat so buildings are oriented according to light requirement of sports activities	Buildings surrounded around central open space/multipurpose space.	The site has dual interface with the road. Each built up mass is spread on the site with its strategic zoning	Site located on secondary road. Building is located on highest level of contour.	The building should be in harmony with surrounding and in response to the topography of the site. The open spaces should be at safer ends for the privacy and security
Volumetric analysis	Indoor sports demand 6M.+ height . The seating stands are multiple level with more height with interesting built pattern	Indoor stadium with 10m.+ height. Creates dominating volume over other structures	Two triple height spaces on either sides with one 4m. Height space in between, giving symmetrical treatment	Floor plates with 3.5 m. height and indoor sports according to requirements. Triple height for badminton court	The function of building decides the volume of the building. Stacked buildings are economical since the service can be shared vertically
Parking	Parking distributed around near different sports units as there is long distance circulation road. More than 600 cars can be parked	200 Cars and 100 two wheelers. Parking is insufficient and not planned well	Free parking is available with time restriction. A parking disc is required to show the time of arrival. Full time parking with time permissions allowed for buses.	Basement parking with surface parking. Parking for 100 cars approx.	Number of members of the club decide the number of parking space.

	YAMUNA SPORTS COMPLEX	SIRI FORT SPORTS COMPELX	HJØRRING ARENA	SAN WAYAO RECREATION CLUB / CSWADI	INFERENCES
Landscape	1 m. wide planter bay provided all along rhea internal roads. Shrubs planted within the kerbs for clear visual channelling of the entrance and drop off for cooler and shedder effect	The plot has thick foliage in and around along the set back ,creating visual barrier maintaining the clubs privacy. Most of the trees have been kept untouched , helping in biodiversity.	Equal amount of soft and hardscape on the site. Rain water harvesting tank used as a water body, a landscape element. Existing trees on the site retained	No existing trees on site. Shrubs and plants provided inside the building at entrance and open areas	Landscaping decides the quality of the space. The open spaces can be function specific and landscaping can be used as a design technology for separating the functions.
Structural system	For a strong ,ductile and durable sports structure RCC frame structure is adopted. North light truss is used for roofing in the badminton court.it employs wide span lattice girders which support trusses at right angles hence more economical.	A robust, flexible, and long-lasting sports facility utilizes an RCC frame for its structural framework. The badminton court is covered with a north light truss, which incorporates wide-span lattice girders supporting perpendicular trusses, making the design more cost-effective.	Concrete is a pleasant material, which becomes nicer, the more it wears, it is neither ugly scratches or impact damage, minimizing maintainace and increase longativity.it is quite ideal for a building like this, where there is great activity	The relationship between structure and space portray a beautiful balance of form and function. The u-shaped glass panels provide a translucent facade that gently shows off its large cross-braced structural elements. The simple arrangement of columns and beams open the space volumetrically as well as illuminated naturally. Every piece of steel is painted to show off its strength and beauty within the larger complex of spaces.	For stronger and long lasting structure RCC is used. For lightweight structures like roofing trusses with advantages of allowing diffused light is used. For a attractive building a good mix of material can be used. Impact resistant and low maintenance building materials are essential for a sports club.
Design concept	Luxurious and scenic design, maximum play of positive and negative spaces	Opulent and picturesque design, optimizing the interplay between positive and negative spaces.	Newly built simple. Play with building materials-wood and concrete	Compact ,empowering structure	Having a design concept gives an appeal to the architectural value of the architectural value of the structure and is also aesthetically pleasing to the user. It also creates connectivity, and the user relates to the space.

CHAPTER 4 : DESIGN

4.1 SITE ANALYSIS

INTRODUCTION

Location of the proposed site is A-7 Narela, Delhi. The project area is bounded by the Delhi Haryana border in the north, western Yamuna canal in the west, Gt Karnal road in the east and Bandli- Auchandi Marg in the south west.

INDIA

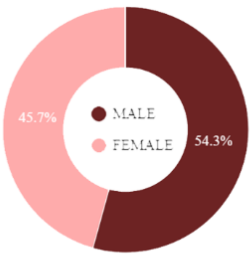
DELHI

NARELA

AMENITIES

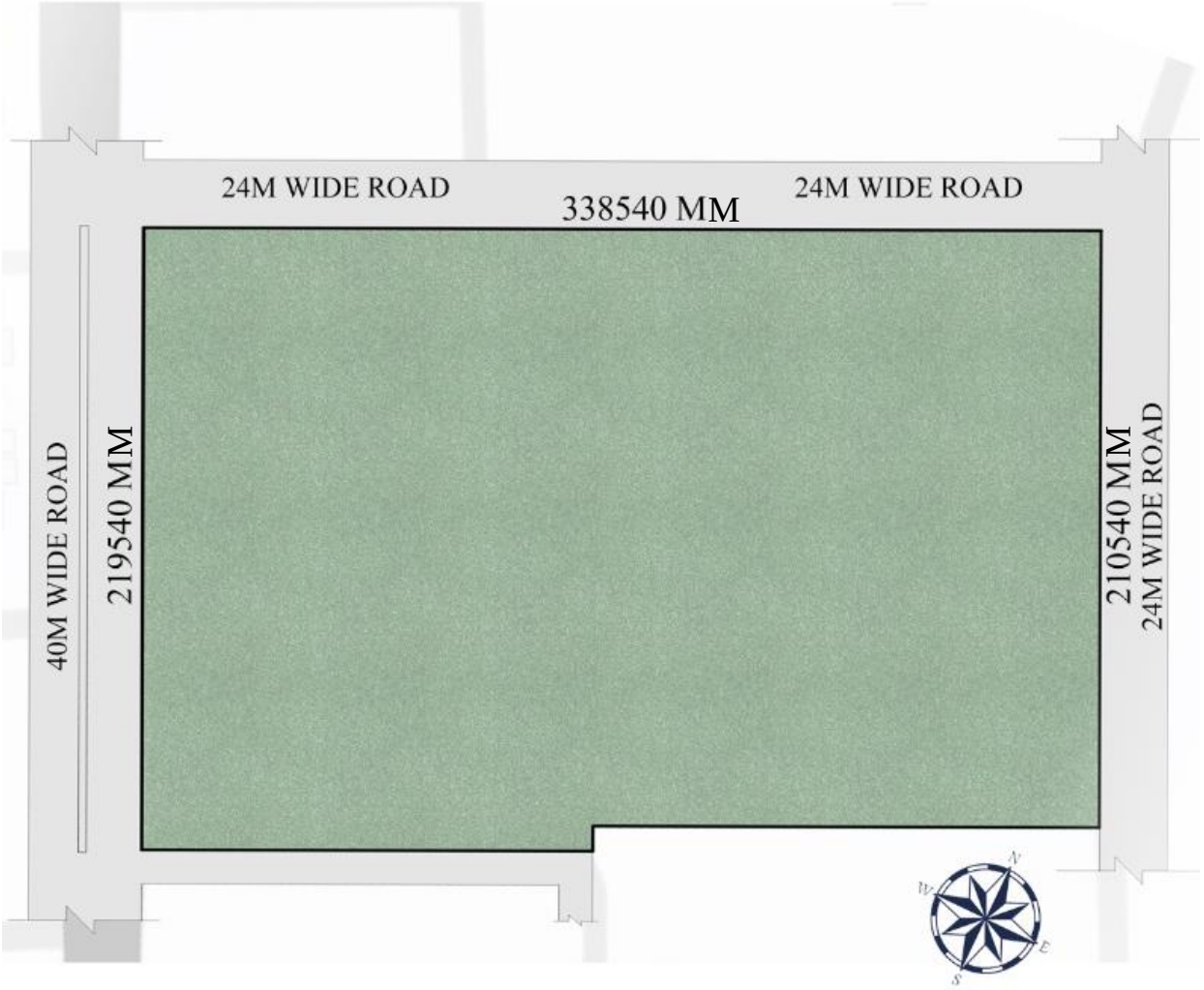
NEW DELHI RAILWAY STATION	-	34.2 KMS
INDRA GANDHI INTERNATIONAL AIRPORT	-	48.7 KMS
NARELA POLICE STATION	-	3.0 KMS
HOSPITAL	-	6.4 KMS

DEMOGRAPHICS



MALE POPULATION - 439,576
FEMALE POPULATION - 370,337

The coordinates of our site are 28°50'45.37"n, 77° 6'6.48"e



Area of our Proposed site is **17.96 acres (72699.99 sq. M.)**

ZONING

2KMS RADIUS

The area surrounding the proposed site is basically moderately developed Residental area, Commercial area , Educational area and Industrial Area.

SWOT ANALYSIS

S — **STRENGTH**: THE STRENGTH OF OUR PROPOSED SITE IS THAT IT IS ACCESSIBLE FROM ALL FOUR SIDES.

W — **WEAKNESS**: LACK OF PUBLIC TRANSPORT CONNECTIVITY TO THE SITE.

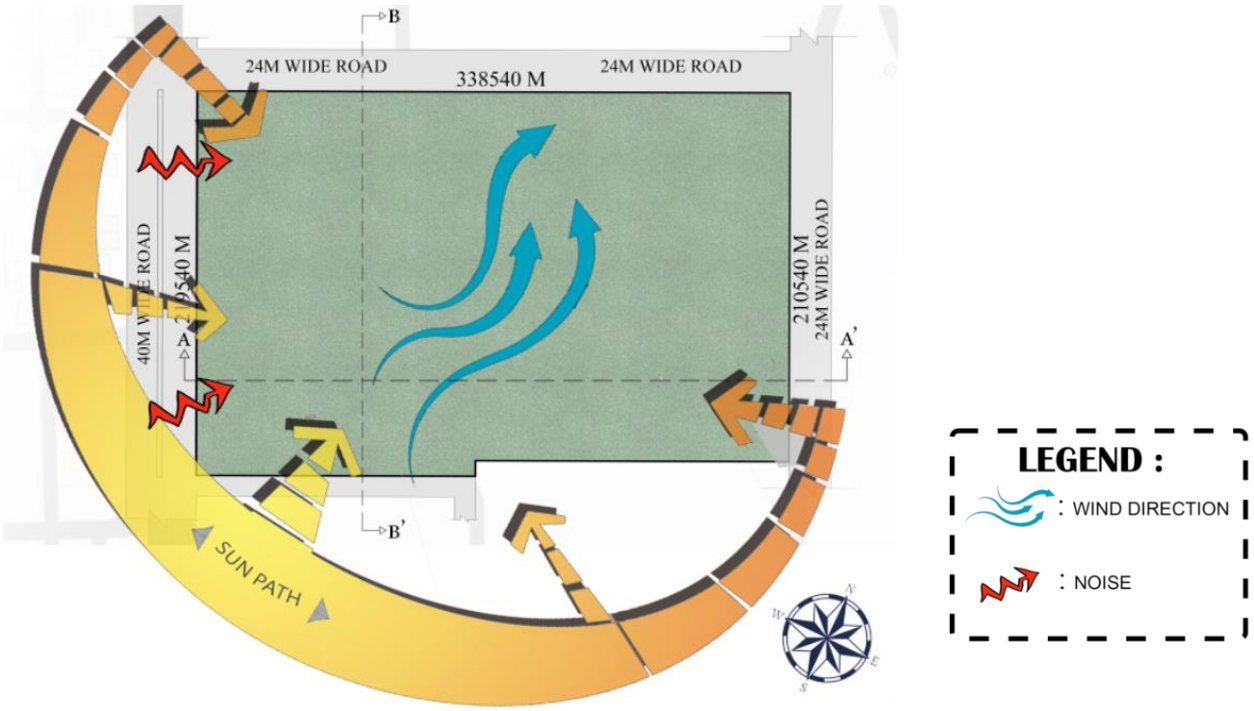
O — **OPPORTUNITY**: WILL GIVE RISE TO SPORTING ACTIVITES AS SURROUNDINGS HAVE INSTITUTIONAL AND RESIDENTIAL AREAS.

T — **THREATS**: SITE FALLS UNDER SEISMIC ZONE 4

CLIMATE

Narela has composite climate the district's yearly temperature is 29.05ºc and it is 3% higher than india's averages. Narela typically receives about 13.04 mm of precipitation and has 19.09 rainy days annually.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Nov	Oct	Dec	Year
Record high °C (°F)	26.0 (78.8)	31.0 (87.8)	39.0 (102.2)	45.0 (113.0)	47.0 (116.6)	48.0 (118.4)	47.0 (116.6)	41.0 (105.8)	40.0 (104.0)	38.0 (100.4)	34.0 (93.2)	29.0 (84.2)	48.0 (118.4)
Average high °C (°F)	20.24 (68.43)	23.71 (74.68)	30.15 (86.27)	38.27 (100.89)	41.96 (107.53)	42.92 (109.26)	38.4 (101.12)	35.65 (96.17)	34.89 (94.8)	33.86 (92.95)	28.47 (83.25)	22.1 (71.78)	32.55 (90.59)
Daily mean °C (°F)	16.08 (60.94)	19.34 (66.81)	25.73 (78.31)	34.47 (94.05)	38.82 (101.88)	40.0 (104.0)	35.72 (96.3)	33.05 (91.49)	32.01 (89.62)	30.16 (86.29)	24.72 (76.5)	18.54 (65.37)	29.05 (84.29)
Average low °C (°F)	10.39 (50.7)	12.62 (54.72)	17.23 (63.01)	25.79 (78.42)	31.06 (87.91)	33.08 (91.54)	30.59 (87.06)	28.18 (82.72)	27.02 (80.64)	24.14 (75.45)	19.19 (66.54)	13.53 (56.35)	22.73 (72.91)
Record low °C (°F)	6.0 (42.8)	8.0 (46.4)	10.0 (50.0)	19.0 (66.2)	22.0 (71.6)	25.0 (77.0)	24.0 (75.2)	24.0 (75.2)	22.0 (71.6)	19.0 (66.2)	15.0 (59.0)	6.0 (42.8)	6.0 (42.8)
Average precipitation mm (inches)	5.67 (0.22)	6.92 (0.27)	3.97 (0.16)	1.95 (0.08)	2.84 (0.11)	10.2 (0.4)	50.65 (1.99)	46.73 (1.84)	22.74 (0.9)	0.64 (0.03)	2.6 (0.1)	1.52 (0.06)	13.04 (0.51)
Average precipitation days (≥ 1.0 mm)	0.91	1.0	1.0	0.82	0.82	1.45	5.0	4.64	2.36	0.27	0.64	0.18	1.59
Average relative humidity (%)	54.0	55.45	41.78	22.73	17.77	27.26	50.11	63.47	59.58	34.38	32.56	36.88	41.33
Mean monthly sunshine hours	8.28	10.97	11.24	12.33	13.65	13.85	13.14	12.6	11.17	9.31	8.53	8.53	11.13



The above image shows the sunpath, Wind direction and potential noise disturbance on our site.

SITE SECTIONS

SITE SECTION AT B-B'

SITE SECTION AT A-A'

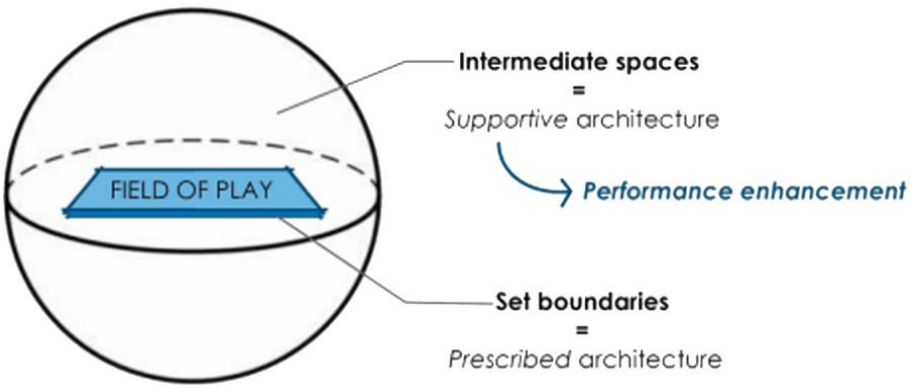
SITE IMAGES

4.2 CONCEPT

EVIDENCE BASED DESIGN AND SPORTS PSYCHOLOGY

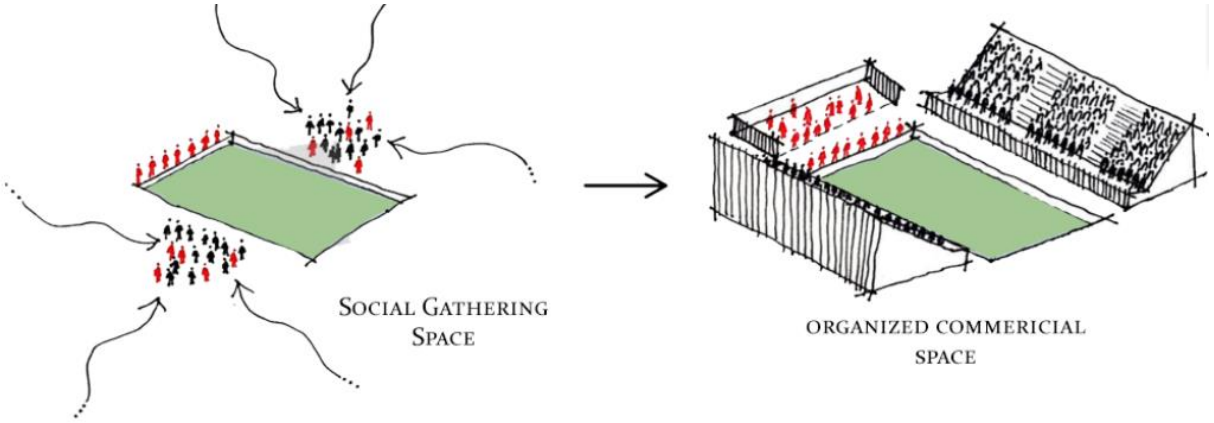
INTRODUCTION

Evidence based design has been widely used in research pertaining to “healing environments” in hospitals. The design of “healing environments” is to use neuroscience to benefit from the effect of “psychologically supportive spaces. However, evidence based design research goes further than merely healing environments, it is an investigation of how external stressors on users can be reduced and how the operational efficiency of a building can improve the quality of service it accommodates.



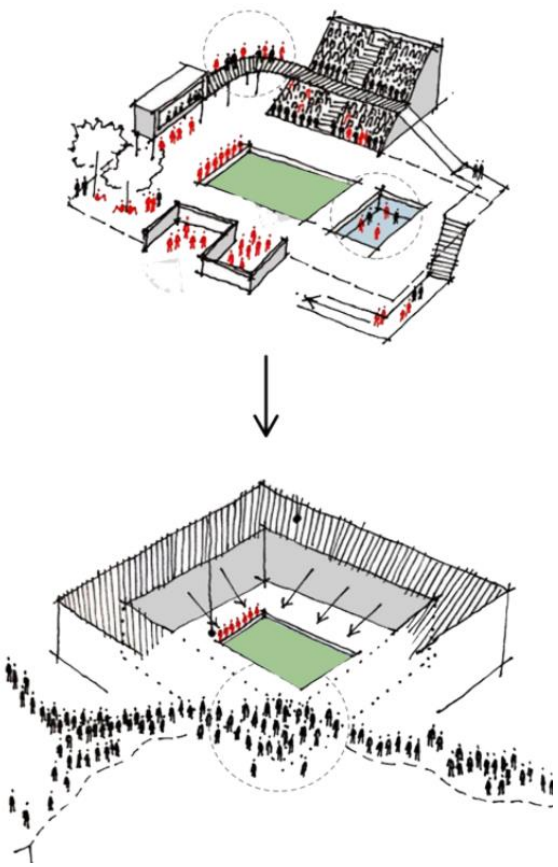
The sports and regulations authorities typically set standards and requirements for the design of facilities in all the sports. However, the intermediate spaces like the marshalling room, etc. play a major role on the performance of the player by reducing the impact of external stressors.

BACKGROUND



Earlier playing fields lacked specificity, which allowed early sports architecture to be adapted and altered as needed by designers. But now the spaces are standardized to promote a fair and competition driven approach and space.

PROBLEM



The commercialization of sports has resulted in sport as an industry and as a result, its architecture having the main objective of economic gain as opposed to the initial goal of sport to “betterment of individual”. Due to commercialization of sports, the experience of the user is often ignored during the design process resulting in the architect to respond only to some aspects of the design such as functionality, aesthetics, etc

EVIDENCE BASED DESIGN PRINCIPLES

Mental stressors experienced by athletes could negatively affect their performance. These stressors include:-

LACK OF FOCUS

ANXIETY

LACK OF CONFIDENCE

FEELINGS OF DISCOURAGEMENT WHEN INJURIES OCCUR

The architecture must deploy evidence-based design principles that resolve these issues such as:

•Noise reduction in spaces through material choices and zoning to enhance focus.

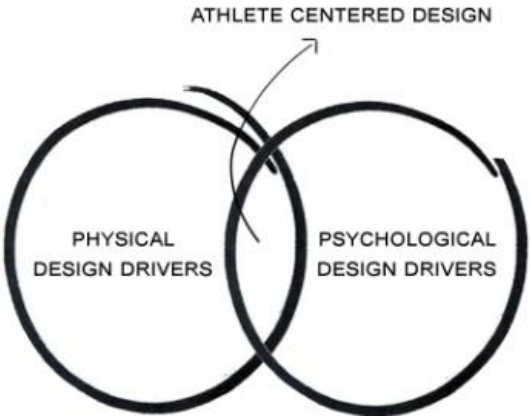
•Improved natural lighting to keep users' minds alert.

•Flexible spaces to give users control over their environment to induce feelings of confidence.

•Injecting nature into design to induce calmness in spaces.

•Designing for social spaces that encourage healthy interaction and support between people.

A mix of physical design drivers like use of appropriate materials, strategic placement of elements, etc. And psychological design drivers like natural ventilation, connection with nature, etc. Makes the space into a holistic athlete centered space

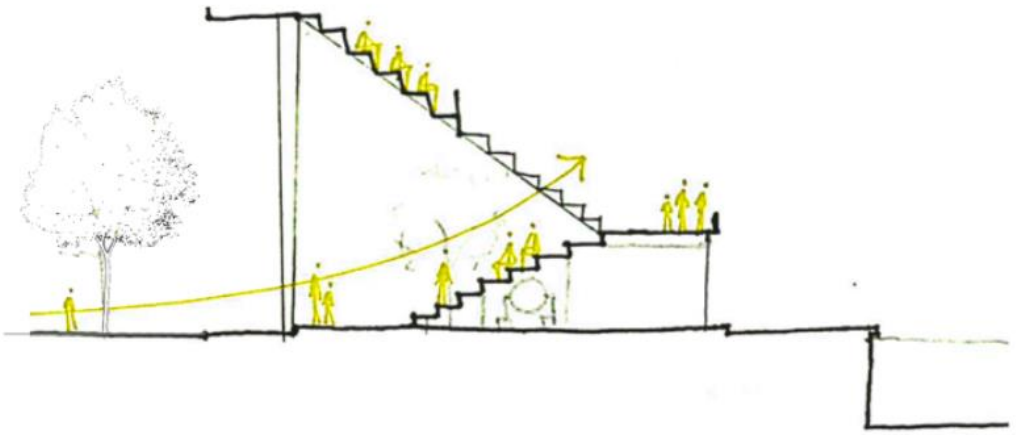


DESGIN INTEVENTIONS BASED ON EVIDENCE BASED DESIGN

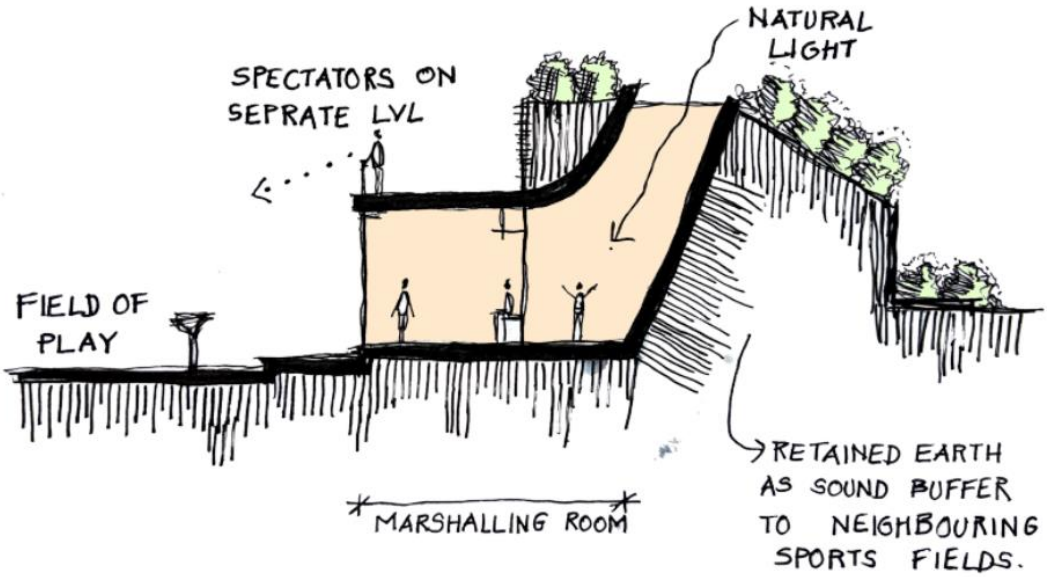
AIM	EVIDENCE BASED DESIGN	ADITIONAL SPATIAL RESPONSES
Focus and Concentration	**Focus** To prevent "result oriented mindset"	**Restrict Visual Access** From External Distractions
Self-Doubt		**Break Away Spaces** Protection from Doubt Inducing factors
Coping Skills	**Positive Thoughts** Combating emotional Setbacks	**Improved Accessibility** Between player and Support figures
Regulating Mood	**Calmness**	**Connecting with Nature** To relax the user before play area
Mental Impact of Injuries		**Visual Access** To Rehab Spaces
Being in the Zone	**Improve Concentration** And remove distractions	**Break Away Spaces** Avoid External Distractions
Athletes with Disabilities		**Universally Accessible Spaces** For easy access
Functionality		**Social Spaces** For interaction between users
		Removal of Dead Spaces
Coach Athlete Relationship	**Promote Creativity** In coaching Environments	**Adaptable Design** To suit varied coaching methods

A mix of physical design drivers like use of appropriate materials, strategic placement of elements, etc. and psychological design drivers like natural ventilation, connection with nature, etc. makes the space into a holistic athlete-centered space.

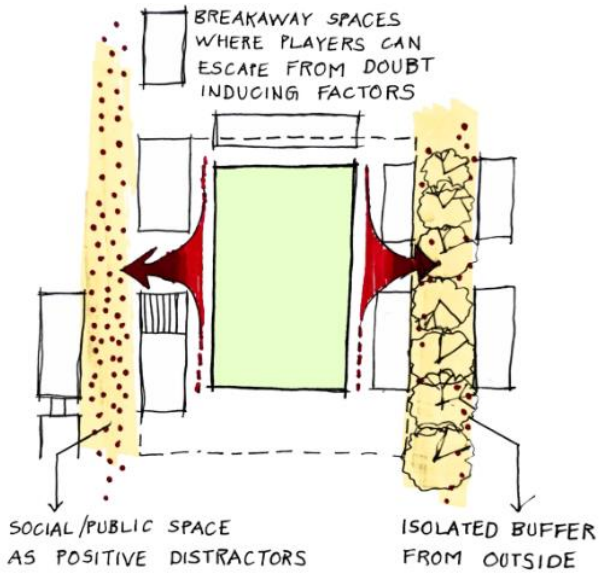
PLANNING STRATEGIES



The spaces must be easy to navigate which will lead to easy access and will not have a negative impact on the energy of the player. The spaces must have proper signages for guiding. Inaccessible or hard to navigate designs often drains the energy of athletes or users resulting in under perfomance. Athletes need to stay composed. This can be achieved through accessible support system.

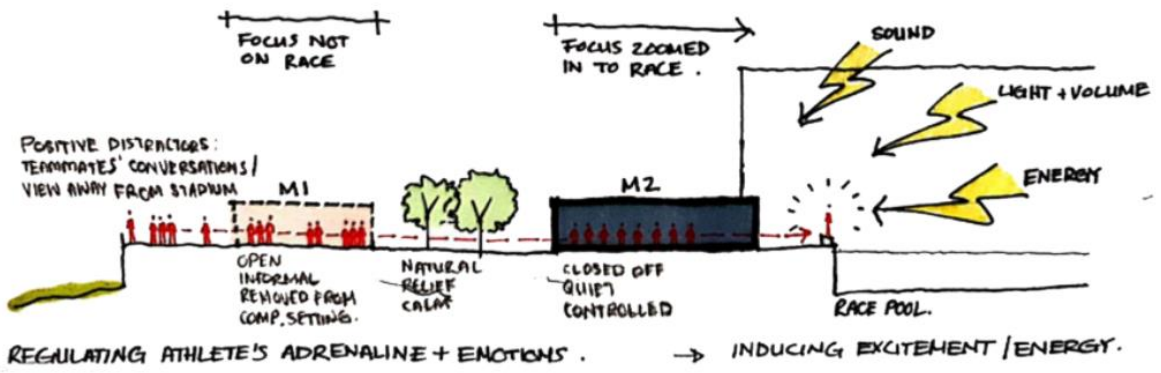


In order to enhance an athlete's focus pre-play, various evidence-based design techniques can be used. Multisensory design acts as positive distractions for athletes, helping them to avoid pre-play anxiety. These take the form of **"breakaway spaces**". The spaces where people feel highest levels of doubt can be identified and designed accordingly.



HIGH ACTIVITY VS LOW ACTIVITY BREAKAWAY SPACES

Spatial design principles such as exposure to nature, that induce feelings of calm can be incorporated into the design spaces which players can interact with while leading up to the play area. enhanced sensory experiences can be used to induce energy or excitement through drastic changes in spatial characteristics.



4.2 AREA ANALYSIS

AREA TITLE	NOS	AREA (SQ.M)	TOTAL AREA (SQ.M)
1.ADMINSTRATIVE BLOCK			
➢ Entrance foyer	1	88	88
➢ Admin Reception	1	34.2	34.2
➢ Admin Waiting area	1	31.2	31.2
➢ Office area	1	90	90
➢ Directors cabin + toilet	1	36.8	36.8
➢ Managers cabin + toilet	1	24.3	24.3
➢ Meeting/ conference	1	90	90
➢ AV room	1	72	72
➢ Toilet block	3	62.6	187.8
➢ Visitor's Reception	1	34.2	34.2
➢ Visitor's Waiting Area	1	31.2	31.2
➢ Sports retail store	1	32.5	32.5
➢ Sports Museum/ information hall	1	121.5	121.5
➢ Changing room block	1	61.9	61.9
➢ AREA OF GROUND FLOOR			952.15
➢ AREA OF FIRST FLOOR			751.87
		TOTAL	**1704**
2. FITNESS FACILITIES (Gym)			
➢ Entrance foyer	1	15	15
➢ Reception & Waiting area	1	120	120
➢ Weight training area			
-Machine area			
-Free weight area	1	300	300
➢ Cross-fit training area (semi open/ outdoor)	1	154.2	154.2
➢ Cardio area	1	140	140
➢ Yoga and aerobics	1	216.1	216.1
➢ Trainers cabin + toilet	2	21.8	43.6
➢ Sports nutritionist cabin + toilet	1	21.8	21.8
➢ Changing /locker room area	2	21	42
➢ Toilet area	2	30.2	60.5
➢ Bath area	2	23.5	47
➢ Equipment Store area	1	48	78
➢ Rest room	1	30	30
➢ Av room (for fitness lectures)	1	120	120
➢ AREA OF GROUND FLOOR			1443.6
➢ AREA OF FIRST FLOOR			933.1
		TOTAL	**2376.7**
3. BADMINTON AND TABLE TENNIS ARENA			
➢ Reception	1	60	60
➢ Coach cabin	2	28.2	56.4
➢ Rest room	1	36	36
➢ Equipment store area	1	49.8	49.8
➢ Performance Enhancing Gym	1	174	174
➢ Changing /locker room area	2	21	42
➢ Toilet area	2	30.2	60.4
➢ Bath area	2	23.1	46.2
➢ Elec. room	1	13.8	13.8
➢ Indoor Sports hall	1	1218	1218
(4 badminton courts & 4 table tennis tables)			
AREA		**TOTAL**	**1960.2**

4. AQUATIC SPORTS ARENA

➢ Entrance foyer	1	40	40
➢ Reception	1	30	30
➢ Waiting area	1	30	30
➢ Coach Cabin	2	28.2	56.4
➢ Rest room	1	50	35
➢ Equipment store area	2	50	100
➢ Performance Enhancing Gym	1	264	264
➢ Changing /locker room area	2	21	42
➢ Toilet area	2	30.2	60.4
➢ Bath area	2	21	42
➢ Elec. room	1	15.6	15.6
➢ Indoor Sports hall	1	5500	5500
(1 nos 25m x 50m Olympic size swimming pool- depth 2m /6feet. 7 inch & 1 nos 20m x 25m Olympic size diving pool- depth 5m /16 feet)			
AREA		**TOTAL**	**6492.5**

5. MEDICAL FACELITIES

➢ Entrance lobby	1	15	15
➢ Reception and waiting	1	38.5	38.5
➢ Sports Physician cabin + toilet	1	35	35
➢ Physiotherapist cabin + toilet	1	35	35
➢ Physio gym (for athletes injury recovery)	1	50	50
➢ Bed ward	1	50	50
➢ Toilet block	4	16	64
➢ Doping test lab	1	43	43
➢ Sports performance lab	1	43	43
➢ Medical store	1	9.4	9.4
➢ AREA OF GROUND FLOOR			375.3
➢ AREA OF FIRST FLOOR			225.8
		TOTAL	601.1

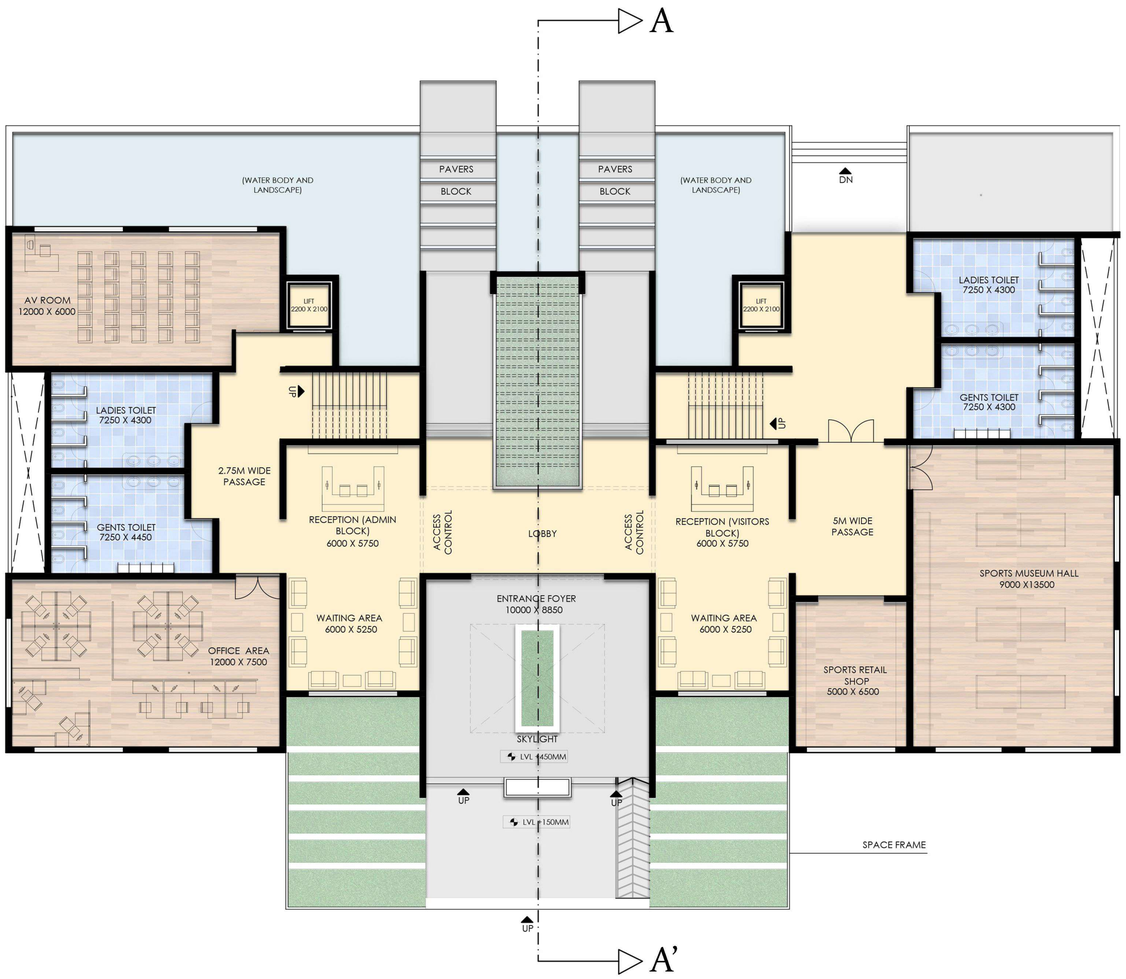
Total Built up Area- 1704 + 2376.7 + 1906.2 + 6492.5 + 601.1 = 13,080.5 m2

Total Ground Coverage- **11223.75m2 i.e. 15.49%**
Maximum Ground Coverage allowed- 20%
(other outdoor sports area are exclusive of total built up area)

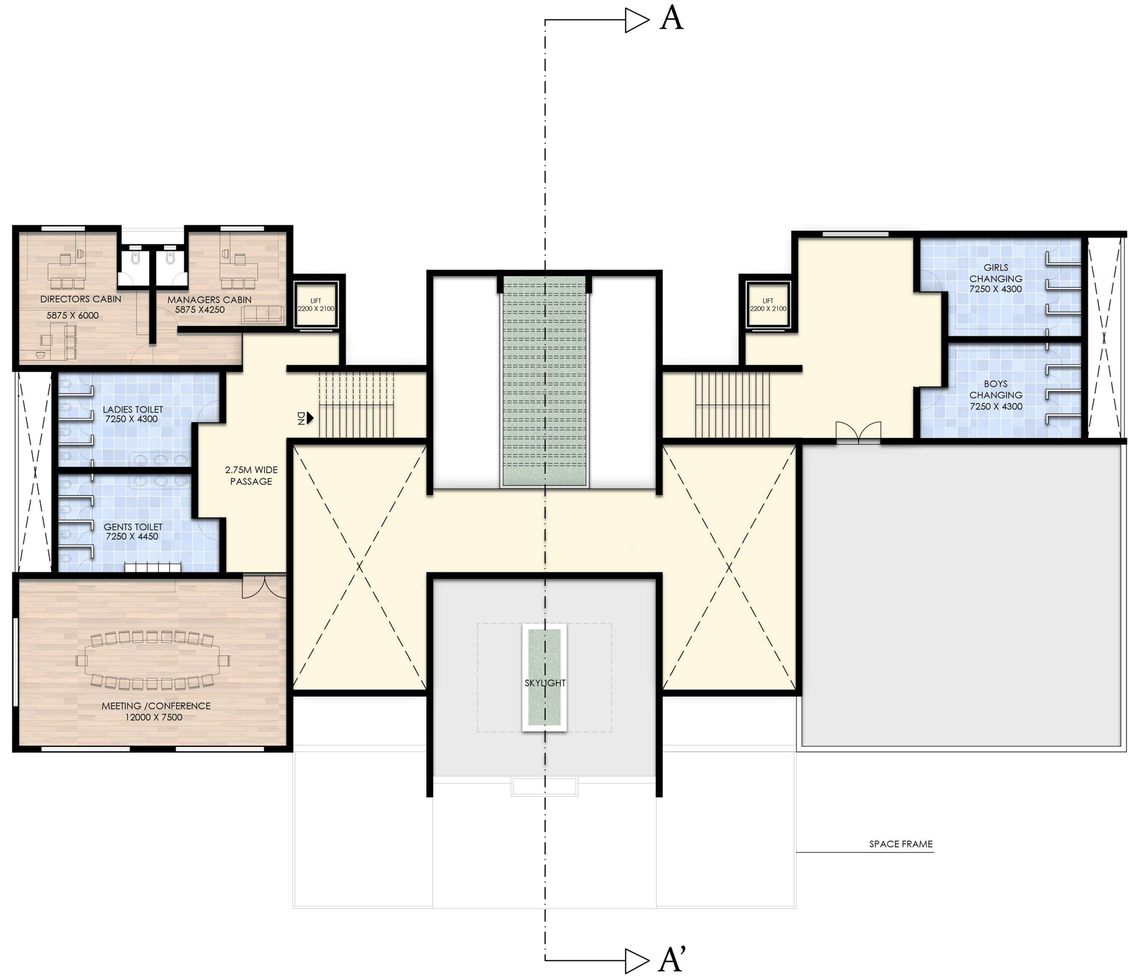
4.3 DRAWINGS


24 M WIDE ROAD
338.54 M
ENTRY 1
9 M WIDE INTERNAL ROAD
EXIT
40 M WIDE FRONT ROAD
219.58 M
15 M WIDE INTERNAL ROAD
ADMIN BLOCK
BASKETBALL COURTS
6 M WIDE INTERNAL ROAD
AQUATIC ARENA
9 M WIDE INTERNAL ROAD
BUS PARKING
PARKING
VOLLYBALL COURTS
MEDIC BLOCK
ATHLETICS GROUND
210.7 M
24 M WIDE ROAD
GYM AND FITNESS ARENA
BADMINTON AND TABLE TENNIS ARENA
TENNIS COURTS
ENTRY/ EXIT 2
9 M WIDE INTERNAL ROAD
159.51 M
12 M WIDE SERVICE ROAD
SERVICE ENTRY/EXIT

SITE PLAN



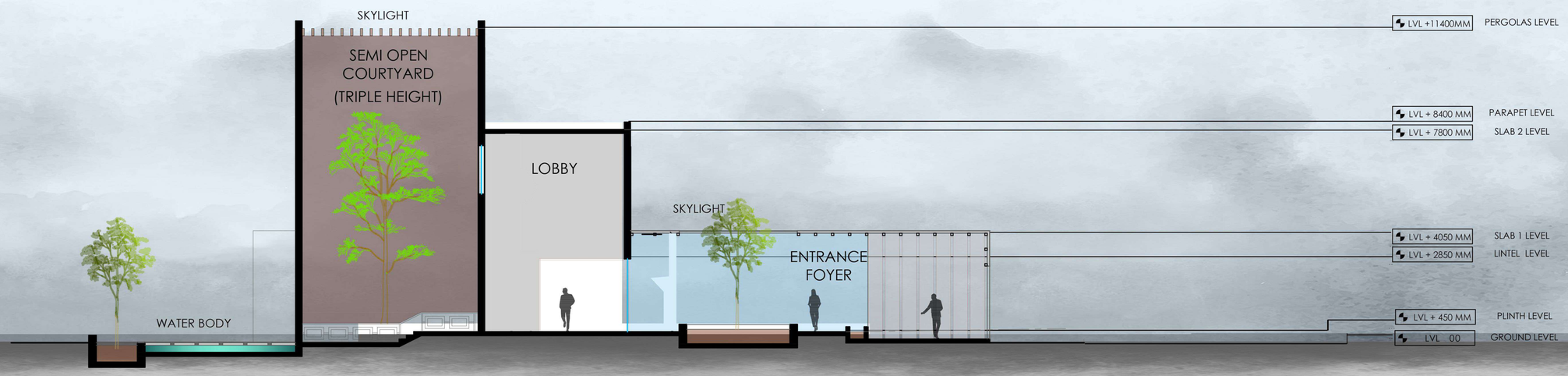
GROUND FLOOR PLAN



FIRST FLOOR PLAN

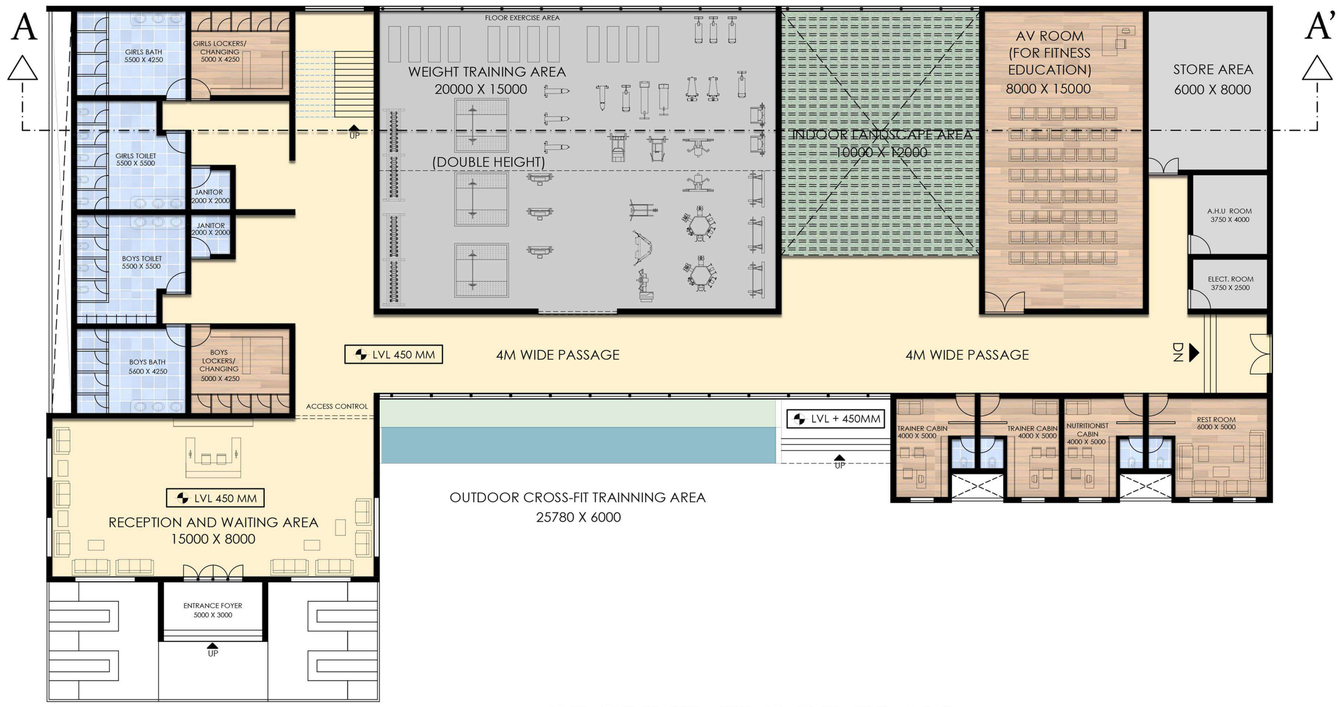
ADMINISTRATIVE BLOCK AND VISITOR'S CENTER

FRONT ELEVATION

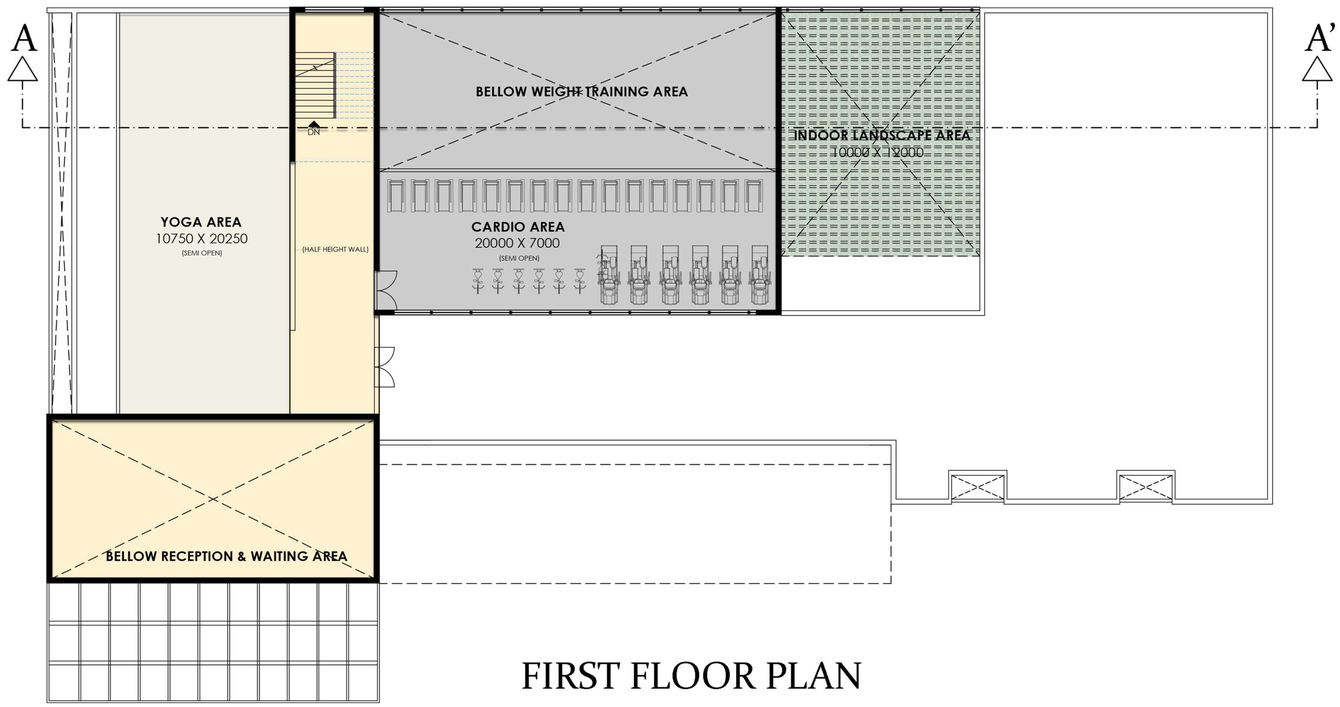


SECTION A-A'

ADMINISTRATIVE BLOCK AND VISITOR'S CENTER

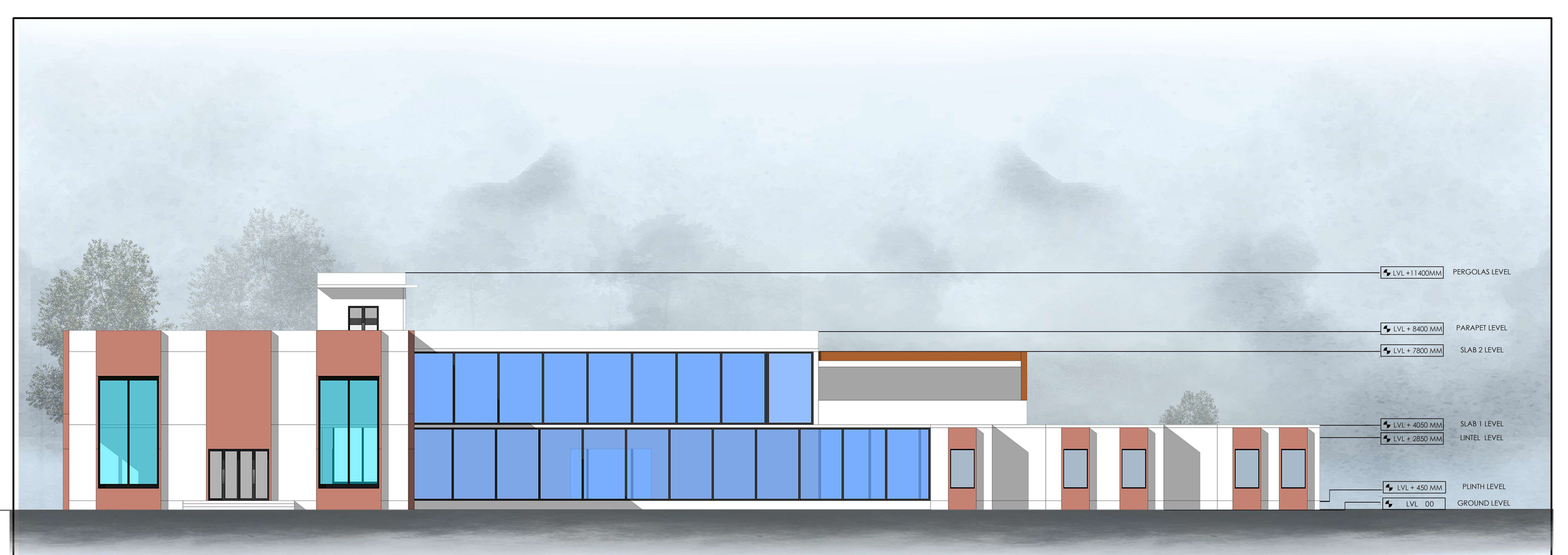


GROUND FLOOR PLAN

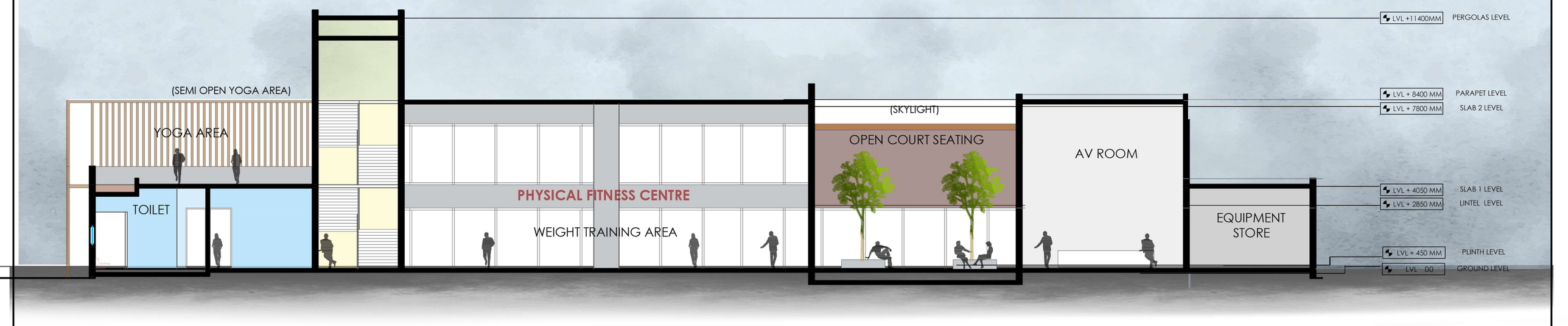


FIRST FLOOR PLAN

FITNESS AND GYM BLOCK

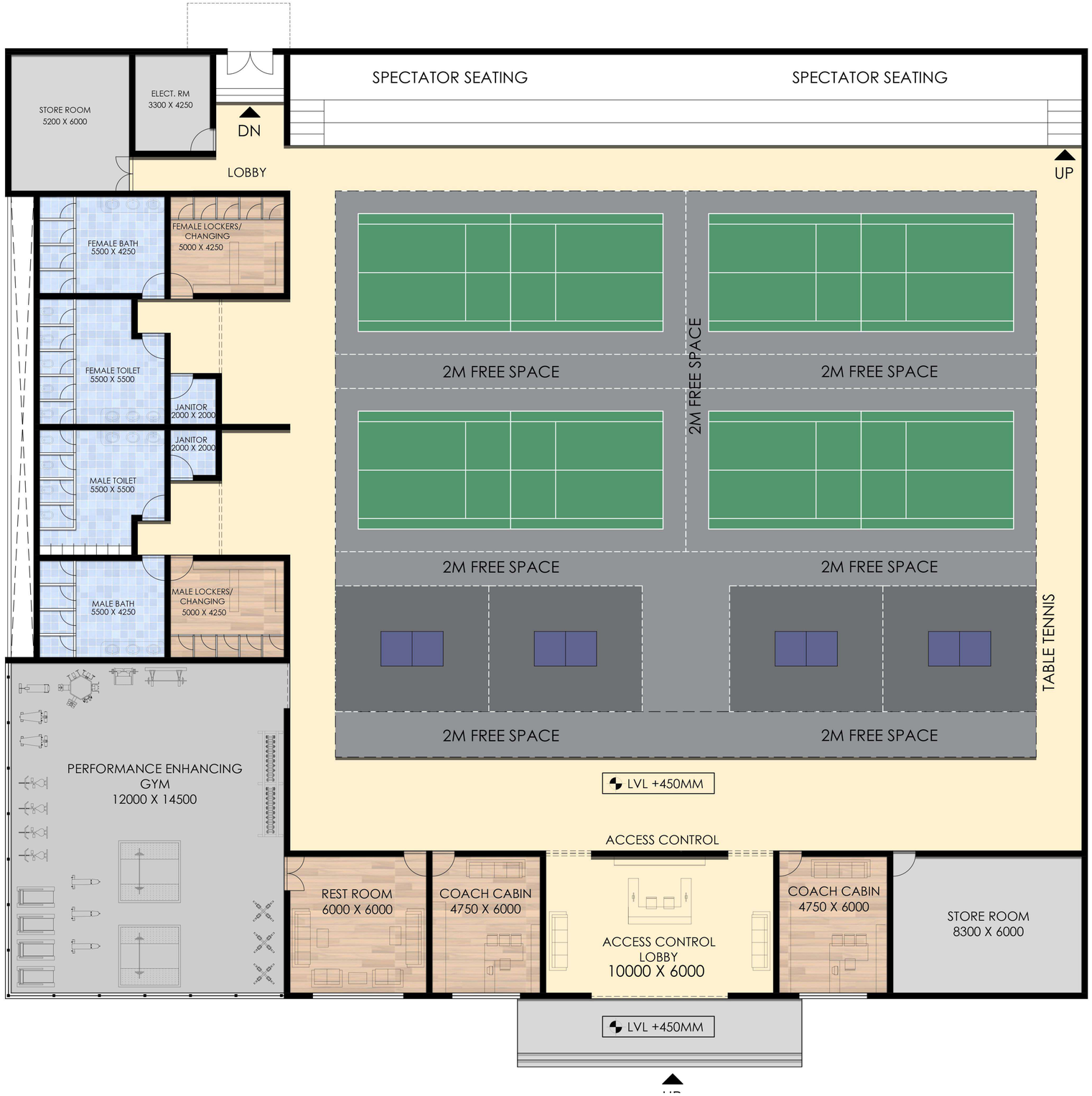


FRONT ELEVATION



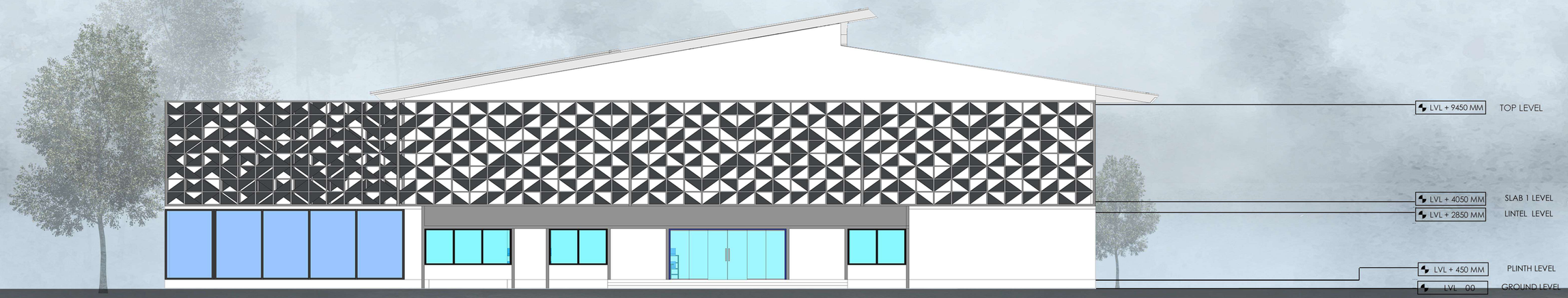
SECTION A-A'

ADMINISTRATIVE BLOCK AND VISITOR'S CENTER

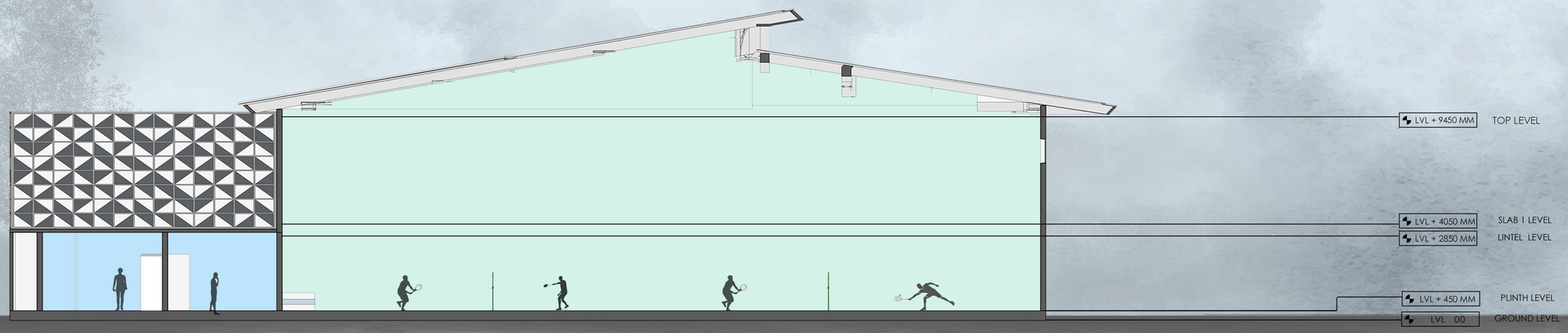


GROUND FLOOR PLAN

BADMINTON AND TABLE TENNIS BLOCK

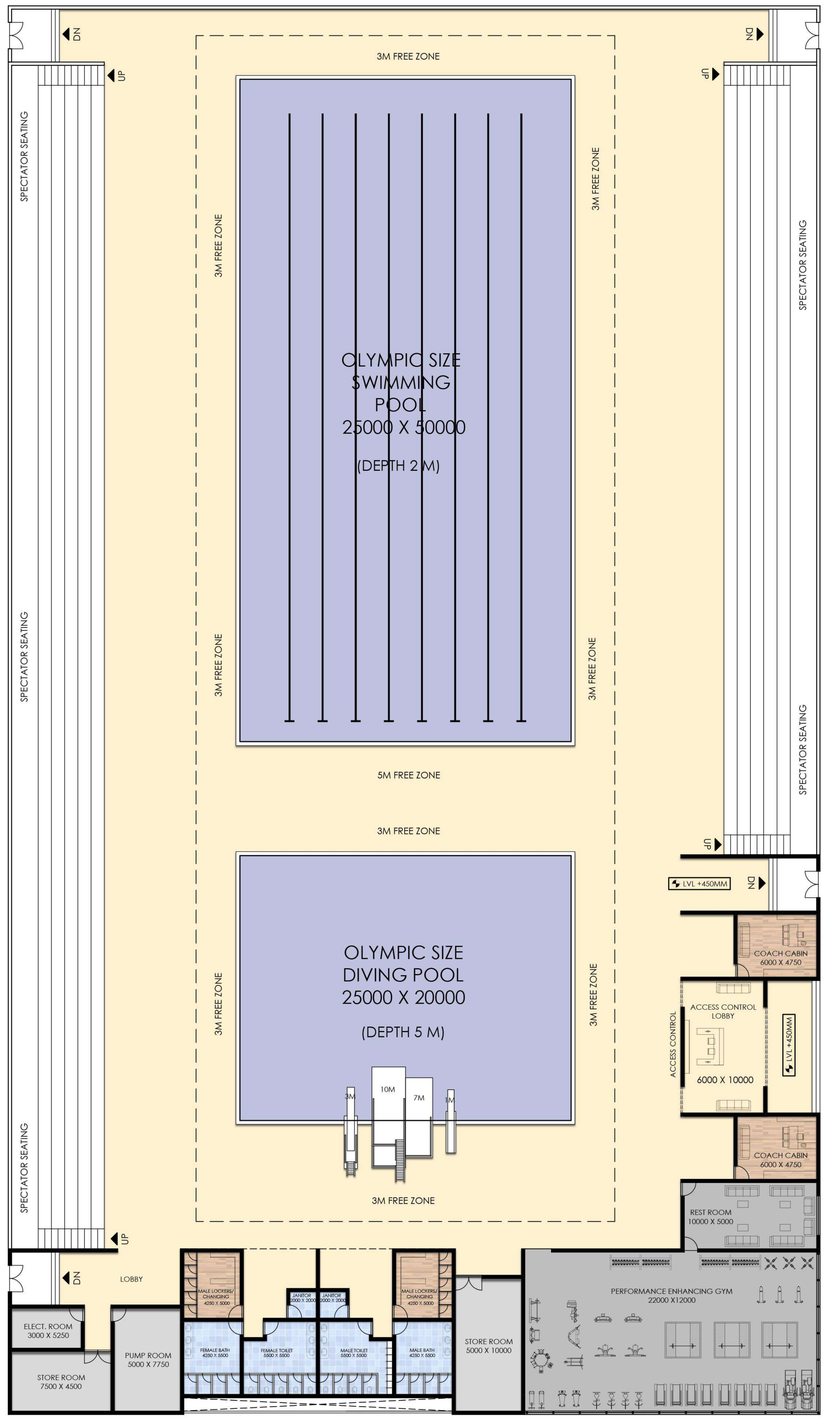


FRONT ELEVATION



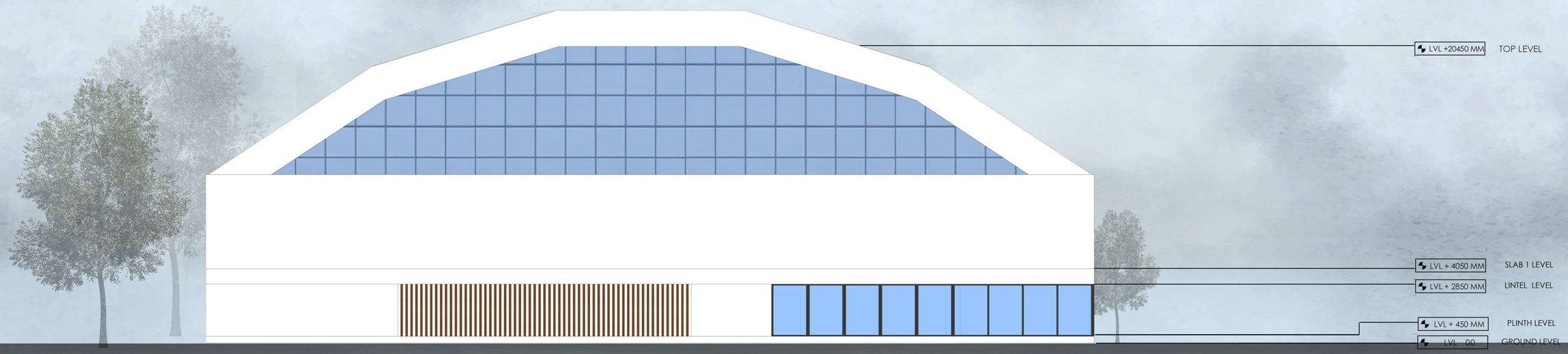
SECTION A-A’

BADMINTON AND TABLE TENNIS ARENA

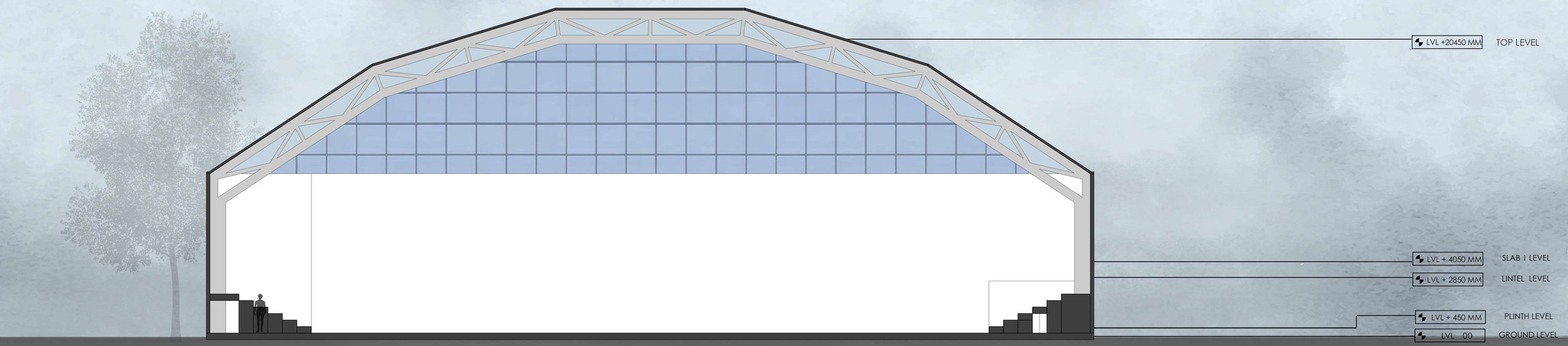


GROUND FLOOR PLAN

AQUATIC ARENA



FRONT ELEVATION



SECTION A-A’

BADMINTON AND TABLE TENNIS ARENA

GROUND FLOOR PLAN

FIRST FLOOR PLAN

MEDIC BLOCK AND PHYSIOTHERAPY BLOCK

FRONT ELEVATION

SECTION A-A’

MEDIC AND PSHSIOTHERAPY BLOCK

4.4 RENDERS