

TECHNO- HUB
A CENTER FOR DIGITAL GAMING
Bhaktapur

By:

Birendra Chhosokoso

(760111)

A thesis submitted in partial fulfillment
of the requirements for the
Degree of Bachelor of Architecture



Purbanchal University
KHWOPA ENGINEERING COLLEGE
DEPARTMENT OF ARCHITECTURE
Libali, Bhaktapur, Nepal
AUGUST 2025



An Undertaking of Bhaktapur Municipality

KHWOPA ENGINEERING COLLEGE

(Affiliated to Purbanchal University)

Est. 2001

No. 201382918



CERTIFICATE

This is to certify that the thesis entitled **TECHNO HUB - A CENTER FOR DIGITAL GAMING** at *Duwakot, Bhaktapur*, submitted to the Department of Architecture of Khwopa Engineering College by **Mr. Birendra Chhosokoso** of Class Roll No. 11/ B.Arch./076 has been declared successful for the partial fulfillment of the academic requirement towards the completion of the degree of Bachelor of Architecture of Purbanchal University.

Ar. Sakar Shrestha
Supervisor

Ar. Rashish Lal Shrestha
Thesis Coordinator

Ar. Binayendra Bahadur Shrestha
(External Juror)

Ar. Archana Bade Shrestha
Head of Department of Architecture

DECLARATION

I hereby declare that the thesis entitled “**Techno Hub – A Center for Digital Gaming**”, submitted to the Department of Architecture, Khwopa Engineering College, in partial fulfillment of the requirements for the degree of **Bachelor in Architecture (B. Arch.)**, is my original work carried out under the guidance of my supervisor.

This thesis has not been submitted, either in part or in full, for any other academic degree, diploma, or professional qualification. All the sources of information and references used in this work have been duly acknowledged.

I take full responsibility for the content, originality, and authenticity of this research work.

Birendra Chhosokoso(760111)

B.ARCH- 076

August, 2025

ABSTRACT

The rapid global rise of esports has created a significant demand for dedicated architectural spaces tailored to competitive gaming. As virtual sports continue to gain mainstream recognition, traditional stadium designs fall short in meeting the unique spatial, acoustic, and technological needs of esports events. This thesis explores the emerging typology of esports arenas, focusing on how architecture can enhance both player performance and audience engagement within a digitally immersive environment.

The research draws upon global precedents and literature to identify core design parameters such as spatial flexibility, acoustic comfort, visual immersion, lighting control, and technological infrastructure. Through comparative analysis of successful international esports venues and gaming centers, the study investigates how these elements come together to create functional and emotionally resonant spaces. Considerations such as sightlines, seating arrangements, backstage logistics, and streaming capabilities are examined in detail to understand the intersection between architecture and media technology.

Additionally, this thesis delves into user experience by evaluating the expectations of different user groups—players, spectators, streamers, and event organizers. It explores how venue design can foster community interaction, commercial viability, and brand identity while remaining adaptable for future technological advancements. Emphasis is also placed on sustainability, modularity, and urban integration as esports venues become prominent landmarks in modern cities.

The outcome of this research is a design proposal for a purpose-built esports arena that addresses the physical, digital, and experiential dimensions of competitive gaming. This thesis aims to contribute to the growing discourse on esports architecture, offering a comprehensive framework for designing next-generation venues that blend performance, spectacle, and innovation.

Birendra Chhosokoso

760111

ACKNOWLEDGEMENT

First and foremost, I would like to express my deepest gratitude to my thesis supervisor, Ar. Sakar Shrestha for their invaluable guidance, support, and encouragement throughout the development of this project. Their insightful feedback and architectural expertise played a crucial role in shaping both the research and design phases of this thesis.

I would also like to thank the faculty members of the Department of Architecture , Khwopa Engineering College, whose teaching and mentorship have greatly influenced my academic growth and design thinking. Special thanks to the thesis review panel for their constructive criticism and motivating words during each stage of my work.

I am also thankful to my friends and classmates for their constant support, creative discussions, and moments of collaboration that made this journey more enriching and enjoyable.

Lastly, I owe heartfelt thanks to my family for their unwavering love, patience, and moral support throughout my academic life. Their belief in me has been a continuous source of strength and inspiration.

This thesis would not have been possible without the collective support of all these individuals, and I am sincerely grateful for their contributions.

Birendra Chhosokoso

760111

Department of Architecture

Khwopa Engineering College

TABLE OF CONTENTS

DECLARATION	III
ABSTRACT	IV
ACKNOWLEDGEMENT	V
TABLE OF CONTENTS	VI
LIST OF TABLES	IX
LIST OF FIGURES	X
CHAPTER 1: INTRODUCTION	1
1.1 BACKGROUND	1
1.2 HISTORY OF ESPORTS	2
1.3 AIM AND OBJECTIVES	3
1.4 PROJECT JUSTIFICATION	4
1.4 SCOPE OF THE STUDY	4
1.5 LIMITATIONS OF THE STUDY	5
1.6 PROBLEM STATEMENT	6
1.7 METHODOLOGY	6
CHAPTER 2: LITERATURE STUDY	9
2.1 ESPORTS ECOSYSTEM	9
2.2 ESPORTS BOOTCAMP	9
2.3 TRAINING FACILITY	10
2.4 FACILITIES AND INFRASTRUCTURE IN AN ESPORTS FACILITY	11
2.4.1 Training Rooms	11
2.5 COMPETITION ARENAS	14
2.5.1 Player Experience and Gaming Stations	15
2.5.2 Arena Layout and Viewing	15
2.5.3 Broadcasting and Technical Spaces	17
2.6 LIGHTING AND ACOUSTICS	17
2.6.1 Customizable Lighting	17
2.6.2 Key Space Considerations for Lighting and Acoustics	18
2.6.3 Acoustic Enhancements	18
2.8 TECHNOLOGICAL INFRASTRUCTURE: SPATIAL DESIGN FOR ESPORTS FACILITIES	24
2.9 ADMINISTRATIVE AND MEDIA AREAS	27
2.10 FACILITIES AND INFRASTRUCTURE IN AN ESPORTS BOOTCAMP	30

2.10.1 Player Accommodation	31
CHAPTER 3: INTERNATIONAL CASE STUDY	33
3.1 ARKNEMESIS GAMING	33
3.1.1 DESIGN APPROACH	33
3.1.2 STRENGTH	34
3.1.3 WEAKNESS	34
3.1.4 SPACES	35
3.1.5 PLAN.....	36
3.1.6 INFERENCE	36
3.2 FUSION ARENA	37
3.2.1 DESIGN APPROACH.....	37
3.2.2 INFERENCE	39
3.3 HYPERX ARENA.....	40
3.3.1 DESIGN APPROACH	40
3.3.2 FACILITIES DETAILS	40
3.3.4 FLOORS PLAN	42
3.3.5 INFERENCE	43
CHAPTER 4: NATIONAL CASE STUDY.....	44
4.1 E-SPORTS NATIONAL CHAMPIONSHIP -2025	44
4.2 ARABPATI ESPORT.....	46
4.2.1 PRODUCTION AND BROADCASTING CHART	47
CHAAPTER :5 SITE ANALYSIS	49
5.1 SITE INFORMATION	49
5.2 ACCESSIBILITY AND ACCESS	49
5.3 TOPOGRAPHY.....	50
5.4 INFRASTRUCTURES	51
5.5 CLIMATIC ANALYSIS.....	51
5.6 BUILDING-BY-LAWS.....	53
5.7 SWOT ANALYSIS	53
CHAPTER 6: PROGRAM FORMULATION.....	54
6.1 MAIN ARENA	54
6.2 MARKET PLAZA	54
6.3 ADMINISTRATION	55
6.4 BOOTCAMP (ACCOMMODATION) – 16 UNITS.....	55
6.5 SUPPORTIVE SPACES	55
CHAPTER 7: DESIGN DEVELOPMENT	56

7.1 CONCEPT.....	56
7.2 ZONING AND FUNCTIONAL DISTRIBUTION	57
7.3 CIRCULATION PLANNING	59
7.4 FORM DEVELOPMENT	60
CONCLUSION	62
<i>ANNEX</i>.....	
<i>REFERENCES</i>	

LIST OF TABLES

Table 1 Consideration for Lighting and Acoustics	18
Table 2 Allocation Summary	23
Table 3 Spaces And Area of Arknemesis Gaming	35
Table 4 Program Formulation of Arena.....	54
Table 5 Program Formulation of Plaza.....	54
Table 6 Program Formulation of Administration Block.....	55
Table 7 Program Formulation of Bootcamp	55
Table 8 Program Formulation of Supportive Spaces	55

LIST OF FIGURES

Figure 1 Flow Chart of Methodology	8
Figure 2 Gaming Setup	11
Figure 3 Training Room.....	13
Figure 4 Competition Arena	14
Figure 5 Competition Arena	14
Figure 6 Seating Options	15
Figure 7 Dimension of Seating	16
Figure 8 Screen Viewing Angle.....	16
Figure 9 Broadcasting Room	17
Figure 10 Lighting System.....	18
Figure 11 Sound Insulation.....	19
Figure 12 Sound Insulation.....	19
Figure 13 Sound Insulation.....	20
Figure 14 Lounge Area	21
Figure 15 Food and Beverage Zone.....	22
Figure 16 Fan Zone	22
Figure 17 Server Room.....	24
Figure 18 Networking Room	25
Figure 19 Control Room	26
Figure 20 Media and Interview Room	29
Figure 21 Circulation	30
Figure 22 Coach and Analyst Room.....	32
Figure 23 Arknemesis Gaming	33
Figure 24 Pie chart of spaces	35
Figure 25 Planning of spaces	36
Figure 26 Fusion Arena	37
Figure 27 Seating Area	39
Figure 28 Spaces and Circulation	39
Figure 29 Hyper X Arena	40
Figure 30 Players Pods.....	41
Figure 31 Ground Floor Plan	42
Figure 32 First floor Plan.....	43

Figure 33 E-sport National Championship - 2025	44
Figure 34 Event layout.....	45
Figure 35 Production and Broadcasting System.....	47
Figure 36 Location Map.....	49
Figure 37 Road Network.....	50
Figure 38 Site Condition.....	50
Figure 39 Temperature Chart.....	51
Figure 40 Rainfall Chart	51
Figure 41 Wind flow Chart.....	52
Figure 42 Precipitation.....	52
Figure 43 Conceptual diagram.....	56
Figure 44 Bubble Diagram Concept	57
Figure 45 Zoning.....	58
Figure 46 Circulation	59
Figure 47 Form Development (Phase I).....	60
Figure 48 Form Development (Phase II)	60
Figure 49 Form Development (Phase III).....	61

CHAPTER 1: INTRODUCTION

1.1 Background

Esports, or electronic sports, refers to the world of competitive video gaming where professional players and teams engage in organized tournaments and leagues. This industry has surged in popularity over the past decade, transforming from a niche hobby into a mainstream entertainment phenomenon. Originating in the late 20th century with early arcade and console games, esports has grown exponentially, transforming into a global phenomenon. Today, it encompasses a wide range of game genres, including real-time strategy, first-person shooters, multiplayer online battle arenas, and sports simulations.

The esports industry has evolved significantly, boasting organized leagues, professional teams, and major tournaments that attract millions of viewers worldwide. These events are often held in large arenas and streamed online, drawing audiences comparable to traditional sports. The economic impact of esports is substantial, with lucrative sponsorship deals, media rights, and prize pools amounting to millions of dollars.

Esports also fosters a unique culture, with dedicated fan bases, influential streamers, and thriving online communities. It offers players opportunities to develop skills such as teamwork, strategic thinking, and quick decision-making. As esports continues to grow, it is reshaping the landscape of entertainment and sports, gaining recognition as a legitimate and influential industry.

Esports features a wide range of game genres, including real-time strategy (RTS), first-person shooters (FPS), and multiplayer online battle arenas (MOBA), with popular titles like League of Legends, Dota 2, Counter-Strike: Global Offensive, Overwatch, and Fortnite leading the way. Esports generates significant revenue through sponsorships, advertising, media rights, merchandise, and ticket sales. Major brands such as Intel, Red Bull, and Coca-Cola sponsor teams and events, contributing to the industry's financial growth. The community around esports is vibrant, with passionate fans engaging with their favorite players and teams both online and at live events. Despite facing challenges such as ensuring player welfare and maintaining competitive integrity, the future of esports looks promising, with continued investment, expanding viewership, and greater mainstream acceptance positioning it as a significant component of the global entertainment landscape.

1.2 History of Esports

a) 1940s-1960s: Foundations of Computer Gaming

- **1940:** British mathematician Alan Turing developed "Turochamp," an early chess-like computer game.
- **1962:** "Spacewar!" was created, one of the first multiplayer computer games, laying the groundwork for competitive gaming.

b) 1970s-1980s: Emergence of Competitive Gaming

- **1972:** Atari released "Pong," leading to the proliferation of arcade games and the growth of the video game industry.
- **1980:** The arcade gaming industry peaked with classics like "Pac-Man" and "Donkey Kong," fostering competitive high-score contests.
- **1983:** The Atari National Space Invaders Championship attracted over 10,000 participants, marking one of the earliest esports events.

c) 1990s: Professionalization of Esports

- **1990:** The Nintendo World Championships were held across North America, highlighting large-scale video game competitions.
- **1997:** The Cyberathlete Professional League (CPL) was established, setting standards for professional gaming, including rules and player contracts.

d) 2000s: Global Expansion

- **2000:** The World Cyber Games (WCG) was founded as the first international esports championship.
- **2002:** The Electronic Sports World Cup (ESWC) began, further promoting international competition.

e) 2010s: Mainstream Recognition

- **2011:** The International Dota 2 Championship's prize pool reached \$1 million, setting new standards for esports rewards.
- **2013:** The League of Legends World Championship's prize pool surpassed \$2 million, solidifying its status in the esports arena.

f) **2020s: Continued Growth and Major Events**

- **2020:** The COVID-19 pandemic led to the cancellation of many in-person events, but online tournaments saw significant increases in viewership and participation.
- **2022:** The Olympic Council of Asia announced that esports would be a demonstration sport at the 2022 Asian Games, with plans to potentially include it as a medal event in future games.
- **2023:** The 15th World Esports Championship was held in Iași, Romania, featuring titles like Counter-Strike: Global Offensive, Dota 2, Tekken 7, eFootball, PUBG Mobile, and Mobile Legends: Bang Bang.
- **2024:** The Esports World Cup took place in Riyadh, Saudi Arabia, from July 3 to August 25, with prize pools totaling \$60 million, aiming to position Saudi Arabia as a global hub for gaming by 2030.

1.3 Aim and objectives

To design a comprehensive esports bootcamp that combines advanced infrastructure, wellness spaces, and a collaborative environment to enhance player performance and support both individual and team development.

The objectives of projects are: -

- To critically analyze the spatial, functional, and technological requirements essential for the design of a contemporary esports center.
- To conceptualize and develop an innovative architectural design that accommodates multiple esports-related functions, including competitive gaming arenas, streaming and broadcast studios, training facilities, and spectator zones.
- To integrate state-of-the-art technological infrastructure within the architectural framework, ensuring seamless connectivity, optimal performance, and adaptability to evolving esports technologies.
- To employ human-centered and sustainable design principles to enhance user comfort, operational efficiency, and environmental responsiveness within the esports center.
- To devise an efficient circulation and access strategy that facilitates safe, intuitive, and accessible movement of diverse user groups, including players, staff, and spectators.

- To explore and implement architectural aesthetics that embody the futuristic, immersive, and dynamic culture of esports, thereby creating a compelling and engaging spatial experience.
- To formulate scalable and flexible design solutions capable of accommodating future technological advancements, capacity expansion, and site-specific contextual challenges.

1.4 Project justification

Esports in Nepal is still in its early stages, lacking the necessary bootcamps for professional training and guidance. The absence of specialized facilities, high-performance gear, and a supportive environment hinders players' progress, limiting their ability to compete at higher levels. Many gamers struggle with basic personal setups, preventing them from reaching their full potential in the competitive esports scene. This gap in infrastructure stifles the growth of esports and leaves potential talent undiscovered.

With esports becoming an official part of the Olympics (Olympic Esports) and included in the South Asian Games since 2022, there is increasing global and regional recognition of the industry. Nepal's esports market has also seen notable growth, with 171 players earning a total of \$1.6 Million USD across 45 tournaments. The highest-earning game was *PLAYERUNKNOWN'S BATTLEGROUNDS Mobile*, which accounted for 96.50% of all earnings. Despite this success, the lack of proper training facilities and support systems limits the ability to fully capitalize on these opportunities.

To address this, we propose the design of a holistic esports bootcamp and training facility that combines advanced technology, coaching, and recovery resources. This facility will prioritize both physical and mental well-being, helping players develop their skills and maintain a balanced lifestyle. By providing the necessary tools and environment, the project aims to elevate Nepal's esports industry, attract global attention, and foster investment for future growth.

1.4 Scope of the Study

This architectural thesis focuses on the design of a contemporary **Esports Center** within the urban context of **Kathmandu, Nepal**, addressing the emerging demand for structured spaces dedicated to competitive gaming, digital entertainment, and youth culture. The scope includes:

1. **Architectural Design Development:** The study will cover conceptual and schematic design phases, focusing on spatial planning, circulation, massing, and aesthetic expression suited to the urban density of Kathmandu.
2. **Programmatic Functions:** The Esports Center will incorporate essential facilities including gaming arenas, broadcast studios, bootcamps, VR zones, media lounges, merchandise and F&B outlets, administrative offices, and a community interaction area.
3. **Technological Infrastructure:** The design will consider the spatial and infrastructural requirements of high-performance gaming, including server rooms, acoustic treatments, cooling systems, and digital display installations.
4. **Cultural and Urban Context:** The project will reflect Kathmandu's urban fabric and social patterns, with sensitivity to local climatic conditions, available materials, and construction practices.
5. **User-Centric Design:** The center will be designed to serve a diverse group—professional gamers, casual players, audiences, organizers, and media professionals—while ensuring inclusivity, comfort, and accessibility.
6. **Sustainability and Resilience:** Passive design strategies (natural ventilation, daylighting), earthquake-resilient design approaches, and adaptable planning will be incorporated, considering Kathmandu's environmental and seismic context.

1.5 Limitations of the Study

1. **Technical Detailing:** The design will not include detailed engineering systems (e.g., structural load calculations, MEP systems), but will indicate spatial provisions for them.
2. **Economic Feasibility:** The project will not cover detailed cost analysis, business models, or revenue projections due to lack of real-world sponsorship or investment data.
3. **Operational Strategy:** Management and operation models (staffing, scheduling, maintenance) are outside the scope, though their spatial requirements are considered.

4. **Technology Specifications:** While the spatial and infrastructural needs of gaming technology will be addressed, exact technical specifications (hardware, server capacity, network bandwidth) will not be detailed.

1.6 Problem statement

The gaming and esports industry in Nepal has been on the rise thanks to dedicated players and entrepreneurs aiming for a global presence. 171 rising esports player from Nepal among which 86% are male and remaining 14% are females. The lack of esports training centers has become a challenge to their growth. Esports bootcamps are focused training centers that include advanced gaming equipment, fast internet, and a place for teams to work together and strategize. In Nepal, the would-be players and teams find it difficult to train and prepare for competitions as they don't have access to these resources and hence fall short at an international level.

Apart from offering basic gaming infrastructure, esports bootcamps provide complete solutions as training centers taking care of one's physical fitness, mental fitness and the functioning of a team. They provide the best scenarios for players to come and polish their skills with the help of coaches and analysts with the conditions closest to that of a tournament setting. In the absence of these facilities players from Nepal suffer from issues like over training, unregulated training, and insufficient training which further affects the development of the industry.

Bumping up the funds and engaging in esports bootcamps could change the nature of competitive gaming in the country of Nepal. These facilities would not only aid the players in competing across the globe, but they would also bring international competition and generate job prospects for the people in technology and media. By fostering a vibrant esports ecosystem and incorporating Nepal's cultural identity, bootcamps could position the country as a regional hub for esports while contributing to economic development.

1.7 Methodology

The methodology adopted for this architectural thesis involves a research-based design approach, combining both qualitative and quantitative methods to develop a

comprehensive understanding of the spatial, functional, and cultural requirements of an esports center within the context of Kathmandu. The study begins with a literature review of existing esports facilities, design precedents, and theoretical frameworks related to gaming environments, immersive architecture, and user-centered spatial planning. This is followed by case studies of international and regional esports venues to analyze functional zoning, circulation strategies, technological integration, and audience engagement features.

A site analysis is conducted to understand the physical, environmental, and socio-cultural context of the selected location in Kathmandu, including climate, access, topography, existing infrastructure, and urban fabric. Primary data is gathered through interviews and surveys (where possible) with gamers, event organizers, and media professionals to gain user insights and preferences. Based on these findings, a design program is formulated outlining spatial requirements, area distribution, and technical considerations.

The conceptual design phase involves diagramming, zoning, and form exploration guided by site constraints, programmatic needs, and experiential goals. Sketches, 3D models, and digital simulations are used to iterate design solutions. The final proposal is developed through architectural drawings, visualizations, and schematic layouts, integrating considerations for sustainability, flexibility, technology, and future expansion. The methodology ensures that the final design is both contextually relevant and forward-thinking, aligned with the evolving needs of Nepal's gaming and youth culture.

Literature Review: Review existing studies and best practices in esports bootcamp design, focusing on training environments, player development, wellness needs, and the integration of technology in esports facilities.

Research Design: Employ a mixed-methods approach, integrating both qualitative and quantitative data collection methods to comprehensively understand the needs of esports athletes.

Participant Selection: Select a diverse group of esports players, coaches, and industry professionals, considering various skill levels, game types, and training needs to ensure a comprehensive understanding.

Data Collection:

- Qualitative: Conduct interviews and focus groups with esports players, coaches, and industry experts to explore their needs and perspectives on effective training environments.
- Quantitative: Distribute surveys to gather data on player preferences, training challenges, and infrastructure requirements.

Data Analysis:

- Qualitative: Apply thematic analysis to identify common trends and insights from interviews and focus groups.
- Quantitative: Use statistical methods, such as descriptive statistics and regression analysis, to analyze survey data and draw correlations between player needs and facility design elements.

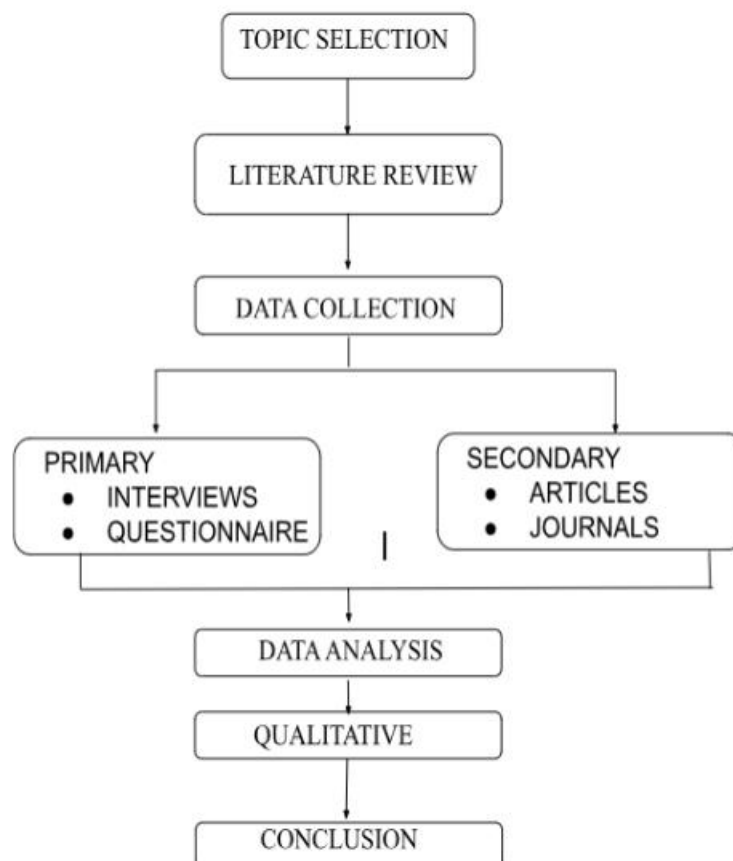


Figure 1 Flow Chart of Methodology

CHAPTER 2: LITERATURE STUDY

2.1 Esports Ecosystem

The esports ecosystem is a dynamic and multifaceted network encompassing a wide range of stakeholders essential to its growth and sustainability. Central to the ecosystem are the players, ranging from amateurs to professionals, who compete in various game titles.

These players are often associated with professional teams supported by coaches, analysts, and managerial staff who enhance performance and develop strategies (Jenny et al., 2017).

Organizers of esports tournaments and leagues form another crucial segment by hosting events that range from local competitions to international championships. These events are broadcast live on platforms like Twitch and YouTube, attracting millions of viewers worldwide. Streaming platforms function as key content distribution channels, facilitating fan engagement through live chat and social media (Hamari & Sjöblom, 2017).

Sponsorship and advertising play significant roles, with major brands investing in esports through endorsements and event sponsorships. These financial inputs support prize pools, team operations, and production quality. Game developers and publishers maintain game integrity through continuous updates, ensuring competitive balance and sustained player interest (Scholz, 2019).

Ancillary services such as journalism, content creation, merchandising, and esports education further enrich the ecosystem. Educational institutions now offer specialized courses and degrees in areas like esports management and game design. Overall, the esports ecosystem functions as a complex, interconnected web that fosters a vibrant and rapidly expanding industry.

2.2 Esports Bootcamp

Esports bootcamps are specialized training centers designed for professional players and aspirants to hone their skills in a structured environment. These facilities are equipped with high-performance gaming setups, optimized internet connectivity, and simulation tools. Dedicated rooms allow teams to collaborate, strategize, and analyze gameplay (Seo, 2016).

In addition to gaming infrastructure, many bootcamps offer accommodations, meals, physical fitness training, and mental health programs, emphasizing holistic player well-being. Bootcamps enable rigorous practice sessions and foster team synergy, ultimately preparing players for competitive events and long-term careers in esports.

Key Roles in an Esports Bootcamp:

- **Professional Player:** Competes at the highest level, earning through tournaments and sponsorships.
- **Coach/Analyst:** Provides strategic guidance and gameplay analysis.
- **Team Manager:** Oversees logistics and player welfare.
- **Content Creator/Streamer:** Builds fan engagement and personal brand via streaming.
- **Esports Journalist/Broadcaster:** Delivers commentary and industry updates.
- **Event Organizer:** Plans and executes esports tournaments.
- **Game Developer/Designer:** Maintains and evolves esports titles.
- **Marketing/PR Specialist:** Promotes teams and events through various media.
- **Sponsorship/Partnership Manager:** Secures and manages financial partnerships.
- **Esports Consultant:** Provides strategic guidance to industry stakeholders.
- **Health and Wellness Professional:** Supports physical and mental fitness.
- **Technical Support/Production:** Manages event streaming and technology.
- **Education and Training:** Develops future professionals through academic programs.

2.3 Training Facility

The emergence of esports has necessitated the development of dedicated training facilities. These spaces offer professional environments where players can refine skills using state-of-the-art equipment and technology. Facilities are outfitted with high-speed internet, performance-grade PCs, and software tools for skill tracking and analysis (Hedlund, 2019).

Training rooms are acoustically treated, ergonomically designed, and optimized for uninterrupted focus. Coaching and analysis rooms provide in-depth feedback, while wellness areas ensure physical and mental health. Some facilities integrate virtual reality tools and data analytics for enhanced skill development.

Besides training, these venues often function as engagement hubs, offering meet-and-greets, live viewing areas, and merchandise sections. Their architectural design often promotes modularity, innovation, and community interaction.

2.4 Facilities and Infrastructure in an Esports Facility

An esports facility is a specialized environment designed to support the unique needs of competitive gaming. Unlike traditional sports venues, these facilities prioritize technological advancements, ergonomic considerations, and versatile layouts to cater to players, teams, and audiences. Below is an exploration of the essential facilities and infrastructure that define a modern esports center.

2.4.1 Training Rooms

Training rooms form the core of any esports facility, as they are where players hone their skills and strategize for competitions. These rooms must be equipped with:

- **Ergonomic Gaming Setups in Training Rooms**

Esports players often spend 6–10 hours daily in training, making ergonomics a critical factor in maintaining comfort, focus, and long-term health. The integration of thoughtfully designed furniture and accessories into training rooms ensures players can perform at their peak while minimizing the risk of fatigue and injury.

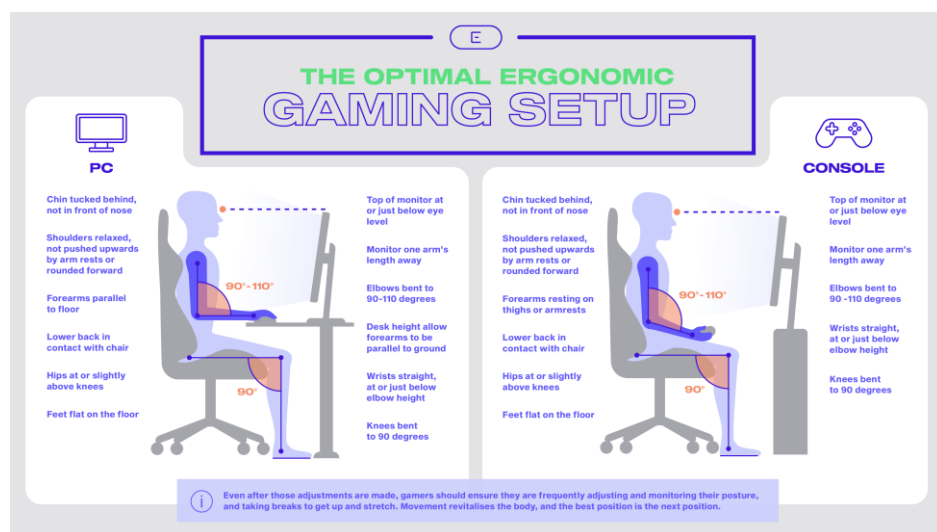


Figure 2 Gaming Setup

Adjustable Desks and Chairs

Desks:

- **Height Adjustability:** Desks with adjustable heights accommodate players of various statures, ensuring their arms rest naturally at 90-degree angles while using keyboards and mice. Standing desk options can provide flexibility, allowing players to alternate between sitting and standing positions, which promotes better posture and circulation.
- **Surface Design:** Smooth, spacious desktops with cable management systems prevent clutter and enable unhindered hand movement, crucial for precise gameplay.

Chairs:

- **Lumbar Support:** Gaming chairs are equipped with adjustable lumbar pillows or built-in support to maintain the natural curve of the spine, reducing back strain during extended sessions.
- **Adjustable Features:** Armrests that move in multiple directions (height, angle, and width), tilt mechanisms, and seat height adjustments allow players to customize their seating positions for maximum comfort.
- **Reclining Capabilities:** Some chairs recline up to 180 degrees, enabling players to take breaks or relax without leaving the training area.

Anti-Fatigue Mats

Anti-fatigue mats are a lesser-known but invaluable addition to esports training rooms. They provide cushioning underfoot for standing players or beneath footrests for seated players, delivering several benefits:

- **Improved Circulation:** The mats encourage subtle muscle movements in the legs, which stimulate blood flow and reduce fatigue during long gaming sessions.
- **Pressure Reduction:** They distribute weight evenly across the feet, alleviating pressure on joints and preventing soreness.
- **Enhanced Comfort:** Textured surfaces provide grip and tactile stimulation, making them particularly useful for players who practice standing stretches while taking breaks.

Benefits of Ergonomic Gaming Setups

- **Reduced Risk of Injury:** Proper seating and desk arrangements prevent conditions like carpal tunnel syndrome, neck strain, and back pain.
- **Enhanced Performance:** Comfortable players can maintain focus and execute precise movements, which is critical in competitive gaming.
- **Longevity in Esports:** Ergonomics promotes overall well-being, ensuring players can sustain their careers without physical detriment.

- **High-Performance PCs:** Systems equipped with the latest processors, GPUs, and high-refresh-rate monitors (e.g., 240Hz or higher) ensure optimal performance for gaming.

Optimizing Placement and Accessibility

1. Whiteboards:

- Install whiteboards at eye level for standing or seated participants.
- Position near training setups for easy reference during discussions.
- Use adequate lighting to minimize glare and ensure visibility.

2. Screens:

- Large screens should be positioned at the front of the room, ensuring clear sightlines for all team members.
- Adjustable tilt and height for optimal viewing angles.
- Pair screens with dedicated sound systems to ensure audio clarity during footage playback.



Figure 3 Training Room

2.5 Competition Arenas

Esports competition arenas serve as the heart of gaming events, blending technology, design, and functionality to create an immersive experience for players and spectators. To ensure success, these spaces must prioritize comfort, engagement, and versatility.



Figure 4 Competition Arena

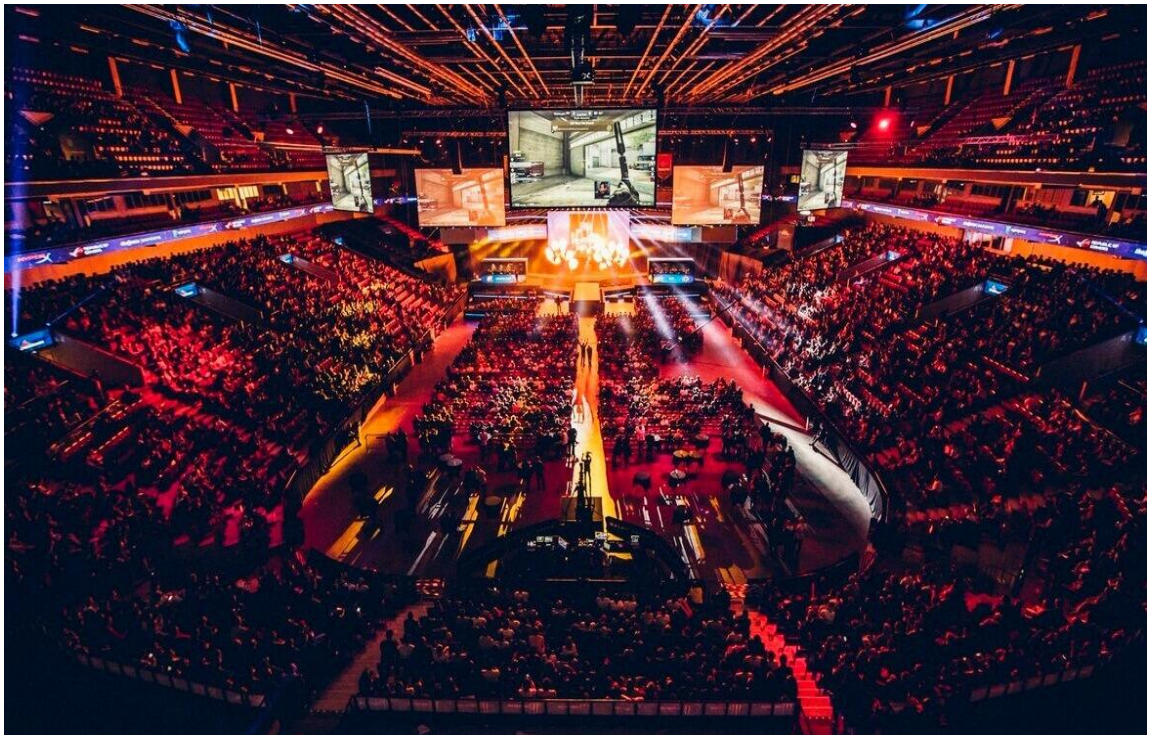


Figure 5 Competition Arena

2.5.1 Player Experience and Gaming Stations

- **Mobile Gaming:** Compact layouts (1.2m x 0.6m), anti-glare lighting, and charging stations.
- **PC Gaming:** Larger setups (1.5m x 0.8m), ergonomic seating, and high-performance gear.
- **Console Gaming:** Shared or solo pods (1.3m x 0.7m), with couch-style seating options.
- **Design Aspects:** Stage dimensions of 10m–12m width, with 4m–6m depth.
- **Audience Visibility:** Tiered seating with 30–50cm elevation between rows.

2.5.2 Arena Layout and Viewing

- **Modular Seating:** Flexible arrangements to accommodate diverse events.

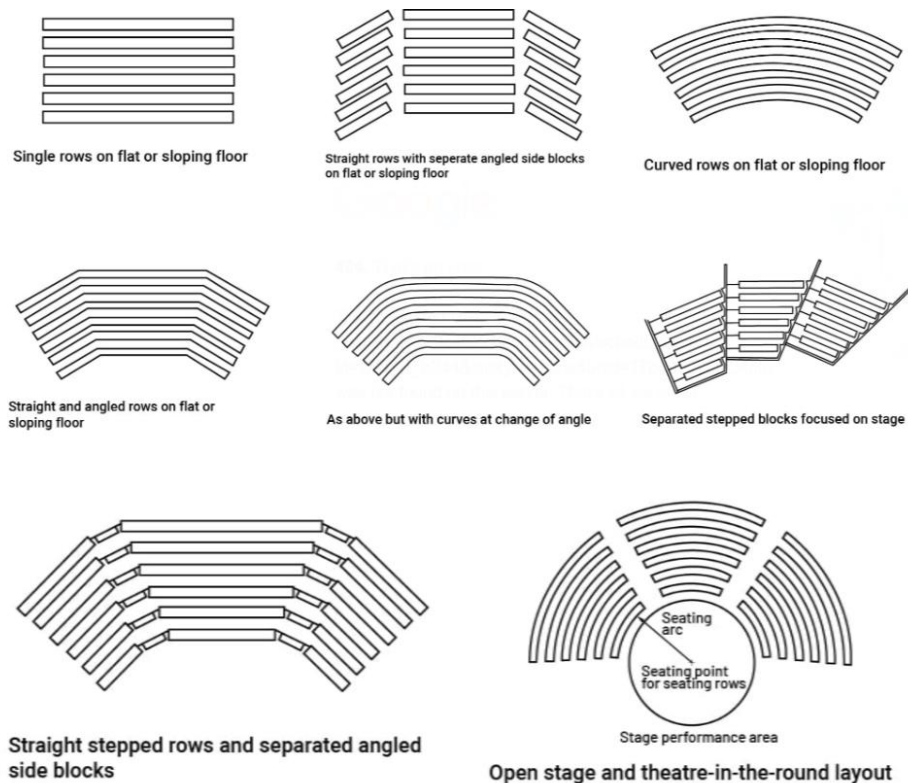


Figure 6 Seating Options

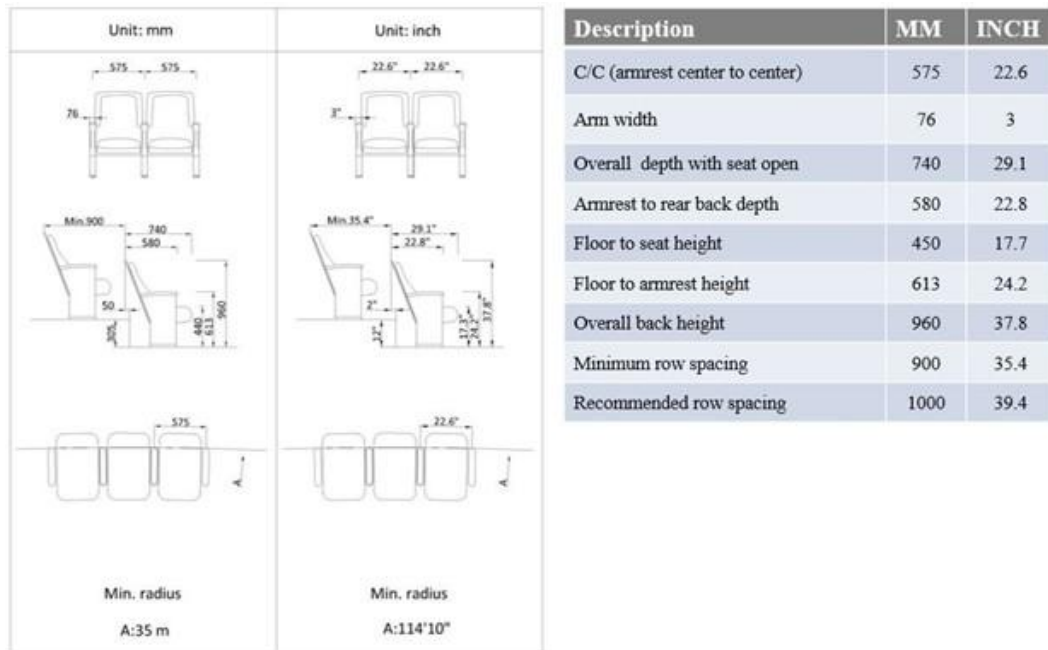


Figure 7 Dimension of Seating

- **Screens and Displays:** Primary (20–30 ft wide) and secondary displays (6–12 ft) strategically placed.
- **Player Pods:** Soundproof booths (1.5m x 1.5m x 2.5m) to minimize distraction.

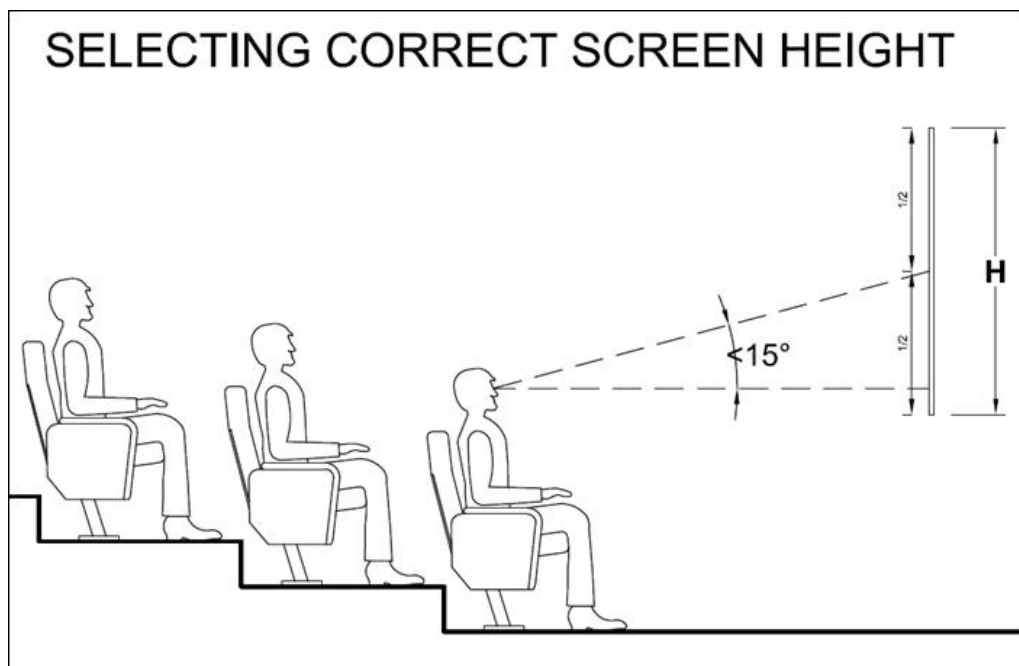


Figure 8 Screen Viewing Angle

2.5.3 Broadcasting and Technical Spaces

- **Broadcasting Booths:** Elevated 3m x 3m rooms with acoustic treatment and AV equipment.



Figure 9 Broadcasting Room

- **Streaming Systems:** HD cameras, mixers, high-speed dedicated internet lines.
- **Technical Support Zones:** 4m x 6m areas for troubleshooting and backstage management.

2.6 Lighting and Acoustics

2.6.1 Customizable Lighting

- **Player Zones:** Dimmable LED task lighting (3500K–5000K).
- **Audience Zones:** Dynamic RGB lights with beam control.

- **Stage Lighting:** Overhead trusses (6m–8m height), spot and ambient lighting.



Figure 10 Lighting System

2.6.2 Key Space Considerations for Lighting and Acoustics

Table 1 Consideration for Lighting and Acoustics

Area	Lighting Features	Acoustic Features	Dimensions
Player Pods	Task lighting, backlighting	Acoustic panels, noise barriers	2m x 1.5m per station
Audience Seating	Dynamic lighting, RGB effects	Surround sound systems, wall panels	5m x 5m per seating module
Stage	Spotlights, floodlights, projection effects	Directional microphones, sound baffles	15m x 8m, 6m height
Broadcast Booth	Adjustable ambient lighting	Soundproofing, sealed doors, acoustic treatment	3m x 3m per booth
Control Room	Functional lighting for task clarity	Echo reduction materials, noise isolation	5m x 7m

2.6.3 Acoustic Enhancements

- **Player Zones:** Partitioned with NRC 0.7+ acoustic panels, carpeted floors.
- **Stage Microphones:** Directional, with noise-canceling features.
- **Broadcast Booths:** Double-glazed, soundproofed with NRC 0.8+ materials.

- **Ceiling Design:** 8m height with baffles to control reverberation.

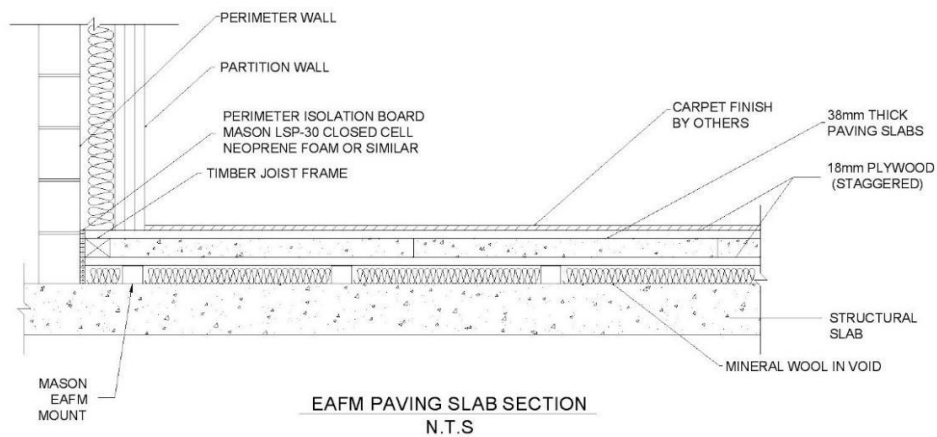


Figure 11 Sound Insulation

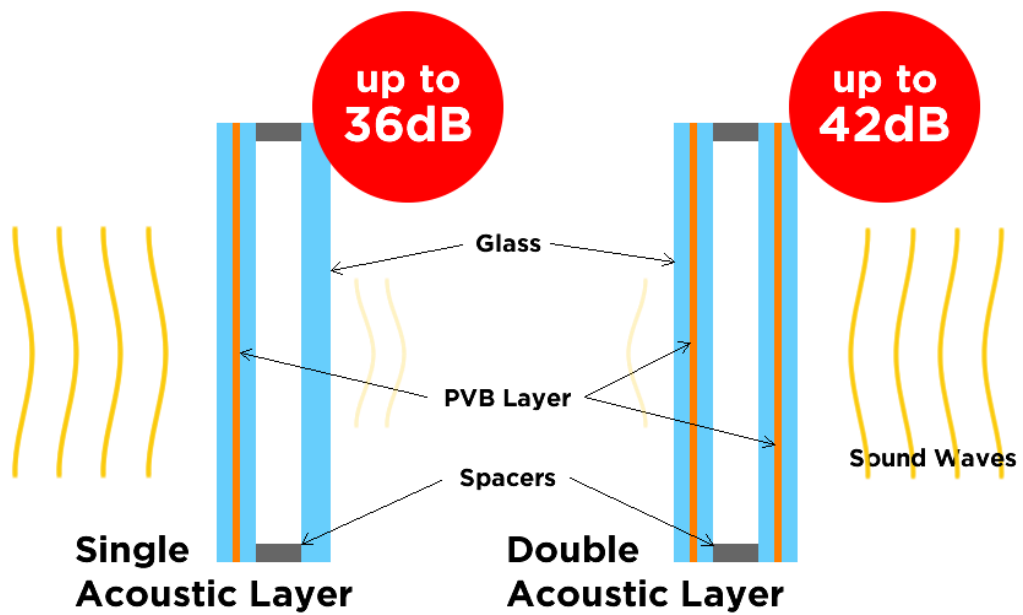
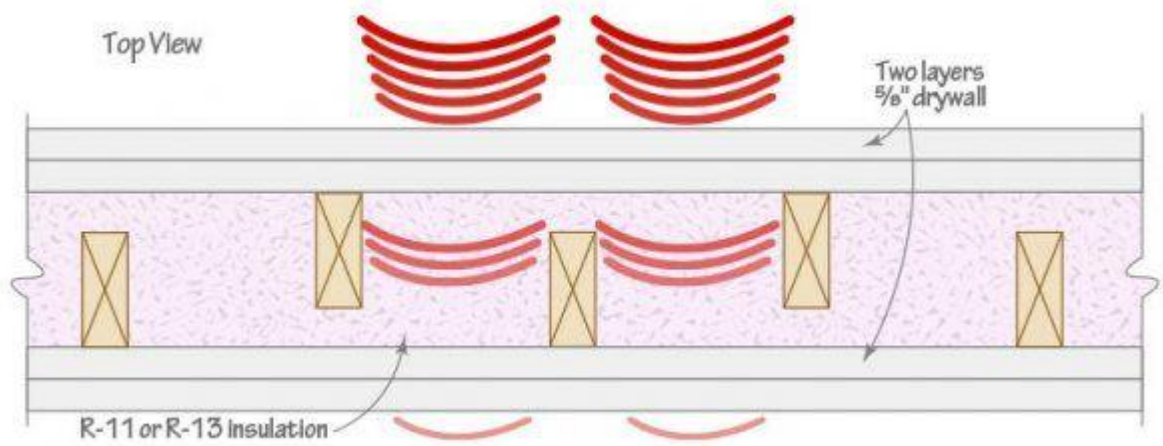


Figure 12 Sound Insulation

5 ADDING MASS*Figure 13 Sound Insulation*

2.7 Break Spaces: Enhancing the Off-Stage Experience

Break areas provide spectators with engaging activities and a chance to recharge between matches, ensuring a more immersive and enjoyable experience.

1. Lounge Areas

- Design Concept: Comfortable seating with charging stations, Wi-Fi access, and ambient lighting creates a relaxing atmosphere.
- Dimensions: Allocate 1.5m² per person in lounge areas to ensure comfort without overcrowding.
- Features: Incorporate couches, bean bags, and tables, along with retro arcade games or smaller gaming setups for casual play.
- Merchandise Shops
- Layout: Merchandise zones should have wide aisles (minimum 1.5m) for easy browsing and mobility.

Dimensions:

- Small arenas: 10m²–20m².
- Larger arenas: 50m² or more, with multiple counters to handle crowd flow.

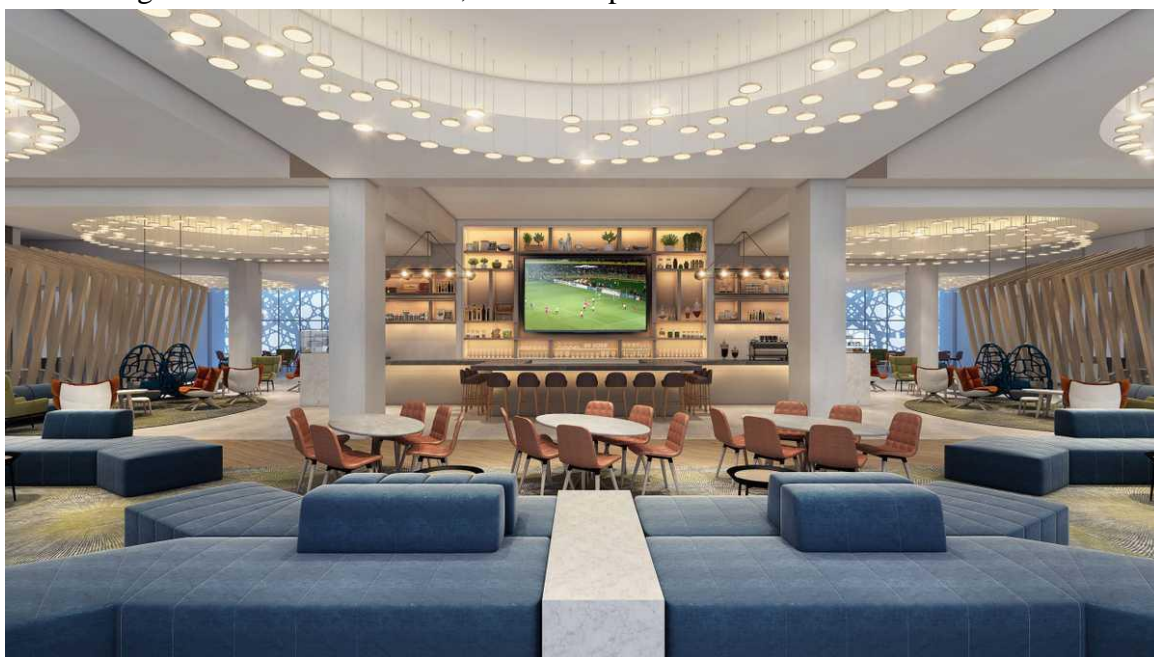


Figure 14 Lounge Area

2. Food and Beverage Zones

- Seating and Walkways: Design ample seating in food courts, with each table area occupying 1.5m x 1.5m. Walkways should be at least 2m wide to prevent bottlenecks.
- Carnival-Style Stalls: Small stalls (minimum 2m x 2.5m each) offer a variety of food options while maintaining the event's festive atmosphere.



Figure 15 Food and Beverage Zone

3. Audience Interaction Zones

- To keep spectators engaged during breaks, interactive zones can offer unique experiences:
- Photo and Experience Booths
- Interactive Spaces: Install photo booths with game-themed backdrops or AR/VR experiences tied to the esports event.



Figure 16 Fan Zone

- Dimensions: Each booth should occupy 4m x 4m, with queue areas separated by stanchions to manage traffic.
- Community and Meet-and-Greet Zones
- Purpose: Host Q&A sessions, meet-and-greets with players, and fan interaction events in dedicated areas.
- Dimensions: Allocate 20m²–30m² per zone, depending on the expected crowd size.

Spatial Allocation Summary

Table 2 Allocation Summary

Space	Function	Dimensions	Features
Tiered Seating	Spectator seating with clear views	0.9m x 0.5m per seat; VIP: 1.2m x 0.9m	High-refresh displays, legroom, charging ports
Accessible Zones	Inclusive seating	0.9m x 1.2m per wheelchair + companion seat	Ground-level access or elevators
Lounges	Relaxation	1.5m² per person	Casual seating, gaming stations, Wi-Fi
Food Courts	Dining areas	1.5m x 1.5m per table; 2m walkways	Carnival-style food stalls
Merchandise Shops	Event merchandise sales	10m²–50m²	Display counters, cashless payment systems
Interactive Zones	AR/VR and fan activities	4m x 4m per booth	Game-themed setups, queue management
Community Zones	Player and fan interaction	20m²–30m²	Meet-and-greets, Q&A sessions

2.8 Technological Infrastructure: Spatial Design for Esports Facilities

Designing robust spaces to support technological infrastructure in esports arenas is essential for smooth operations, uninterrupted gameplay, and reliable event execution. While technical equipment plays a critical role, the spatial organization and allocation of dedicated areas significantly enhance functionality and accessibility.

Server Rooms

Server rooms are critical for hosting game servers, managing data traffic, and controlling event operation

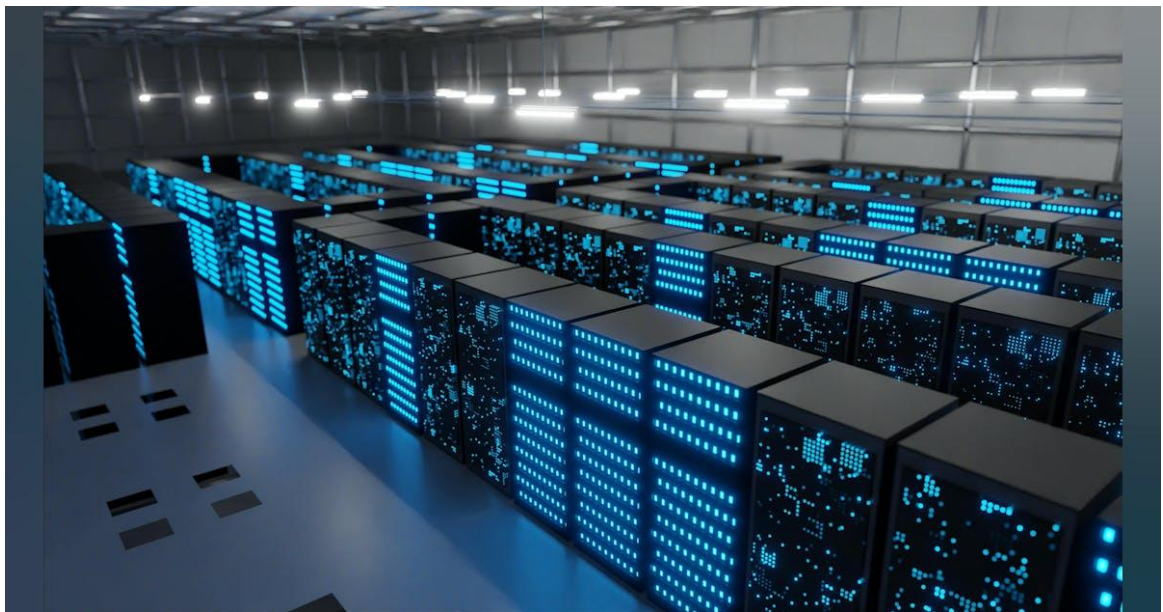


Figure 17 Server Room

Standard Server Room Size:

- For medium-sized facilities: 15m²–20m²
- For large-scale arenas: 30m²–50m², depending on equipment needs.

Spatial Layout Considerations

- Equipment Racks:
- Allocate 1m x 1m per rack, with 1.2m clearance in front and behind for maintenance.
- Racks should have an adjustable configuration to accommodate future expansions.

Access and Maintenance Zones:

- Maintain a clear pathway of 1.5m width around all key equipment for easy access and emergency handling.
- Climate Control and Ventilation:
- Install separate HVAC systems to regulate temperature and humidity, with vent placement ensuring airflow throughout the room.

Backup Power Systems

Backup power systems, including UPS and generators, require dedicated rooms or enclosures to ensure stable operations.

Space Dimensions

- For standard arenas: 10m²–15m², accommodating battery banks and control panels.
- For larger arenas with higher energy demands: 20m²–30m².

Design Features

- Provide a separate entryway of 1.2m width for bringing in or servicing equipment.
- Ensure proper exhaust systems for diesel generators and heat dissipation from UPS units.
- Use fire-rated walls and ceilings, with a dedicated fire suppression system.

Networking Rooms

Networking rooms house routing, switching, and patching equipment to maintain connectivity across gaming stations, broadcasting areas, and spectator zones.



Figure 18 Networking Room

Space Dimensions

- Small arenas: 10m²–12m² for basic networking needs.
- Larger arenas: 20m²–25m², depending on the number of network connections and redundancy requirements.

Spatial Layout Considerations

- Allocate 1m² per cabinet, with 1.2m clearance in front and behind.
- Incorporate overhead cable trays or raised flooring systems for organized wiring and easy maintenance.
- Implement efficient cooling solutions like in-row cooling units to maintain optimal operating temperatures.

Control Rooms

Control rooms serve as the nerve center for managing gameplay, broadcasts, and arena operations.



Figure 19 Control Room

Space Dimensions

- Small-scale operations: 20m²–30m².
- Large arenas with multiple screens and systems: 40m²–50m².

Key Features

- Allocate 1.2m x 0.8m per workstation, ensuring space for monitors, consoles, and peripheral devices.
- Install large windows or displays to provide operators a clear view of the arena.
- Ensure ergonomic seating and at least 1.5m clearance between rows for mobility.

Spaces for Maintenance and Storage

Dedicated spaces for repairing and servicing equipment ensure minimal disruptions during events.

Room Size:

- Small arenas: 10m²–12m².
- Large facilities: 15m²–20m² for more complex equipment setups.

Key Features

- Workbenches, tool storage, and power outlets for maintenance tasks.
- Storage for backup peripherals, cables, and other essential items is necessary for seamless operations.

2.9 Administrative and Media Areas

Back-of-house operations are integral to the seamless management and success of an esports facility. These spaces provide environments for administrative tasks, team coordination, and media production.

Offices for Coaches and Staff

To provide private and well-equipped spaces for strategizing, analyzing gameplay, and managing team logistics.

Space Dimensions

- Small Arenas: 10m²–15m² per office, accommodating up to 2–3 people.
- Large Arenas: 20m²–30m² per office, with dedicated areas for team discussions or reviewing game footage.

Design Features

- Include desks with ergonomic chairs, monitors for game analysis, and ample outlets for electronic devices.
- Space for small team huddles or one-on-one discussions, allocating 3m²–5m² within each office.
- Lockable cabinets or shelves for storing confidential documents, gear, and equipment.

Media Production Areas

To support live broadcasting, content creation, and social media management during events.

Space Dimensions

- Dedicated Production Room: 20m²–40m², depending on the size of the arena and the scale of events.
- Editing Suites: 15m²–25m² per suite, equipped for post-production work.

Design Features

- Tables for broadcasting equipment, with dual monitors, microphones, and lighting rigs.
- Spaced at 2m per workstation, ensuring comfort for operators.
- Acoustic panels and insulated walls to maintain clear audio quality during recordings.
- 5m²–8m² secure areas for storing cameras, tripods, and other media equipment.

Press and Interview Rooms

To facilitate post-match interviews, press briefings, and other media interactions.

Space Dimensions

- Small Arenas: 15m^2 – 25m^2 , sufficient for a few reporters and interview setups.
- Large Arenas: 30m^2 – 50m^2 , with space for cameras, lighting equipment, and a podium.



Figure 20 Media and Interview Room

Design Features

- Tiered seating or flexible chairs for journalists, allocating 1.5m^2 per person.
- Branded backdrops for interviews, covering an area of 3m^2 – 5m^2 .
- Adjustable lighting to highlight speakers and eliminate shadows.

Integration and Accessibility

Placement

Offices: Near team locker rooms or player lounges for efficient communication.

Media Production Areas: Close to the broadcasting booth and server rooms for optimal connectivity.

Press Rooms: Adjacent to the main arena for quick access after matches.

Wayfinding and Flow

Use clear signage and allocate 1.5m–2m wide corridors for smooth movement between administrative and media areas.

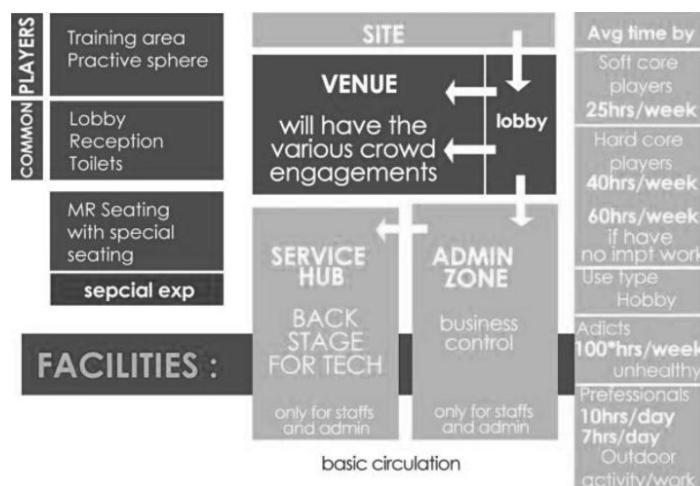


Figure 21 Circulation

2.10 Facilities and Infrastructure in an Esports Bootcamp

Esports bootcamps are purpose-built environments designed to enhance player performance, foster team cohesion, and provide a balanced lifestyle. These bootcamps integrate functional spaces for training, relaxation, and living, ensuring players have everything they need under one roof.

Gaming Stations

Gaming stations are the heart of the bootcamp, providing players with a high-performance setup to refine their skills.

- PC Gaming Zone:** Equipped with powerful PCs, high-refresh-rate monitors, and peripherals tailored for professional use. Each station is ergonomically designed with adjustable chairs and desks to ensure player comfort during long sessions.

Stations are spaced to minimize distractions and provide privacy while maintaining team connectivity.

- **Console Gaming Zone:** This area is designed with shared seating arrangements and tailored setups for console-based gaming. Comfortable couches or chairs ensure players can practice for extended periods without physical discomfort.
- **Mobile Gaming Zone:** Dedicated zones for mobile gamers include padded seating or ergonomic desks with secure mounts for devices, allowing players to focus entirely on their games without discomfort.

Team Strategy Room

The strategy room is a collaborative space where teams can review matches, analyze opponents, and develop gameplay strategies.

- **Features:** Equipped with large screens for video reviews, whiteboards or digital boards for planning, and comfortable seating to accommodate the entire team and coaching staff.
- **Atmosphere:** A quiet and focused environment that promotes productive discussions and strategizing.

Broadcast and Streaming Room

This space supports the creation of content, such as live streams or promotional videos, which are vital for engaging fans and sponsors.

- **Design:** Soundproofed walls ensure professional audio quality, while customizable lighting enhances the visuals for live broadcasts. Multi-camera setups capture various angles, and advanced streaming software enables seamless live content production.

2.10.1 Player Accommodation

Private Player Rooms

Players need private spaces to rest and recharge after intense practice sessions.

- **Design:** Rooms feature comfortable beds, personal storage spaces, and work desks to offer a blend of relaxation and functionality. The interiors are minimalist yet cozy, reducing distractions and promoting focus on their performance.
- **Privacy:** Each room is designed to provide players with a sense of solitude, ensuring they can decompress in a quiet environment.

Shared Living Spaces

Shared spaces foster camaraderie among players and encourage team bonding.

- **Lounge Area:** Features comfortable seating, large TVs, and gaming consoles, creating a relaxed environment for unwinding.
- **Dining Room:** Communal tables encourage players to share meals, strengthening team connections. Equipped with modern dining amenities, the space is as functional as it is inviting.

Recreational Spaces

Mental and physical wellness are crucial for esports athletes, and recreational spaces are designed to support both.

- **Fitness Room:** Equipped with treadmills, resistance machines, free weights, and yoga mats to help players maintain their physical fitness.
 - **Relaxation Zone:** Includes features like bean bags, VR headsets, and calming lighting to promote mental well-being and reduce stress.
- Support and Auxiliary Spaces**

Coach and Analyst Offices

These offices are essential for strategizing and managing player performance.

- **Design:** Quiet, focused spaces with desks, screens for analyzing gameplay, and meeting areas for one-on-one or team discussions. These spaces act as operational hubs for team management.



Figure 22 Coach and Analyst Room

Kitchen and Pantry

Nutrition is a cornerstone of player health and performance. The kitchen and pantry areas provide healthy meal options and snacks.

- **Features:** Fully equipped with modern appliances, meal prep areas, and storage for dietary-specific items to cater to individual player needs.

CHAPTER 3: INTERNATIONAL CASE STUDY

3.1 ARKNEMESIS GAMING



Figure 23 Arknemesis Gaming

LOCATION: NUNGAMBAKAM, CHENNAI

TYOLOGY: GAMING HUB

AREA: 6500 SQ. FT

3.1.1 DESIGN APPROACH

It is one of the famous gaming hubs in Chennai, with being the host of many game competitions. it is in the Isphani centre mall in Nungambakkam. The facility houses many screens connected to extreme gaming desktops, playstations, Xbox, even 72inch screens and projectors are used for gaming. other major facilities provided are cafeteria, lounge, pool table rooms, and toilet facilities.it is one of the major attractions to the people around and below the age of 25. surprisingly people around age 40 are also members of Arknemesis club.

All the spaces are air conditioned with central air conditioning system. another major aspect of the space is the false ceiling and lighting. which create a dark and at the same time energetic ambience which helps in the players to focus more on the games and for others people to concentrate more on the tasks they are doing. the lighting results in creating a focus on the aspects more than the surrounding spaces.

Open hours are from 12pm to 11pm every day, as the time of most customers. pool table room is only available for members of the club while all other gaming facilities could be used by any customers on hourly basis. Other than gaming screen other tv are used displaying game trailers, reviews and other gaming related advertisements, which are exactly not a disturbance for the people who visits. in case of 2 player tournaments, cafeteria seating is altered to setup a projector screen and number of seating accordingly. Pc systems network could be used for WLAN multiplayer gaming or online gaming or even for single player campaign mode.

3.1.2 STRENGTH

Located in a high people traffic zone as between housing, educational and Employment centralized air conditioning helps in reduced cost for air conditioning. Spatial division Using platform level differences, ambient lighting, cafeteria with ample amount of seating for dining and waiting. False ceiling designing merges the activity into the whole spaces.

3.1.3 WEAKNESS

No natural lighting and ventilation spaces allocated close resulting in rare pedestrian traffic difficulty. Polished flooring in cafeteria, in case of wet floors dangerous. Toilet facility not ample, path to toilet spaces also come in contact with staff only areas.

3.1.4 SPACES

Table 3 Spaces And Area of Arknemesi Gaming

SPACES	AREA(Sq.m)
Reception	5.5
Server + BMS	17.5
Lobby	7.5
Indoor Games	225
Cafeteria	70
Dinning	26.5
Kitchen + store	20
Toilets	15.6
Electrical	8.6

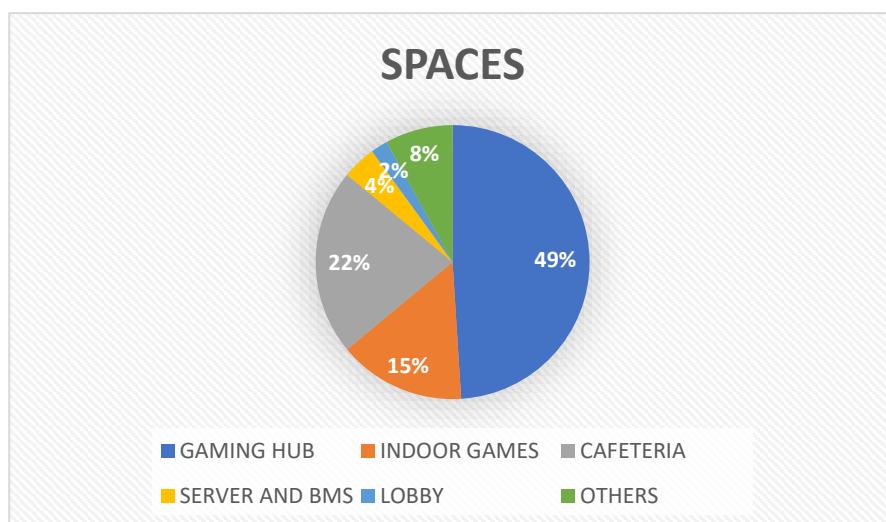


Figure 24 Pie chart of spaces

3.1.5 PLAN

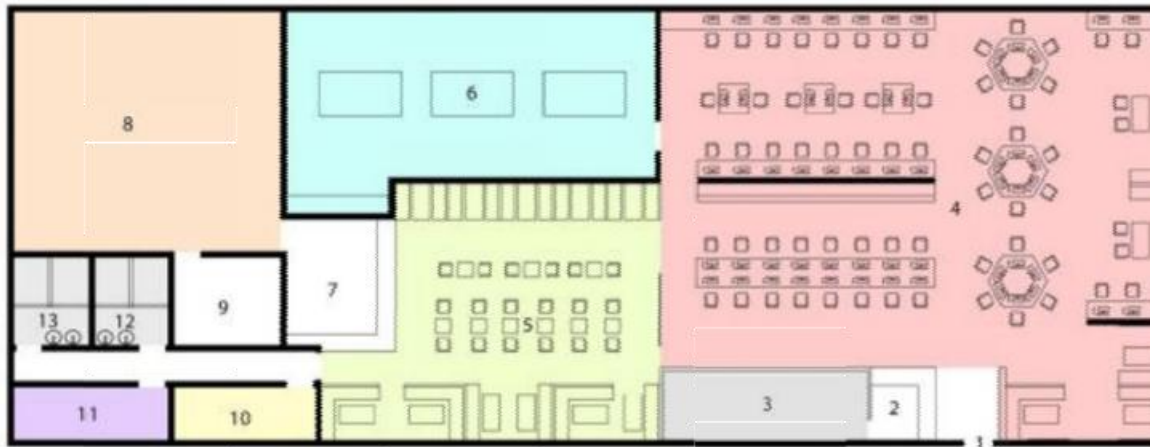


Figure 25 Planning of spaces

- | | |
|--------------------------|------------------------|
| 1.Entry, Exit | 8.Kitchen |
| 2.Reception | 9.Kitchen storage |
| 3.Staff, network control | 10.Staff's locker room |
| 4.Gaming area | 11.Server room |
| 5.Cafeteria seating | 12.Gent's toilet |
| 6.Pool table room | 13.Ladie's toilet |
| 7.Serving counter | |

3.1.6 INFERENCE

Located in highly dense traffic and business zone inside shopping mall. As it is located inside a shopping mall, pedestrian traffic matters one should step down to the basement floor to reach the gaming hub. No landscaping, Zoning done based on the mindset of customers majorly focusing them to the gaming area while providing cafeteria close to it but still not disturbing each other. No natural lighting completely artificial lighting. No natural ventilation provided internal atmosphere is controlled by AHU to maintain the comfort range. Well provided ambience for the gaming hub provided by false ceiling design and ambient lighting.

3.2 FUSION ARENA

LOCATION: Philadelphia, Pennsylvania

TPOLOGY: Arena

AREA: 10,000 sq.ft



Figure 26 Fusion Arena

3.2.1 DESIGN APPROACH

Fusion Arena, located in Philadelphia, stands as one of the world's first purpose-built esports venues, developed specifically for the Overwatch League's Philadelphia Fusion team. With an estimated construction cost of \$50 million and encompassing over 60,000 square feet, this facility exemplifies the future of architectural innovation in the esports domain (Popper, 2019).

Design and Architectural Language

The arena's design merges modern industrial aesthetics with high-tech elements. The structure features extensive LED displays, programmable lighting systems, and flexible stage components. These design strategies provide both immersive environments for fans and modular adaptability for different event types. The building reflects Philadelphia's dual character: its historical roots and its emergence as a technology-driven city.

Player-Centric Features

Fusion Arena emphasizes athlete wellness and performance. Training spaces are equipped with advanced gaming setups, acoustic insulation, and ergonomic furnishings. Warm-up zones, private coaching rooms, and wellness facilities ensure that players have everything they need—from mental preparation to post-match recovery.

Spectator Experience

With a seating capacity of 3,500, the arena utilizes tiered seating, wide sightlines, and immersive audio-visual systems. Massive HD display walls, ambient lighting, and responsive LED graphics enhance the spectator experience. The layout is adaptable to host concerts, fan meetups, and other community events.

Technology and Infrastructure

A robust fiber-optic network infrastructure underpins the entire facility. It supports 4K streaming, real-time analytics, and multiple broadcast control rooms. The integration of media production suites and streaming facilities allows for seamless live coverage, content creation, and post-production.

Sustainability and Innovation

The arena incorporates sustainable building practices, such as energy-efficient lighting, smart HVAC systems, and eco-friendly construction materials. Its design also encourages community use beyond tournaments, enhancing year-round utility and engagement.

3.2.2 INFERENCE

It was vital to design Fusion Arena's sightlines, seating bowl, size and scale of screens and stage in a purposeful manner to create a new, immersive experience that meets the demands of fans already accustomed to consuming high-end digital content. Fusion Arena must be flexible enough to grow with the sport, its many gaming genres as well as technological enhancements over the next decade. Knowing the venue needed to focus on digital entertainment, Fusion Arena's event theater hosts two shows simultaneously by having players front and center while also providing intimate views to the action on screen.



Figure 27 Seating Area

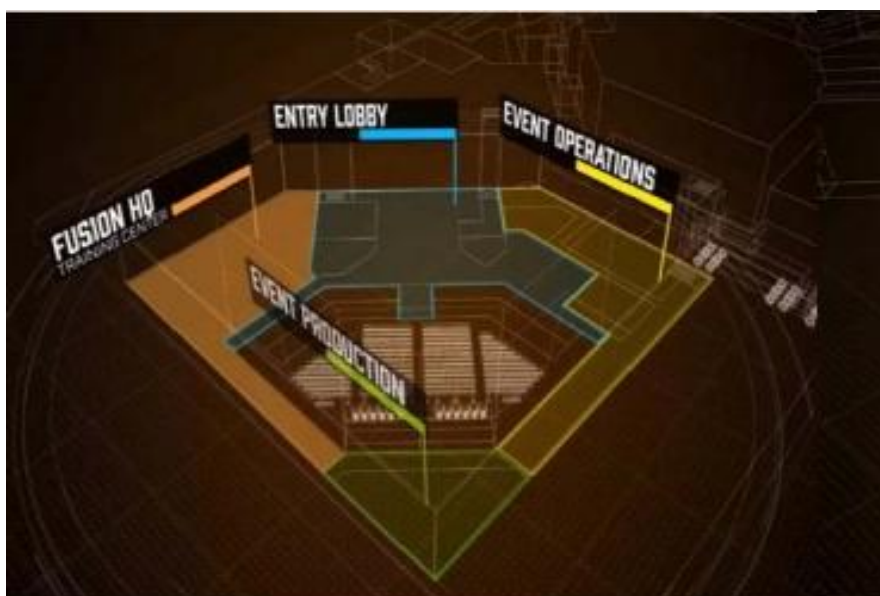


Figure 28 Spaces and Circulation

3.3 HYPERX ARENA

LOCATION: Las Vegas, USA

TYOLOGY: Arena

AREA: 30,000 sq. ft

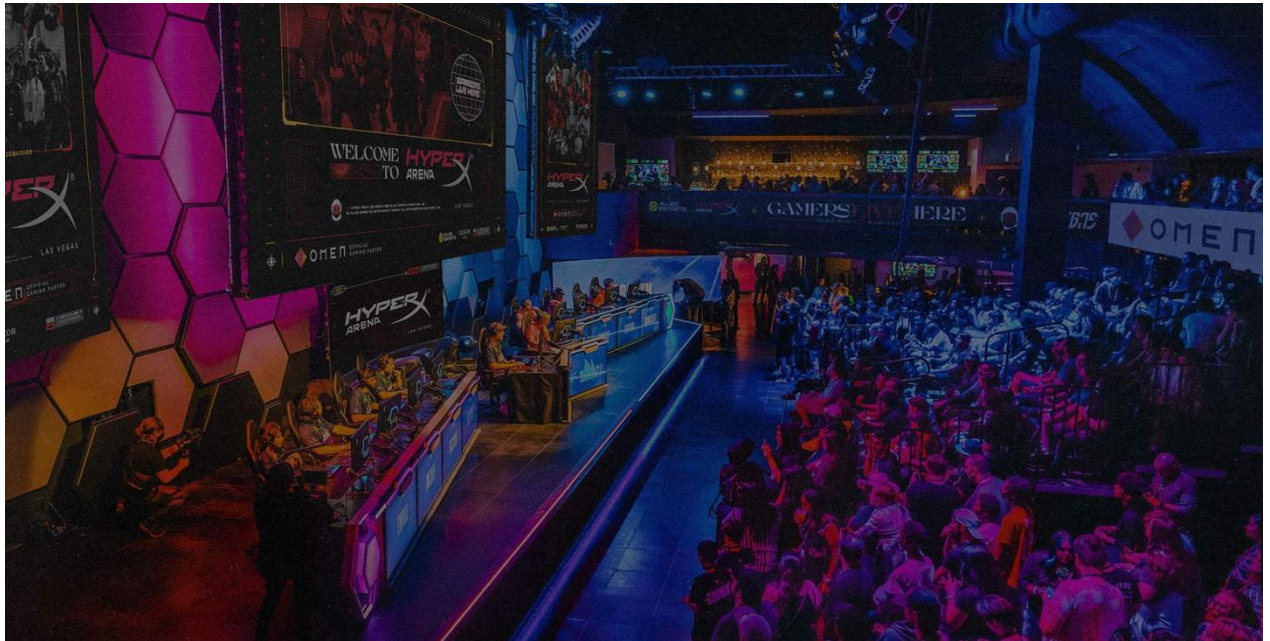


Figure 29 Hyper X Arena

3.3.1 DESIGN APPROACH

Dubbed one of the World's Most Innovative Companies by Fast Company, HyperX Arena Las Vegas has been built to elevate and excite gamers, creators, competition, and content with live events and production services unmatched in a dedicated gaming facility. HyperX Arena boasts unparalleled, customizable, and state-of-the-art capabilities on the iconic Las Vegas Strip. Our dedicated events team is ready to assist you in finding the perfect space and configuration, whether it's for small, intimate gatherings with as few as 10 people or larger, full-scale productions accommodating up to 1,000 attendees. The autonomy of our arena provides exceptional flexibility, coupled with our undivided attention, ensuring the realization of the guest experience you desire, regardless of the size and scale of your event.

3.3.2 FACILITIES DETAILS

- 30,000 square-foot, two-level arena
- 3 VIP Rooms + BOSS LEVEL Suite
- 4 Open Lounge Areas

- Lobby Gaming Area
- Immersive Dome Room
- 1,400 square-foot stage
- Telescopic Stadium Seating (70)

Full-Service Catering

- 2 Full-Service Bars
- Buyout Capacity 1,000
- Broadcast Center & Studio
- 50-foot LED Video Wall
- 160 Gaming PCs



Figure 30 Players Pods

3.3.4 FLOORS PLAN

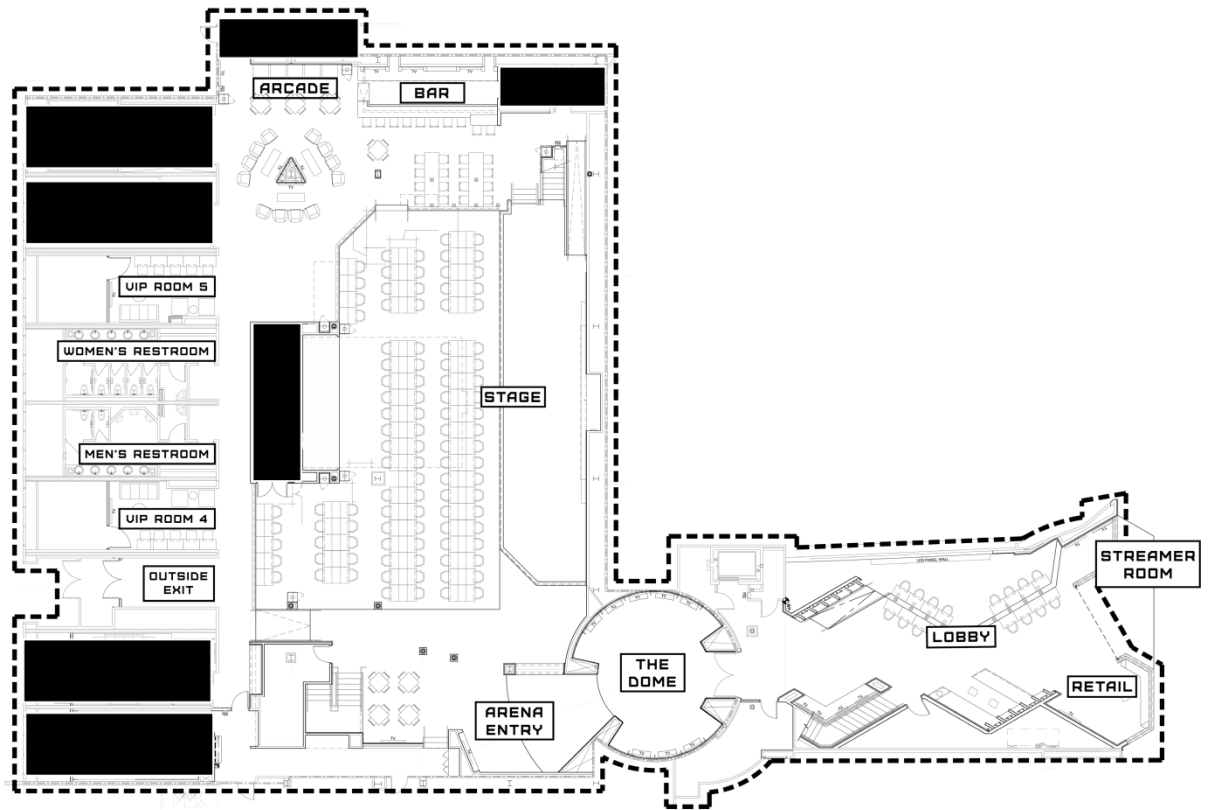


Figure 31 Ground Floor Plan

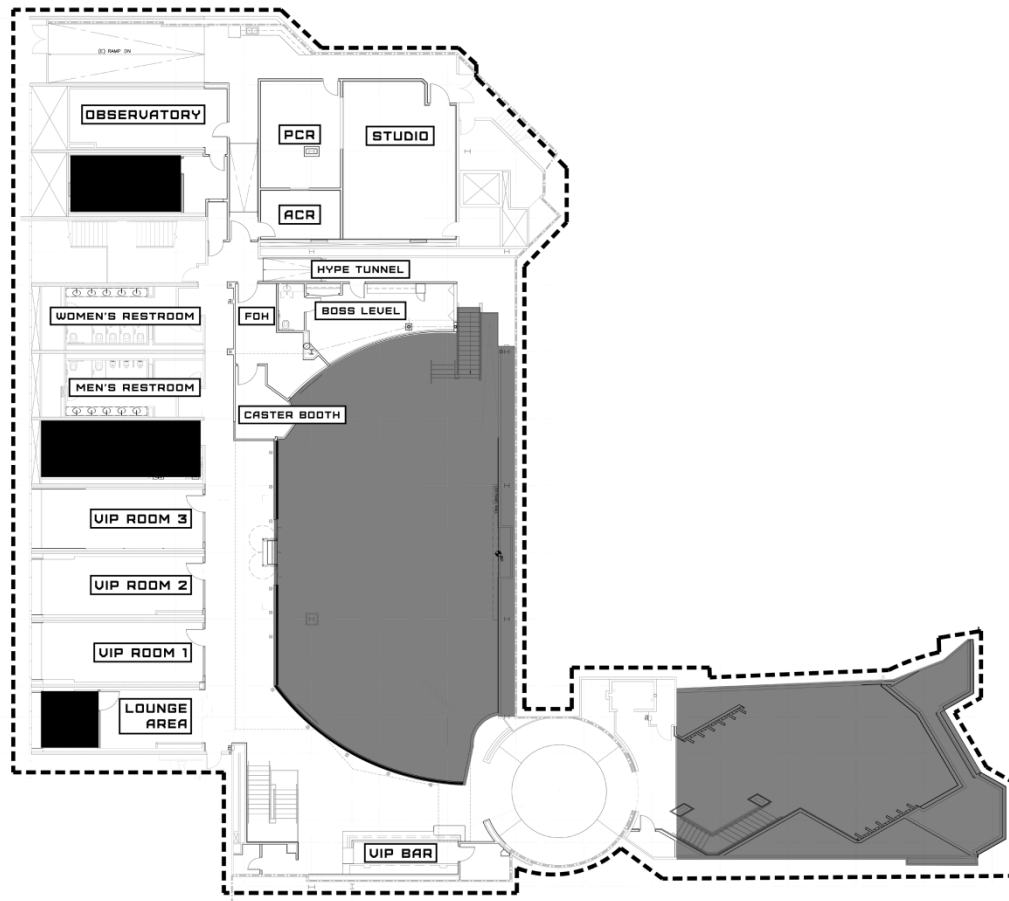


Figure 32 First floor Plan

3.3.5 INFERENCE

HyperX Arena serves as a state-of-the-art esports venue, highlighting the rapid growth and mainstream acceptance of competitive gaming. Its advanced gaming setups, live streaming capabilities, and multifunctional design make it a hub for both professional tournaments and community engagement. The arena contributes to the local economy by attracting tourism and business opportunities while setting a benchmark for future esports venues. Its success reflects the increasing influence of gaming culture and technological advancements in entertainment, solidifying esports as a major industry with global impact.

CHAPTER 4: National Case Study

4.1 E-Sports National Championship -2025



Figure 33 E-sport National Championship - 2025

Venue: Dasharath Rangasala-covered hall

Sponsor: Samsung Galaxy S24 Ultra, RED Bull Energy Drink and Honda

Date: Feb 20 – Feb 22

Organized by: Esports association Nepal

Number of Games: Five

- DOTA 2
- Valorant
- PUBG Mobile
- Mobile Legends
- E-Football.

Substantial Prize Pool: With a total prize pool of NPR 2.5 million, the event offered significant rewards, with PUBG Mobile competitions alone accounting for NPR 1 million.

Live Audience and Entertainment: The tournament was conducted in front of a live audience, complemented by musical performances from renowned Nepali artists, enhancing the overall experience.

Title Sponsorship: Red Bull Nepal served as the title sponsor, Samsung S24 Ultra and Honda

Tournament Structure:

Qualifiers: The championship began with 538 teams in the first round of qualifiers, narrowing down through subsequent rounds to the top teams.

Grand Finals: The finals featured 16 teams competing over 12 matches to determine the champions.

The Esports National Championship 2025 marked a significant milestone in promoting and recognizing esports within Nepal, providing a platform for gamers to showcase their skills and fostering community engagement.

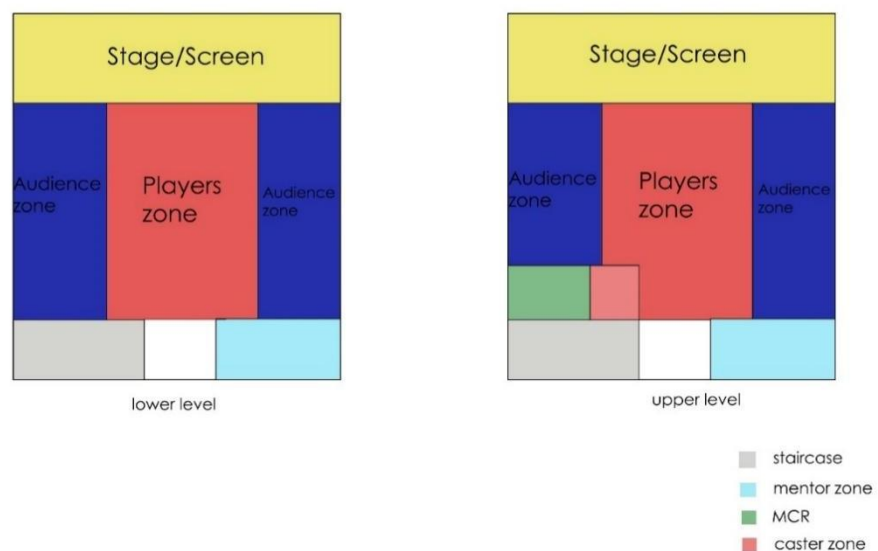


Figure 34 Event layout

4.2 ARABPATI ESPORT

Arabpati Esports is a prominent organization dedicated to uplifting the gaming community in Nepal. Established in 2019 by three individuals passionate about gaming, Arabpati Esports has significantly contributed to the growth and professionalization of esports in the region.



Leadership Team:

- Kaushal Acharya (Arabpati): Chief Executive Officer (CEO)
- Samiya Joshi (Zena): Chief Operating Officer (COO)
- Govinda Shrestha (EagleEyeOP): Chief Innovation Officer (CIO)
- Shirish Dhakal (Shirish): General Manager
- Sujan Shrestha (Naruto): General Manager
- Ronish Shrestha (Ronish): Developer
- Rejin Lama (Astroezin): Producer Assistant

Core Services:

- **Gaming Event Hosting:** Recognizing the cultural shift towards large-scale gaming events, Arabpati Esports organizes live tournaments and LAN events to engage audiences and foster competitive spirit among players.
- **Event Broadcasting and Production:** With a professional management team and a dedicated studio, the organization handles production and broadcasting, delivering content with special effects across platforms like YouTube, Facebook, and Twitch.
- **Event Management:** Utilizing proprietary software, Arabpati Esports efficiently manages various gaming tournaments, ensuring professionalism and smooth operations.

4.2.1 PRODUCTION AND BROADCASTING CHART

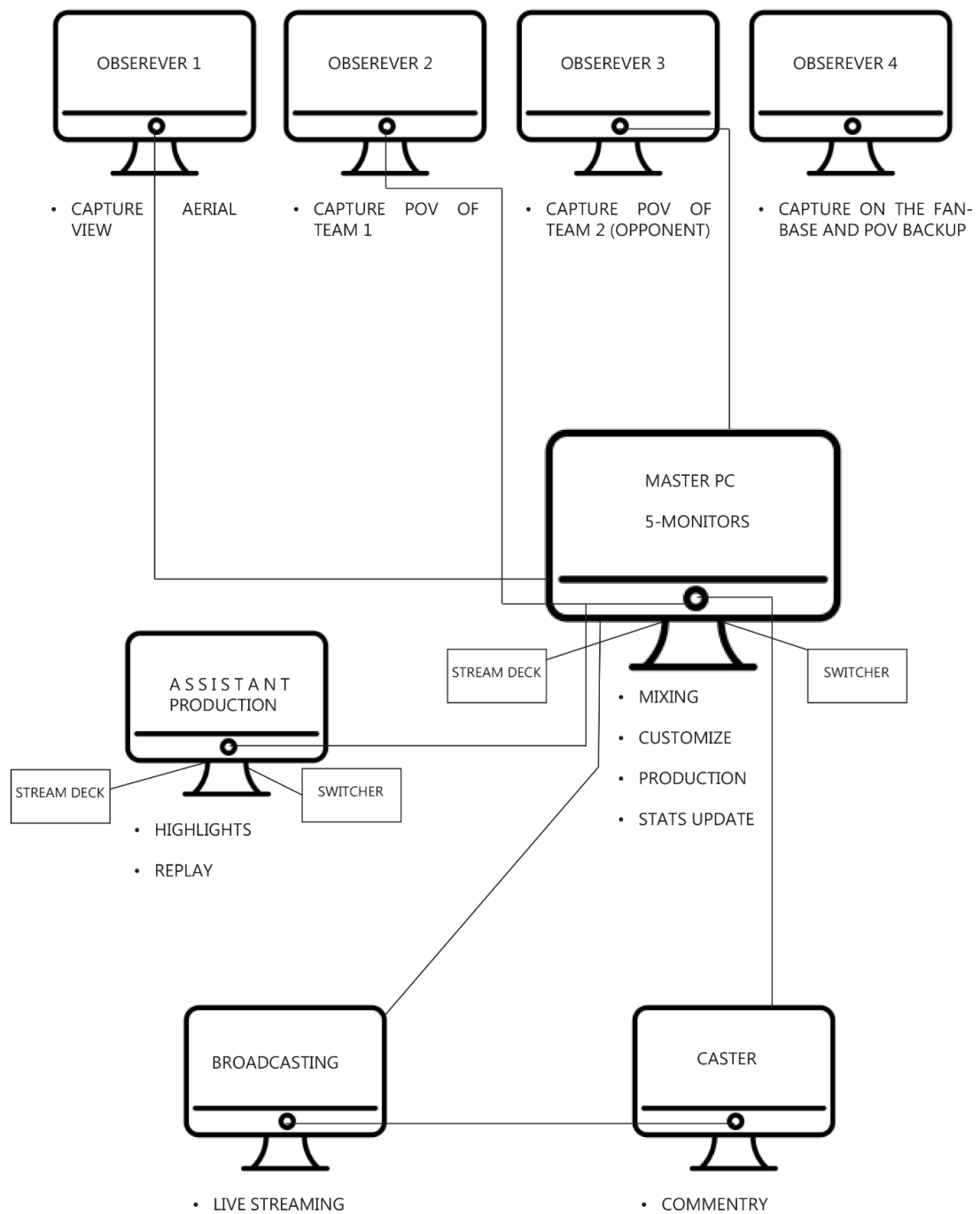


Figure 35 Production and Broadcasting System

- **Talent Management:** Committed to discovering and nurturing talent, the organization provides platforms for players and individuals skilled in other areas to showcase their abilities.
- **Content Creation:** Arabpati Esports collaborates with content creators to enhance reach and engagement, producing original content and supporting others in content development.
- **Brand and Sponsorship Integration:** The organization emphasizes promoting associated brands, striving to maximize audience reach through various means.
- **Website and Software Development:** With in-house expertise, Arabpati Esports develops websites and software, including tools integrated into daily operations for content creation and tournament management.

CHAPTER :5 SITE ANALYSIS

5.1 Site Information



Figure 36 Location Map

Location: Peepalnagar Tole, Duwakot-09, Changu Narayana Municipality

Area: 34575.62 m² (69-15-1-2.7)

Topography: Flat Land

Present Use: Agricultural Land

Zone: Developing Residential

Topography: Flat Land

Present Use: Agricultural Land

Zone: Developing Residential

5.2 Accessibility and Access

The proposed site for the Esports Centre is located in a well-connected area in Bhaktapur. It has good accessibility from multiple key locations in the city, making it convenient for users of all ages and backgrounds to reach the site. The site is accessible from several major bus stops:

- Radhe Radhe Chowk Bus Stop – around 1.2 km away
- Dhungedhara Bus Stop – very close to the site, around 300 meters walking distance
- Sallaghari Bus Stop – about 900 meters away
- Radhe Radhe Bus Stand & Srijana Nagar Bus Stop – both within 1.5 km radius

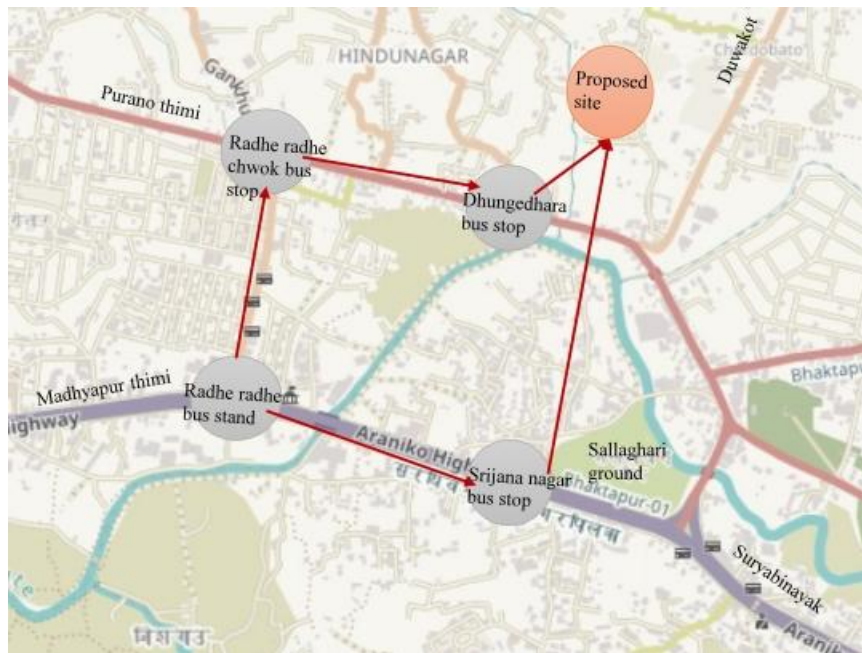


Figure 37 Road Network

5.3 Topography

- Plain land
- Current use -agriculture



Figure 38 Site Condition

5.4 Infrastructures

- City offers basic amenities such as electricity, water supply, and internet connectivity; however, upgrades may be necessary to support the high-performance needs of an Esports Centre.
- Transportation services are easily accessible with availability of both public and private vehicles, along with pedestrian walkways and cycle lanes ensuring smooth user access.
- Commercial centres are within walking distance, which can be beneficial for meeting supply demands of the project and providing additional amenities to users.

5.5 Climatic Analysis

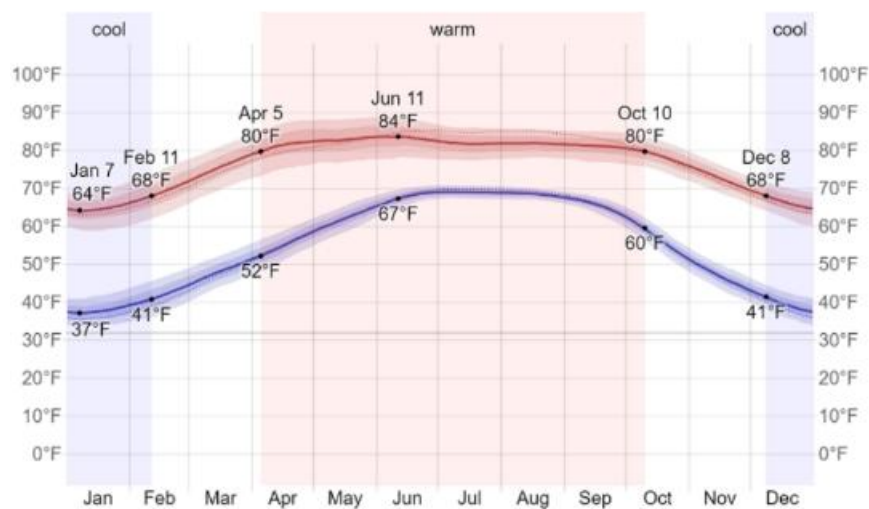


Figure 39 Temperature Chart

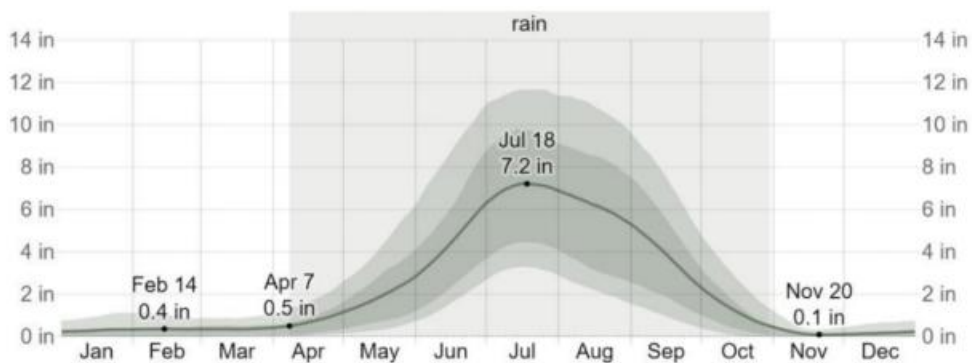


Figure 40 Rainfall Chart

(Source: *climate-data.org*)

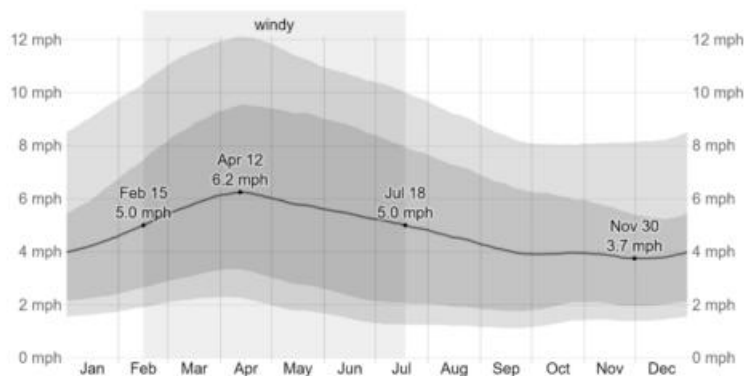


Figure 41 Wind flow Chart



Figure 42 Precipitation

(Source: climate-data.org)

Climate Type: Characterized by warm summers, cool winters, and distinct wet and dry seasons.

Temperature Range:

- Coolest: ~2.8°C (37°F) in early January
- Warmest: ~29°C (84°F) around mid-June
- Comfortable Range: Mid-February to early May and October to early December

Rainfall:

- Dry Season: November to mid-May (lowest: ~0.1 in in November)
- Wet Season: Mid-May to September
- Peak: ~183 mm (7.2 in) around July 18

Humidity:

- Dry Conditions: Below 10% in Jan–Feb
- Muggy Season: Late May to early October
- Peak: 97% on August 1
- Comfortable Range: November to April

5.6 Building-by-laws

- Ground Coverage : 40% for more than 1-0-0-0
- Setback: 3m
- Building Height: 5 Stoery (16m)
- ROW: 6m
- FAR: 3.5
- Floor height: 2.7m min

5.7 SWOT Analysis

Strength

- Flat land
- Surrounded by roads

Weakness

- Minor Roads
- No major facilities (Shopping, cafeterias etc)

Opportunity

- Developing community
- Landmarks and attraction

CHAPTER 6: PROGRAM FORMULATION

6.1 Main Arena

Table 4 Program Formulation of Arena

Space	Dimension (Area)	Capacity	Numbers
Seating Space	40m x 35m (1400 m ²)	1750	1
Stage	23m x 13m (300 m ²)	64	1
Cafeteria	16m x 11m (171 m ²)	40	2
Gaming Station	34m x 19m (646 m ²)	70	1
Male Toilet	5m x 4.5m (22.5 m ²)	8	7
Female Toilet	5m x 4.5m (22.5 m ²)	7	7
Restaurant	16m x 13m (208 m ²)	60	2
Store	12m x 10m (120m ²)		5
Commentary Booth	5m x 2.7m (13.5 m ²)	3	1
Lighting Booth	5m x 2.7m (13.5 m ²)	3	1
Sound Booth	5m x 2.7m (13.5 m ²)	3	1
Video Production Room	6m x 5.5m (33 m ²)	5	1
Master Control Room	7m x 5.5m (38.5 m ²)	5	1
IT Room	7m x 5.5m (38.5 m ²)	4	1
Server Room	9.5m x 5.5m (52.25 m ²)	-	1
Coach Room	3.8m x 3.5m (13.3 m ²)	4	16
Green Room	12m x 6m (72 m ²)	20	2
Player's Lounge	19m x 6m (114m ²)	80	1
VIP Lounge	3m x 3 m(9m ²)	4	3
Media Lounge	3m x 3m (9m ²)	4	4
Event Organization Office	6m x 5m(30m ²)	5	1
Staff Room	5m x 4m (20m ²)	15	2

6.2 Market Plaza

Table 5 Program Formulation of Plaza

Space	Dimension (Area)	Capacity	Numbers
Shops-1	6m x 4m (24m ²)	-	14
Shops-2	9m x 7m (63m ²)	-	2
Restaurant -1	26m x 8m (208m ²)	60	1
Restaurant -2	18m x 9m (162m ²)	64	1
Toilet	7m x 6m (42m ²)	16	1

6.3 Administration

Table 6 Program Formulation of Administration Block

Space	Dimension (Area)	Capacity	Numbers
Reception and Waiting Area	7m x 7m (49m ²)	8-10	1
Office	6.5m x 5m (32m ²)	3-5	1
HR room	4.5m x 3m (13.5m ²)	6	1
Manager room	3m x 3m (9m ²)	1	1
Meeting Room	6.5m x 3m (19.5m ²)	10	1
Toilet	2m x 1.5m (3m ²)	1	2

6.4 Bootcamp (Accommodation) – 16 units

Table 7 Program Formulation of Bootcamp

Space	Dimension (Area)	Capacity	Numbers
Bedroom	5m x 5m (25m ²)	2	3
Training Room	5m x 3.5m (16.5m ²)	6	1
Living Room	5.5m x 8m (44m ²)	8	1
Kitchen and Dining	5.5m x 8m (44m ²)	8	1

6.5 Supportive Spaces

Table 8 Program Formulation of Supportive Spaces

Space	Dimension (Area)	Capacity	Numbers
Gym and Fitness	27.5m x 11.5m (316m ²)	50	1
Canteen	18m x 10m (180m ²)	50	1
Conference Hall	29m x 15m (435m ²)	400	1

CHAPTER 7: DESIGN DEVELOPMENT

7.1 Concept

-Node and Network: A Performance-Centered Spatial Web

This means the arena is the main focus, and all other spaces (like player rooms, wellness, gaming, and shops) are arranged around it, forming a connected and efficient layout.

- **Node (Arena as Anchor):**

- The eSports arena is the spatial and functional epicenter the “performance node.”
- Every major function radiates out from or is anchored to it, positioning the arena as both destination and orientation point.

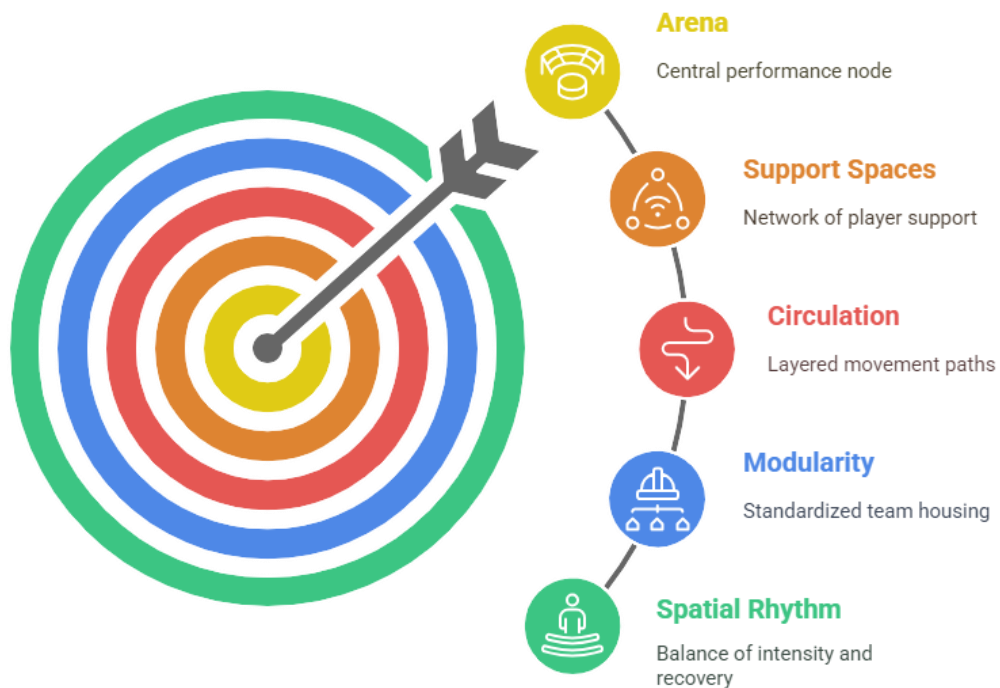


Figure 43 Conceptual diagram

- **Network (Support Zones as Threads):**
 - The surrounding components (gaming zones, accommodations, wellness, merchandise, etc.) form a network of interdependent spaces.
 - Each programmatic element supports the player's journey from arrival, warm-up, gameplay, rest, recovery, to media exposure.
- **Circulatory Logic (Layered Movement):**
 - The layout separates players, staff, audience, and VIPs a concept rooted in processional sequencing and controlled access.
 - This aligns with architecture's use of choreographed circulation for performance venues.
- **Modularity + Repetition (Accommodation Design):**
 - Player housing is repeated in a modular cluster, reflecting eSports' standardized team-based structure.
 - Architecturally, this becomes a tectonic expression of team identity and parity.
- **Spatial Rhythm and Recovery:**
 - Interspersed **green courtyards** and **water bodies** create **pauses** in the network a rhythm that mimics the intensity and cooldown cycle of professional gaming.

7.2 Zoning and Functional Distribution

The site is carefully zoned into **public, semi-public, and private areas** to ensure smooth circulation and proper hierarchy of spaces.

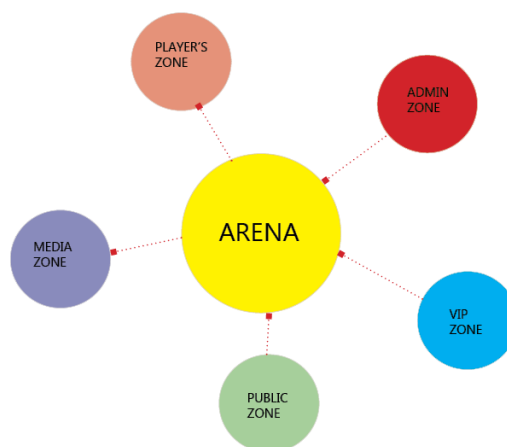


Figure 44 Bubble Diagram Concept

- **Public Zone:** Located at the entrance, this includes ticket counters, lobbies, market spaces, and recreational areas to welcome visitors.
- **Semi-Public Zone:** The arena forms the central focus of the design, providing seating arrangements, stage visibility, and acoustics suitable for large-scale events. Supporting this zone are facilities like conference halls, restaurants, kiosks, and media lounges.
- **Private Zone:** Bootcamps, training areas, player lounges, analyst rooms, and administration offices are located in quieter areas of the site with restricted access, ensuring privacy for professionals and smooth backstage operations.

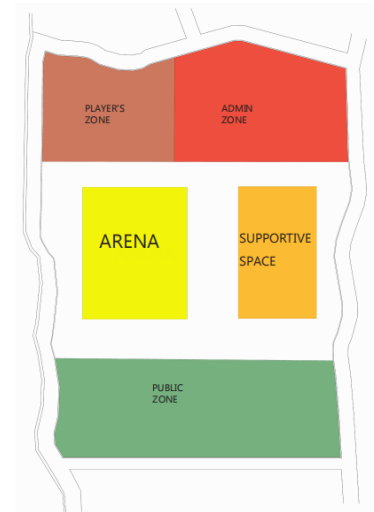


Figure 45 Zoning

7.3 Circulation Planning

Circulation is designed to separate the movement of **visitors, players, staff, and VIPs**, ensuring efficiency and security.



Figure 46 Circulation

Visitors: Enter through the main lobby and are directed towards the arena, recreational areas, and retail spaces.

Players: Have a direct and secure pathway to bootcamps, lounges, and the stage area.

Staff/Officials: Access administration, media production rooms, and technical departments via separate routes.

VIPs: Provided with exclusive entrances, lounges, and dedicated parking for convenience and privacy.

7.4 Form Development

The design process began with the **zoning layout**, where the major functions such as the arena, player's zone, administrative zone, and public areas were organized according to their importance and interrelationships. This initial step helped establish the overall structure of the site and guided the form generation.

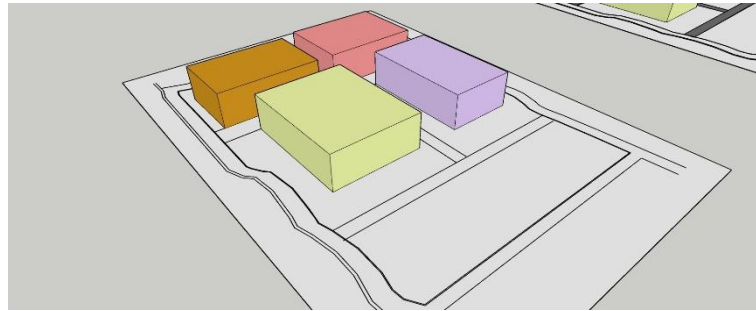


Figure 47 Form Development (Phase I)

In the **first phase**, building masses were developed directly from the zoning plan, translating the functional distribution into three-dimensional forms. This provided a clear understanding of the placement and scale of each functional block.

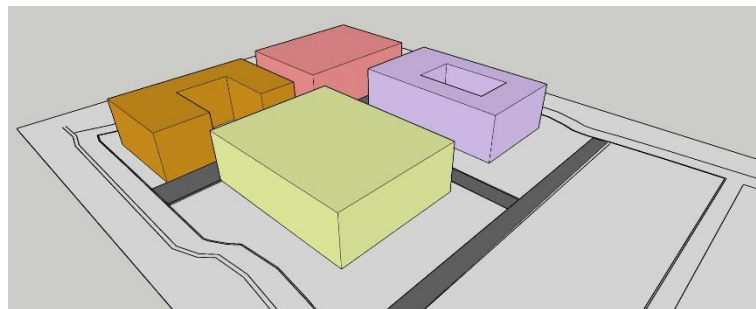


Figure 48 Form Development (Phase II)

In the **second phase**, voids and open spaces were introduced to allow for recreational areas and smooth circulation. These interventions not only improved accessibility but also created opportunities for interaction and relaxation within the site.

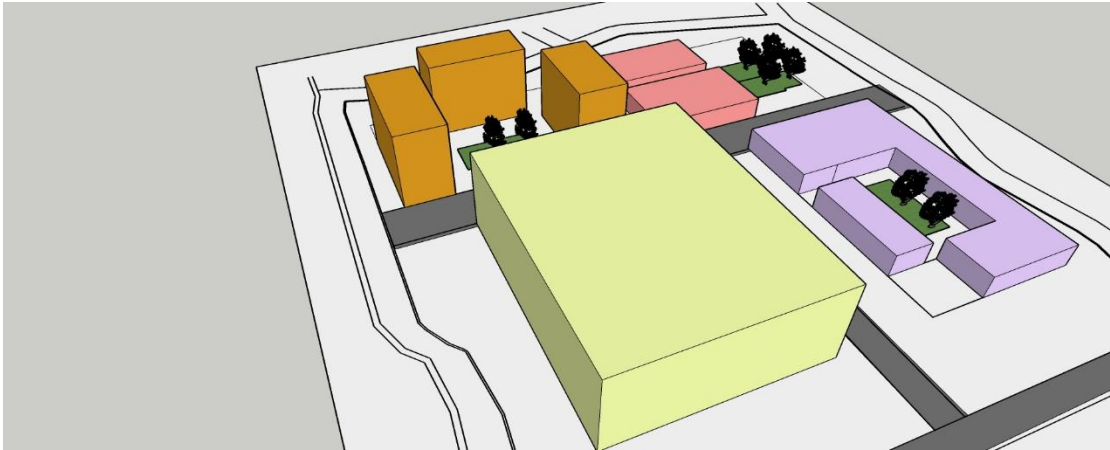


Figure 49 Form Development (Phase III)

In the **third phase**, the larger blocks were broken down into smaller volumes, and spill-out spaces were added to enhance connectivity between indoor and outdoor areas. This step made the overall design more dynamic, interactive, and responsive to the needs of both users and visitors.

Through this gradual development, the design evolved from simple zoning into a more refined and engaging built environment that balances functionality, comfort, and public experience.

CONCLUSION

The design of the Techno Hub - A Center for Digital Gaming, demonstrates how architecture can respond to the growing influence of esports and digital culture by creating a functional, innovative, and people-centered environment. Through careful zoning and design development, the project successfully integrates public, semi-public, and private domains, ensuring smooth circulation and efficiency for players, visitors, and management alike. The arena serves as the central core, supported by bootcamps, administrative spaces, media facilities, and recreational areas that together establish a holistic ecosystem for both competitive and casual gaming.

Architecturally, the project symbolizes the dynamism of digital gaming culture, with its bold form, transparent façade elements, and flexible interiors designed to enhance user experience. Structural strategies such as long-span trusses and advanced acoustic treatments ensure the arena's functionality, while the inclusion of supportive and recreational spaces highlights the project's social dimension. Sustainability measures, efficient services, and well-planned circulation further strengthen the project's practicality and long-term relevance.

In conclusion, the thesis not only provides a spatial solution for the rising demand of esports in Nepal but also explores the potential of architecture in shaping new cultural hubs for entertainment, technology, and community engagement. The Techno Hub is envisioned as more than a gaming facility. It is a modern landmark that celebrates innovation, fosters interaction, and positions esports as a growing cultural and economic force in the region.

ANNEX

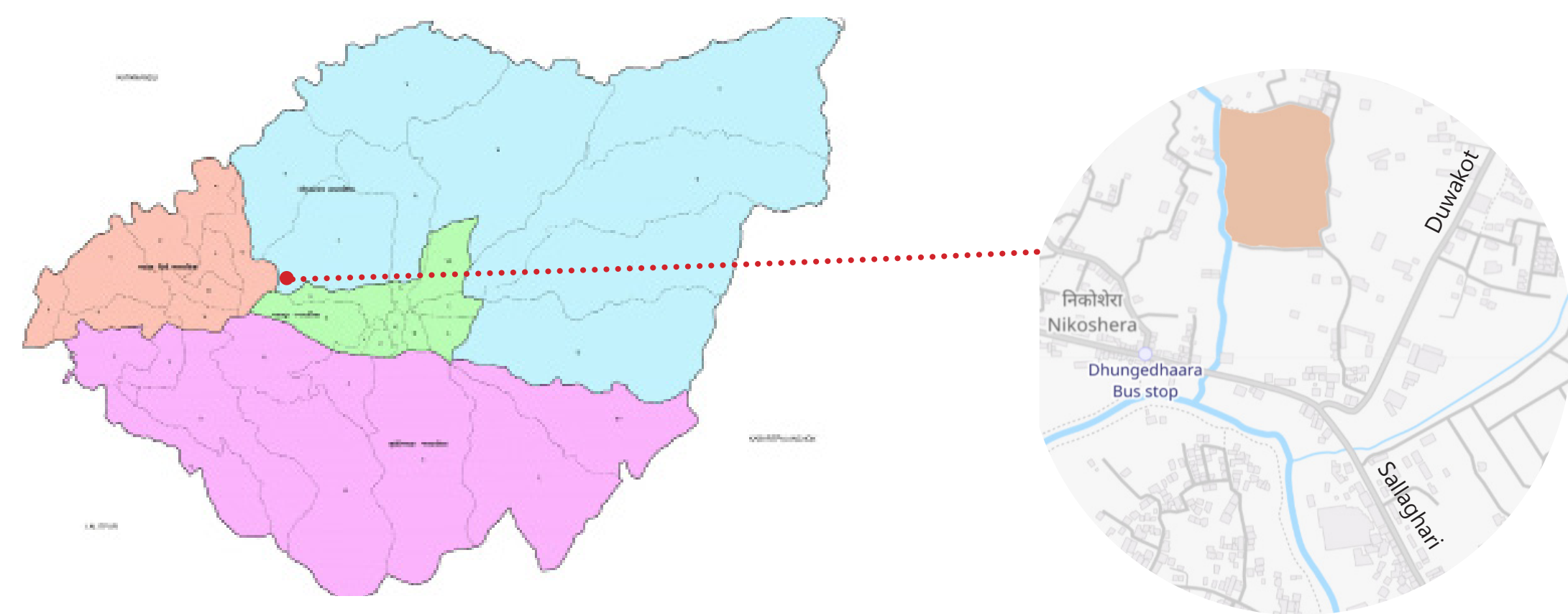
REFERENCES

- ArchDaily. (n.d.). *Populous designs the Western Hemisphere's largest esports arena*. Retrieved May 28, 2025, from <https://www.archdaily.com/913921/populous-designs-the-western-hemispheres-largest-esports-arena>
- DesignQube. (n.d.). *Gaming center interiors at Nungambakkam, Chennai – 6500 sqft*. Retrieved May 28, 2025, from <https://designqube.com/portfolio/gaming-center-interiors-at-nungambakkam-chennai-6500-sqft>
- Hallmann, K., & Giel, T. (2018). eSports—Competitive sports or recreational activity? *Sport Management Review*, 21(1), 14–20.
<https://doi.org/10.1016/j.smr.2017.07.011>
- Hamari, J., & Sjöblom, M. (2017). What is eSports and why do people watch it? *Internet Research*, 27(2), 211–232.
- Hedlund, D. P. (2019). *The motivations of esports players*. In *Understanding esports: An introduction to the global phenomenon* (pp. 95–114). Lexington Books.
- HyperX Arena Las Vegas. (n.d.). Retrieved May 28, 2025, from <https://hyperxarenalasvegas.com/>
- Jenny, S. E., Manning, R. D., Keiper, M. C., & Olrich, T. W. (2017). Virtual(ly) athletes: Where eSports fit within the definition of “sport.” *Quest*, 69(1), 1–18.
<https://doi.org/10.1080/00336297.2016.1144517>
- Kari, T., Siuttila, M., & Karhulahti, V.-M. (2018). An extended study on training and physical exercise in esports. In J. C. Rivera (Ed.), *Handbook of research on the influence and effectiveness of gamification in education* (pp. 142–160). IGI Global. <https://doi.org/10.4018/978-1-5225-7461-3.ch010>
- KLP99 Mall. (n.d.). Retrieved May 28, 2025, from https://www.klp99mall.com/?category_id=6601314
- Layak Architect. (n.d.). *Auditorium: Introduction & design consideration*. Retrieved May 28, 2025, from <https://layakarchitect.com/auditorium-introduction-design-consideration/>

- McGraw-Hill Education. (2014). *Leadership communication* (4th ed.). McGraw-Hill Education. <https://www.scribd.com/document/Leadership-Comm>
- NSELED Cloud. (n.d.). *Esports arena screens*. Retrieved May 28, 2025, from <https://nseledcloud.com/esports-arena-screens/>
- Popper, B. (2019). Philadelphia Fusion to build the first purpose-built esports arena in the West. *The Verge*. Retrieved from <https://www.theverge.com>
- Populous. (n.d.). *Next-generation, purpose-built Fusion Arena breaks ground in the heart of the Philadelphia sports complex*. Retrieved May 28, 2025, from <https://populous.com/article/next-generation-purpose-built-fusion-arena-breaks-ground-in-the-heart-of-the-philadelphia-sports-complex>
- PWP Landscape Architecture. (n.d.). *Pixar Animation Studios*. Retrieved May 28, 2025, from <https://www.pwpla.com/projects/pixar-animation-studios>
- ResearchGate. (n.d.). *Acoustic comfort in indoor sporting arena for E-sports venue: An analysis of the determining criteria and a conceptual framework*. Retrieved May 28, 2025, from https://www.researchgate.net/publication/379213176_Acoustic_Comfort_in_Indoor_Sporting_Arena_for_E-Sports_Venue_An_Analysis_of_The_Determining_Criteria_and_A_Conceptual_Framework
- Scholz, T. M. (2019). *eSports is business: Management in the world of competitive gaming*. Springer. <https://doi.org/10.1007/978-3-030-11199-1>
- Screenline. (n.d.). *Arena projection screens*. Retrieved May 28, 2025, from https://www.screenline.it/en/screens/large-venue-immersive/arena_46450_p/
- Seo, Y. (2016). Professionalized consumption and identity transformations in the field of eSports. *Journal of Business Research*, 69(1), 264–272.
- Taylor, T. L. (2018). *Watch me play: Twitch and the rise of game live streaming*. Princeton University Press. <https://doi.org/10.1177/1461444820939317>
- Trepanowski, R., Li, W., & Hamari, J. (2024). Perceptions of esports and esports athleticism among gamers. In P. DSouza, M. Bujić, N. Xi, & J. Hamari (Eds.),

Proceedings of the 8th International GamiFIN Conference (Vol. 3669, pp. 10–22). CEUR Workshop Proceedings. <https://ceur-ws.org/Vol-3669/paper2.pdf>

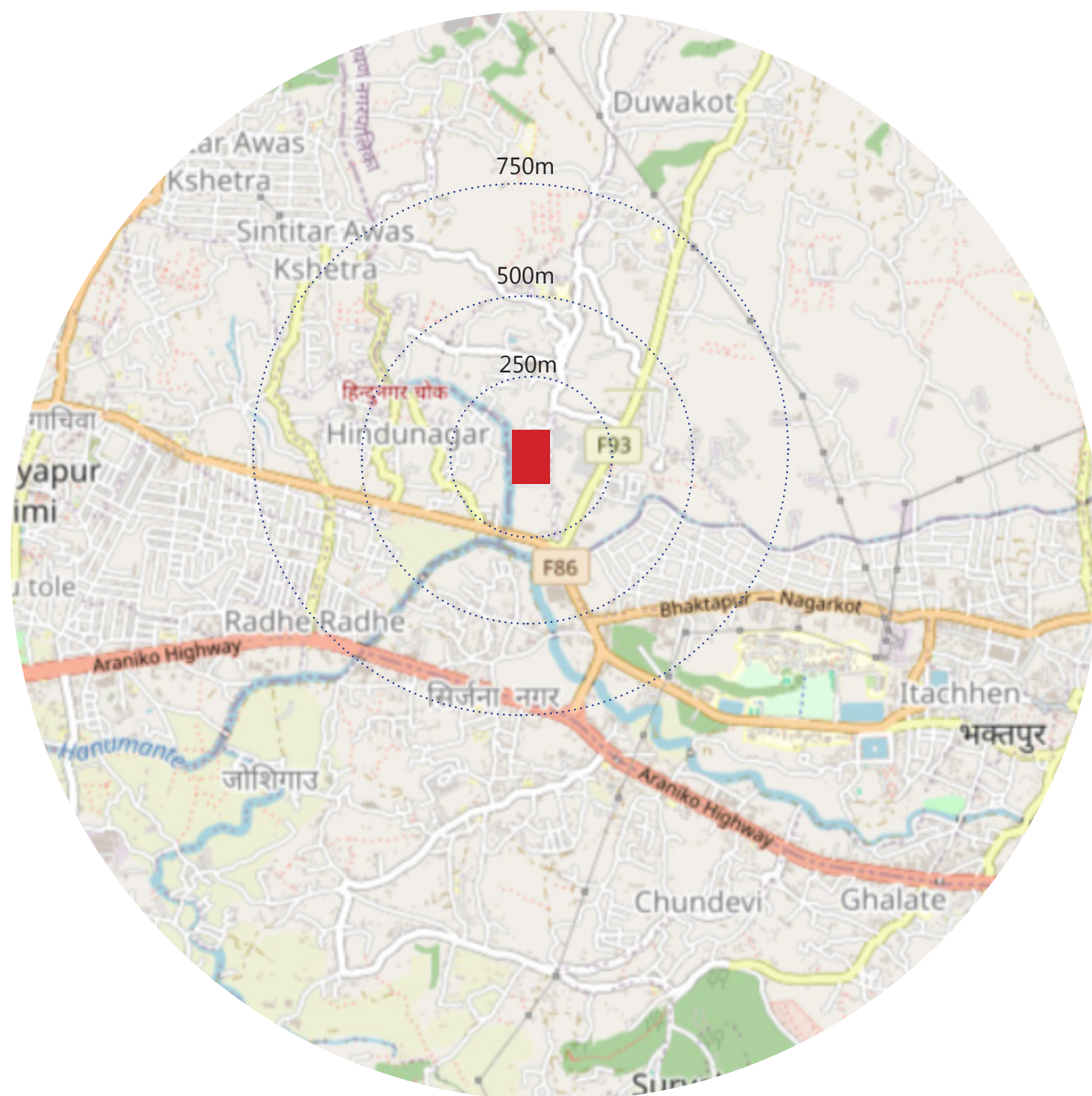
SITE ANALYSIS



INRTODUCTION

Location: Peepalnagar Tole,Duwakot-09,Changu Narayana Municipality
Area : 35450 m²
Topography: Flat Land
Present Use: Agricultural Land
Zone: Developing Residential Topography: Flat Land
Present Use: Agricultural Land
Zone: Developing Residential

ACCESSIBILITY



300m away from Dhungedhara Bus stop

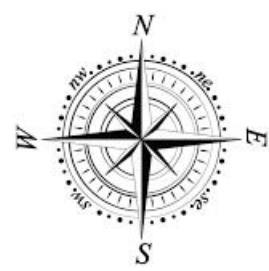
Highway
Feeder Road
District Road
Minor Roads

LANDMARKS



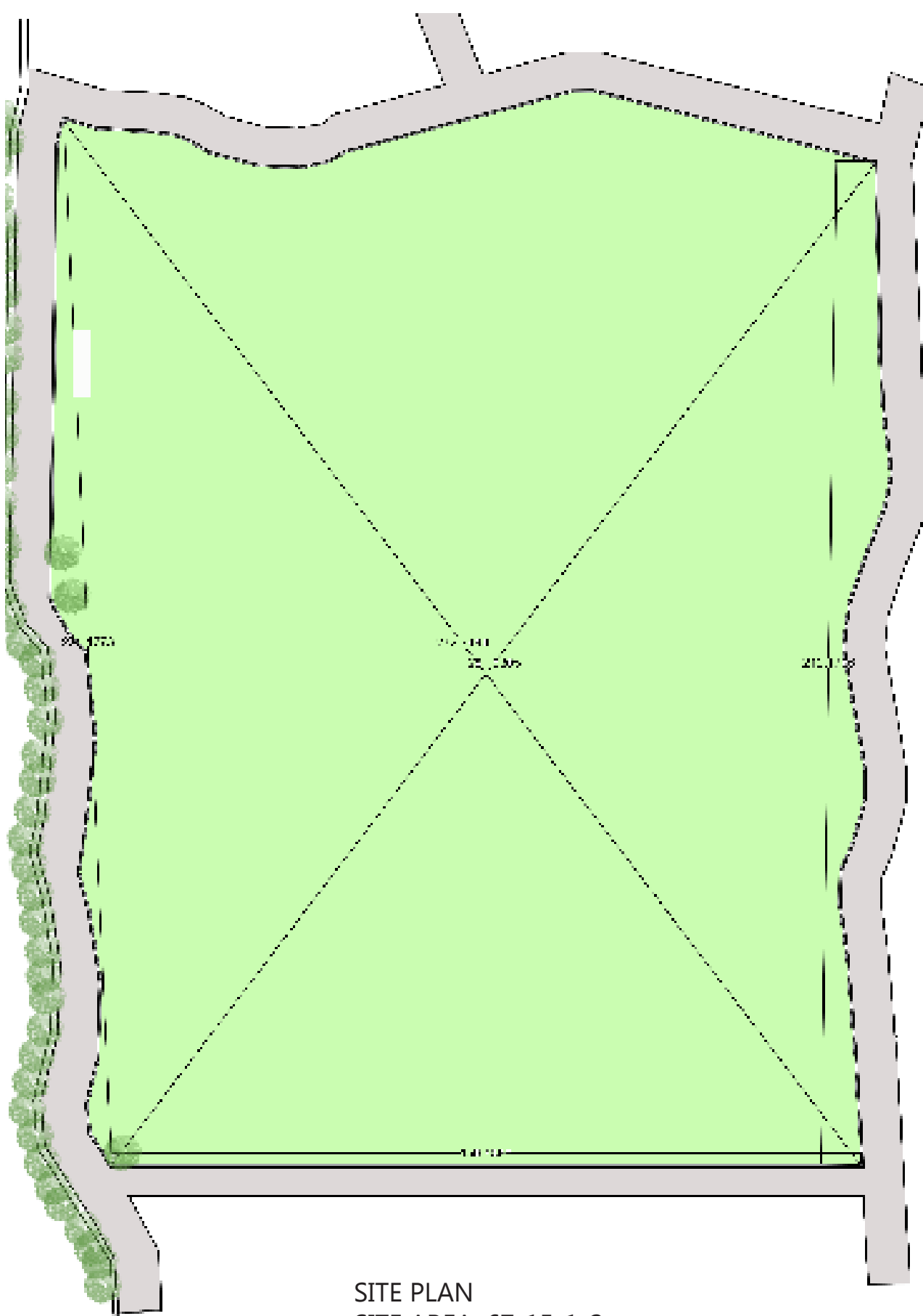
BYE-LAWS

- Ground Coverage : 40% for more than 1-0-0-0
- Setback: 2m
- Building Height: 5 Stoery (16m)
- ROW: 6m
- Add Stair: <25m Travel Distance.
- Ramp: 1:10
- Parking: 10sq.m. in 100sq.m. Builtup
- Floor height: 2.7m min



SWOT ANALYSIS

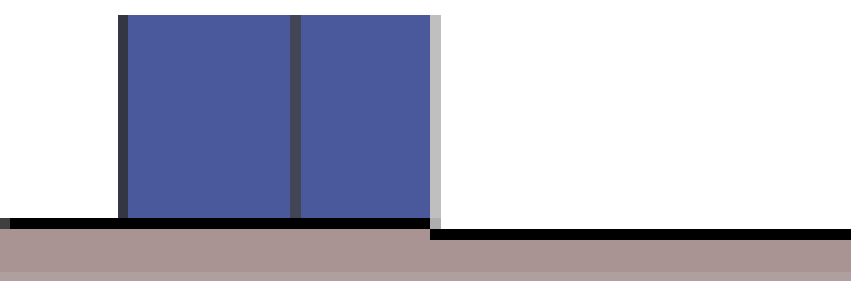
- S** • Flat land
• Surrounded by roads
- W** • Minor Roads
• No major facilities (Shopping, cafeterias etc)
- O** • Developing community
• Landmarks and attraction



SITE PLAN
SITE AREA: 67-15-1-2



SITE SECTION



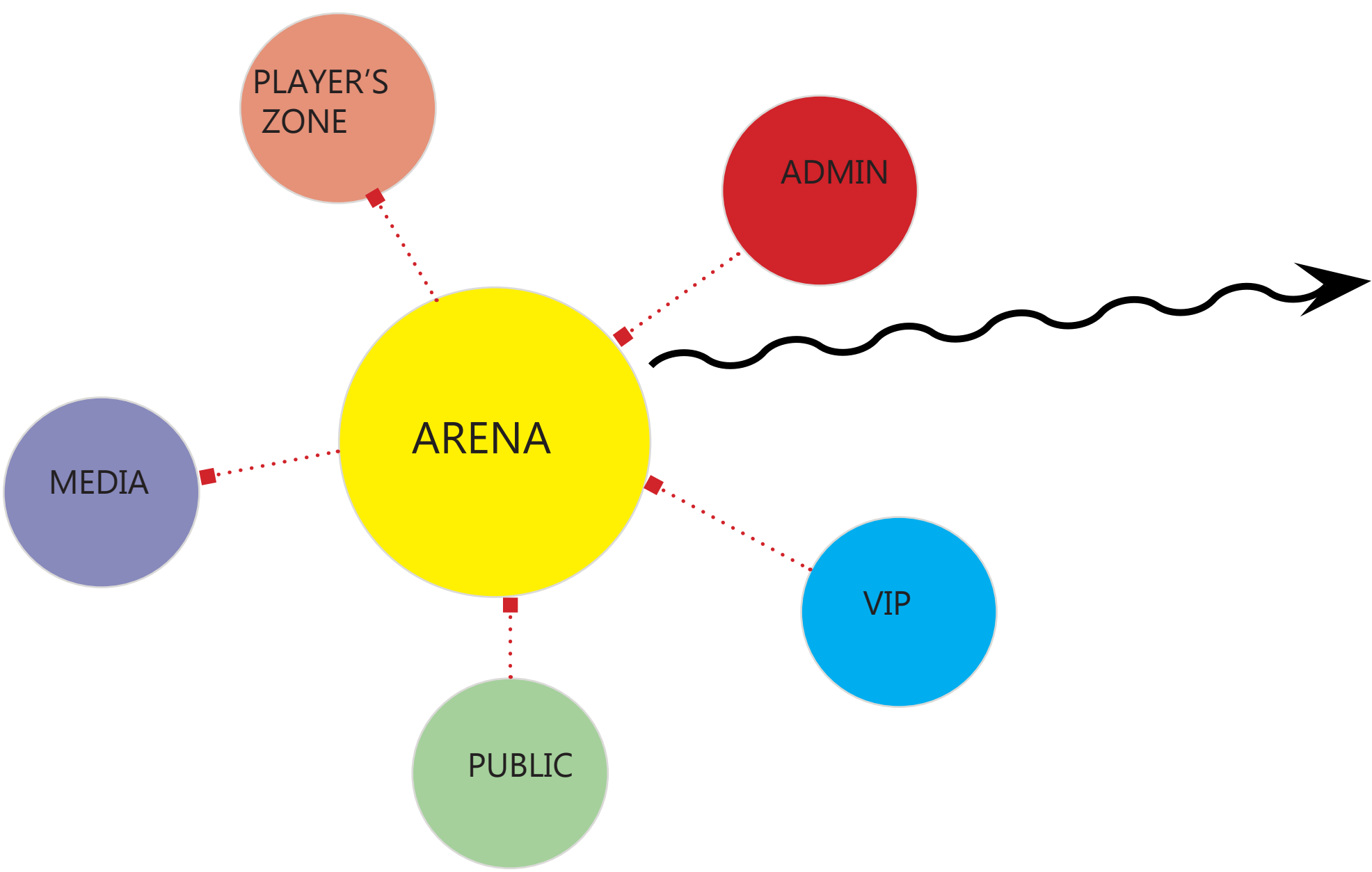
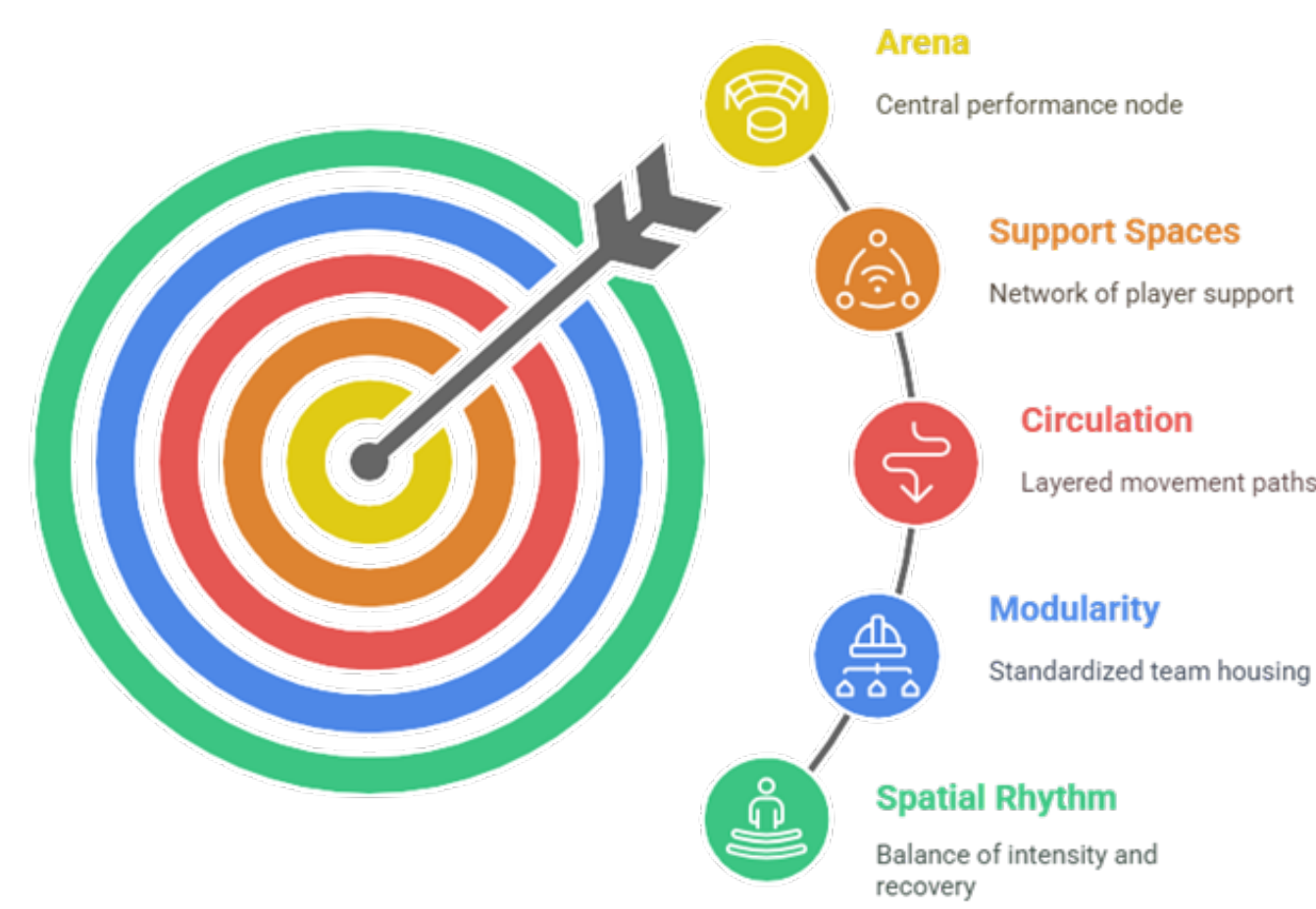
TECHNO HUB
(Hub For Digital Gaming And Animation)

NAME: BIRENDRA CHHOSOKOSO
Fifth year B.Arch/ 760111
Khwopa Engineering College
Libali,Bhaktapur

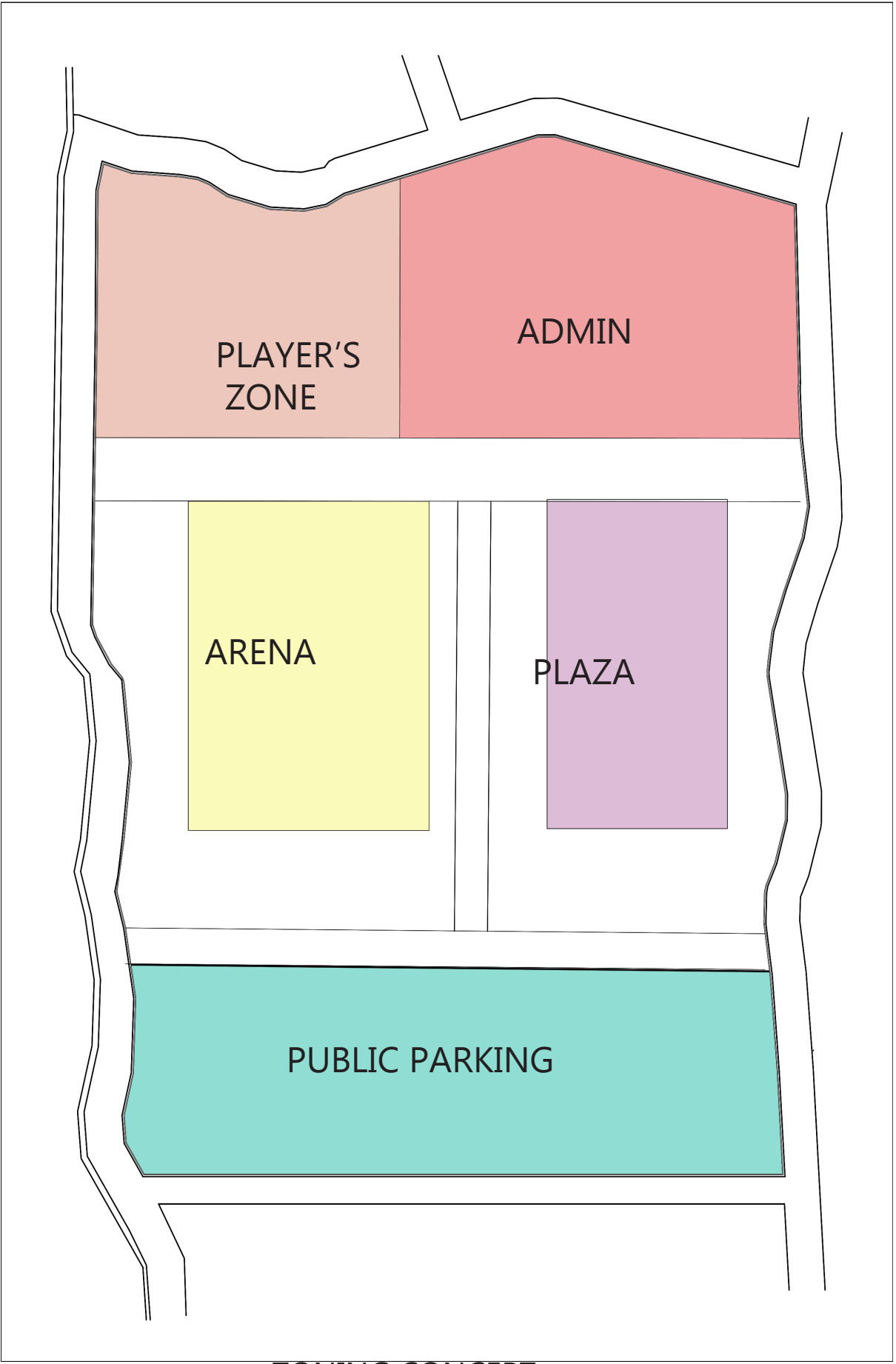
CONCEPT

.Node and Network: A Performance-Centered Spatial Web
This means the arena is the main focus, and all other spaces (like player rooms, wellness, gaming, and shops) are arranged around it, forming a connected and efficient layout.

- This creates a connected and organized layout.
- Makes movement easy and organized.

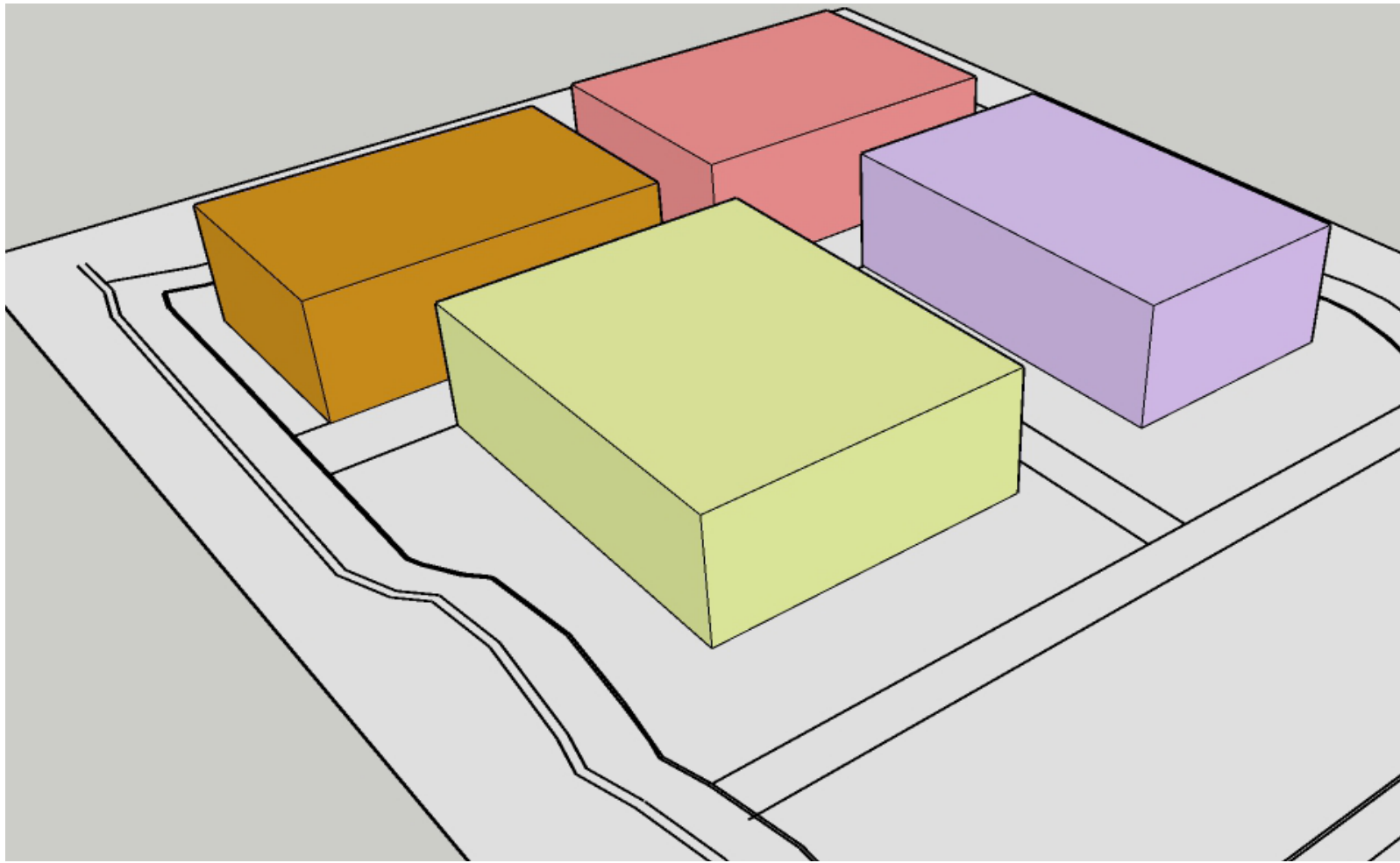


BUBBLE DIAGRAM CONCEPT

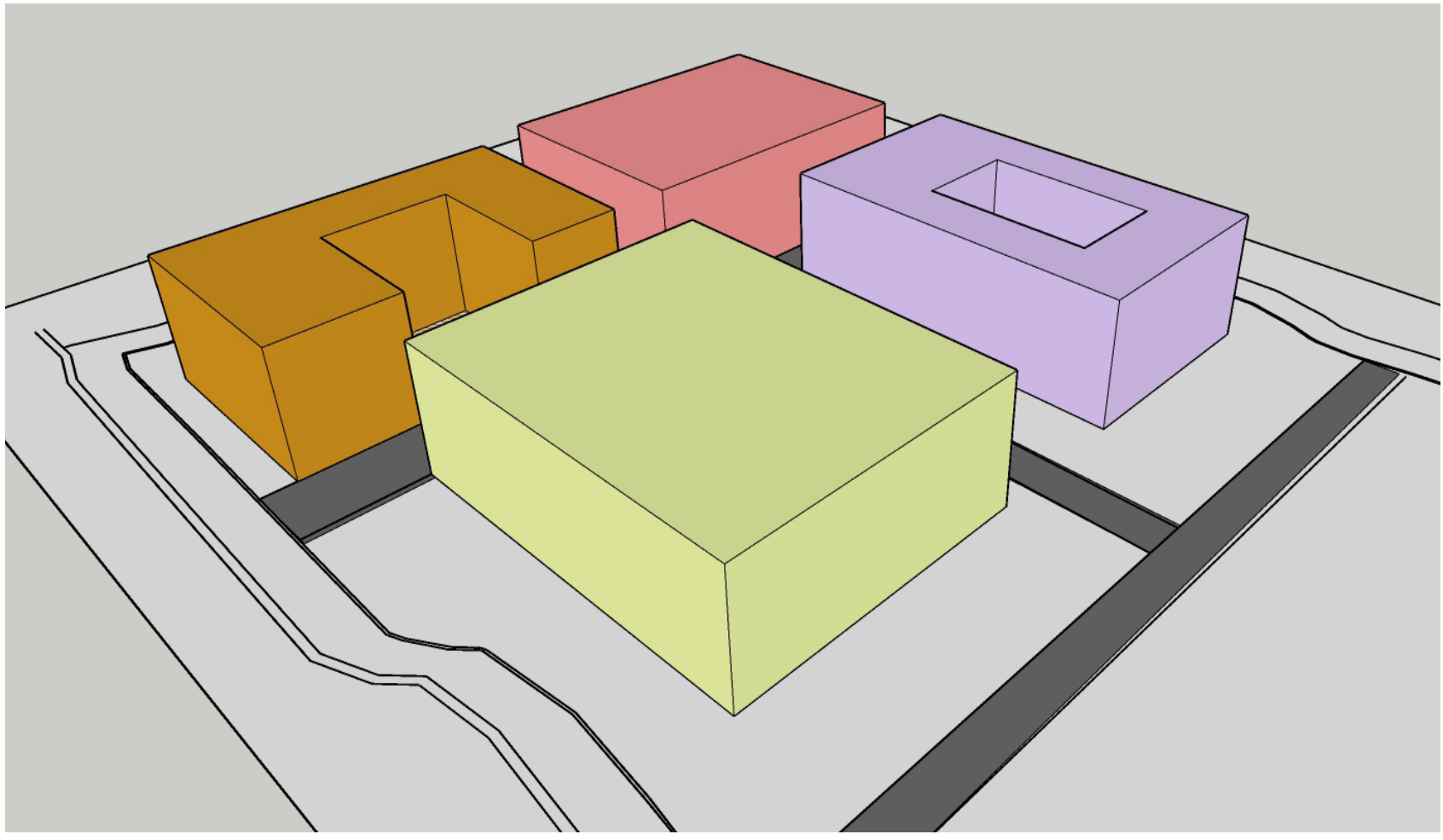


ZONING CONCEPT

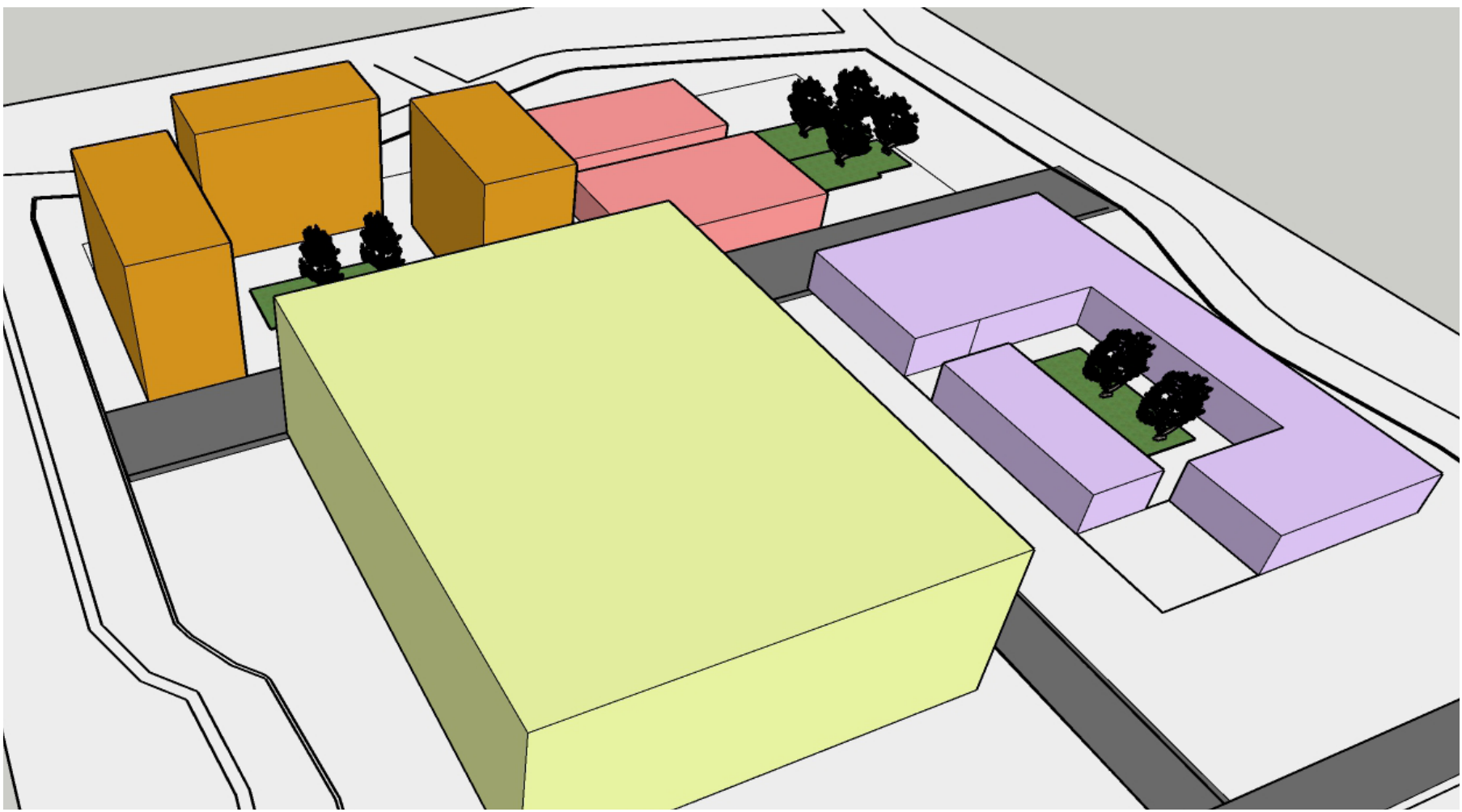
DESIGN DEVELOPMENT



PHASE: I
DEVELOPING FORM FROM ZONING



PHASE: II
MAKE VOID FOR RECREATIONAL SPACES



PHASE: III
BREAKDOWN BLOCK INTO SPACES
AND CRATE SPILT OUT AREA

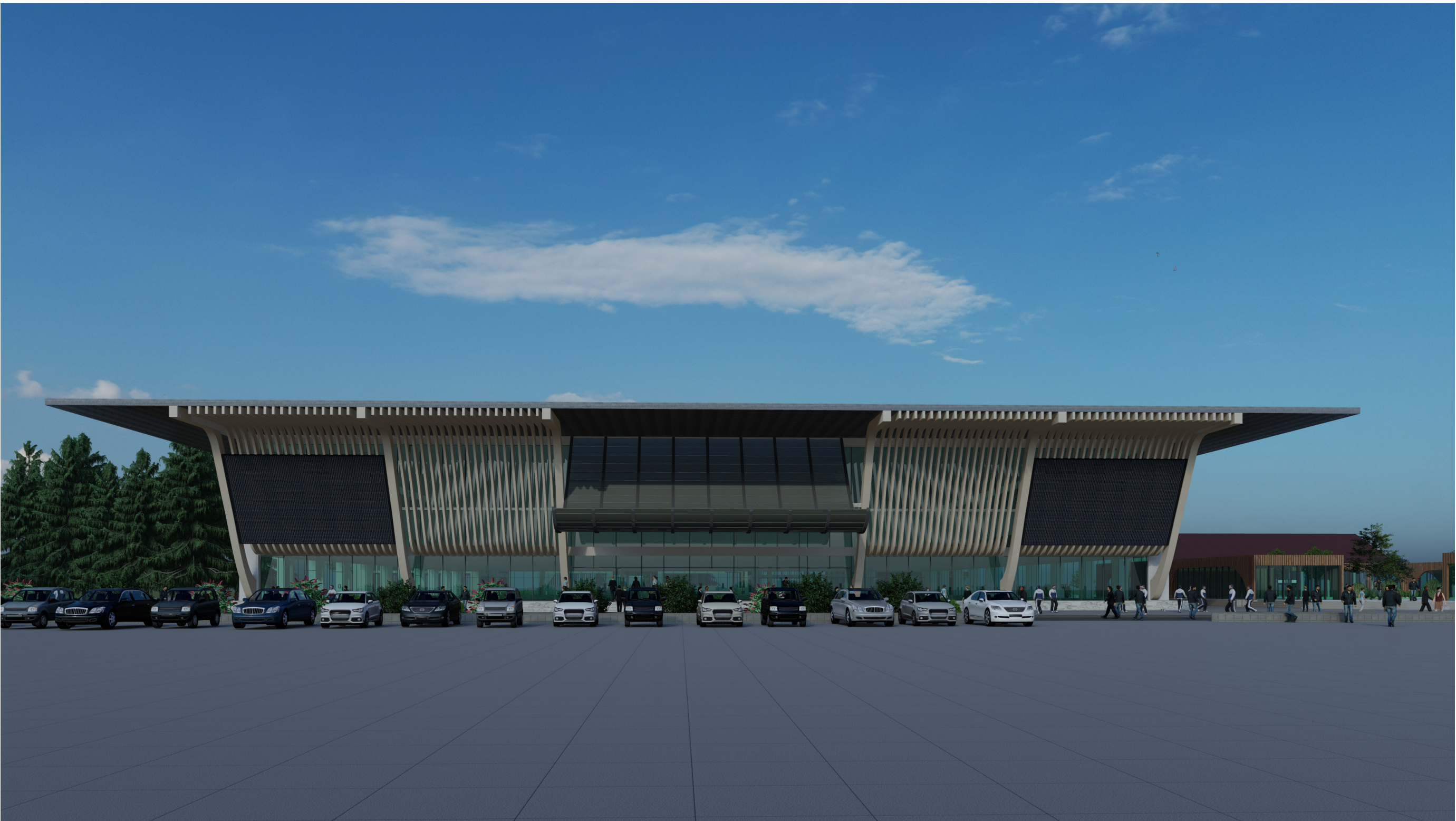
TECHNO HUB
(Hub For Digital Gaming And Animation)

NAME: BIRENDRA CHHOSOKOSO
Fifth year B.Arch/ 760111
Khwopa Engineering College
Libali,Bhaktapur

3D VIEWS



ARIAL VIEW



ARENA VIEW



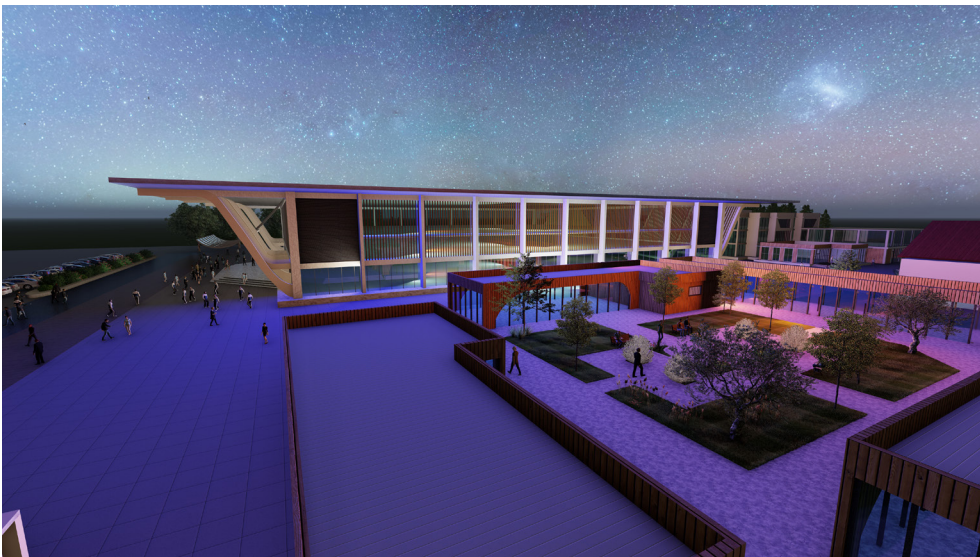
NIGHT VIEW



NIGHT VIEW



MARKET PLAZA VIEW



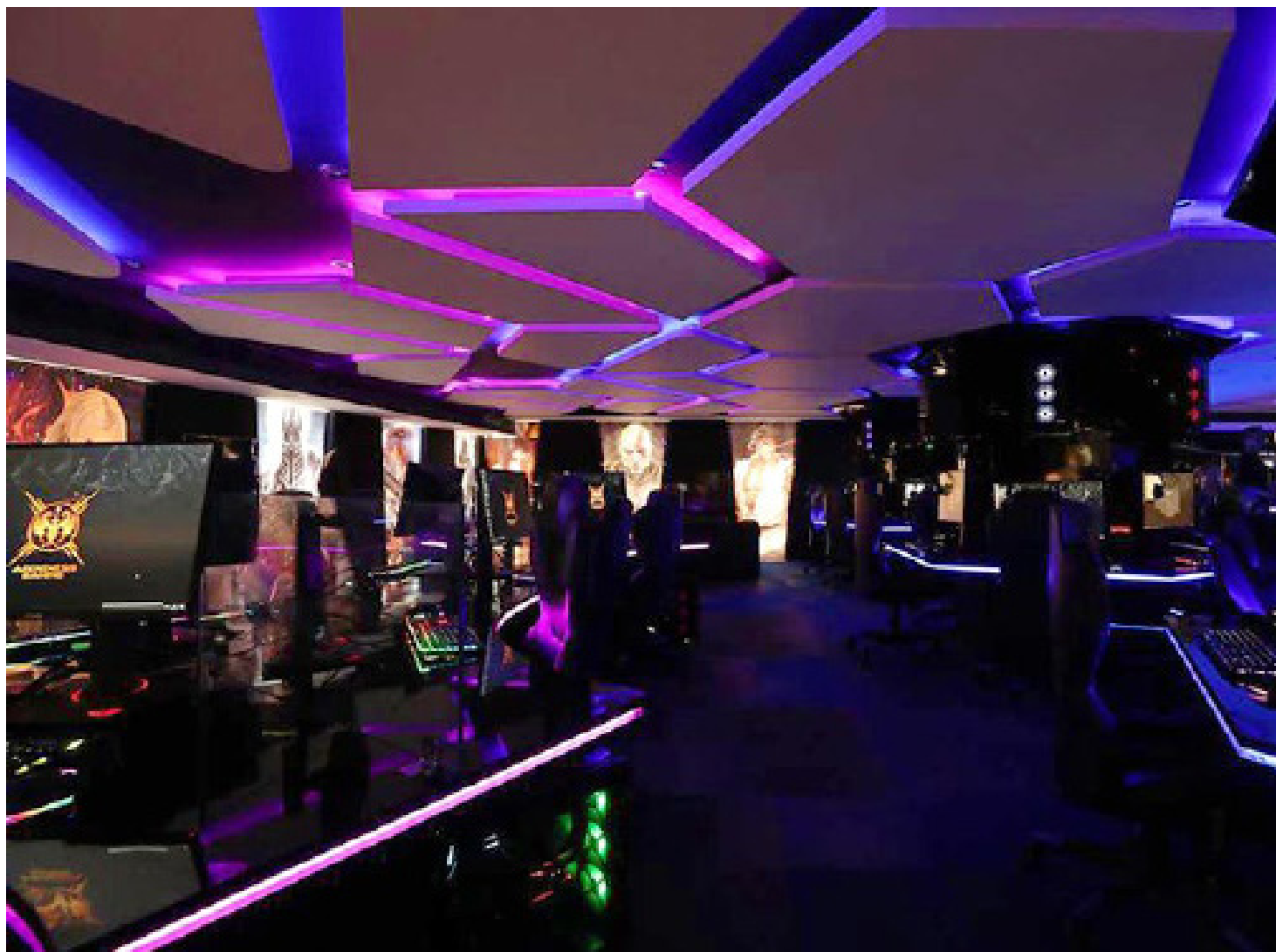
NIGHT VIEW OF MARKET PLAZA

TECHNO HUB
(Hub For Digital Gaming And Animation)

NAME: BIRENDRA CHHOSOKOSO
Fifth year B.Arch/ 760111
Khwopa Engineering College
Libali,Bhaktapur

CASE STUDY

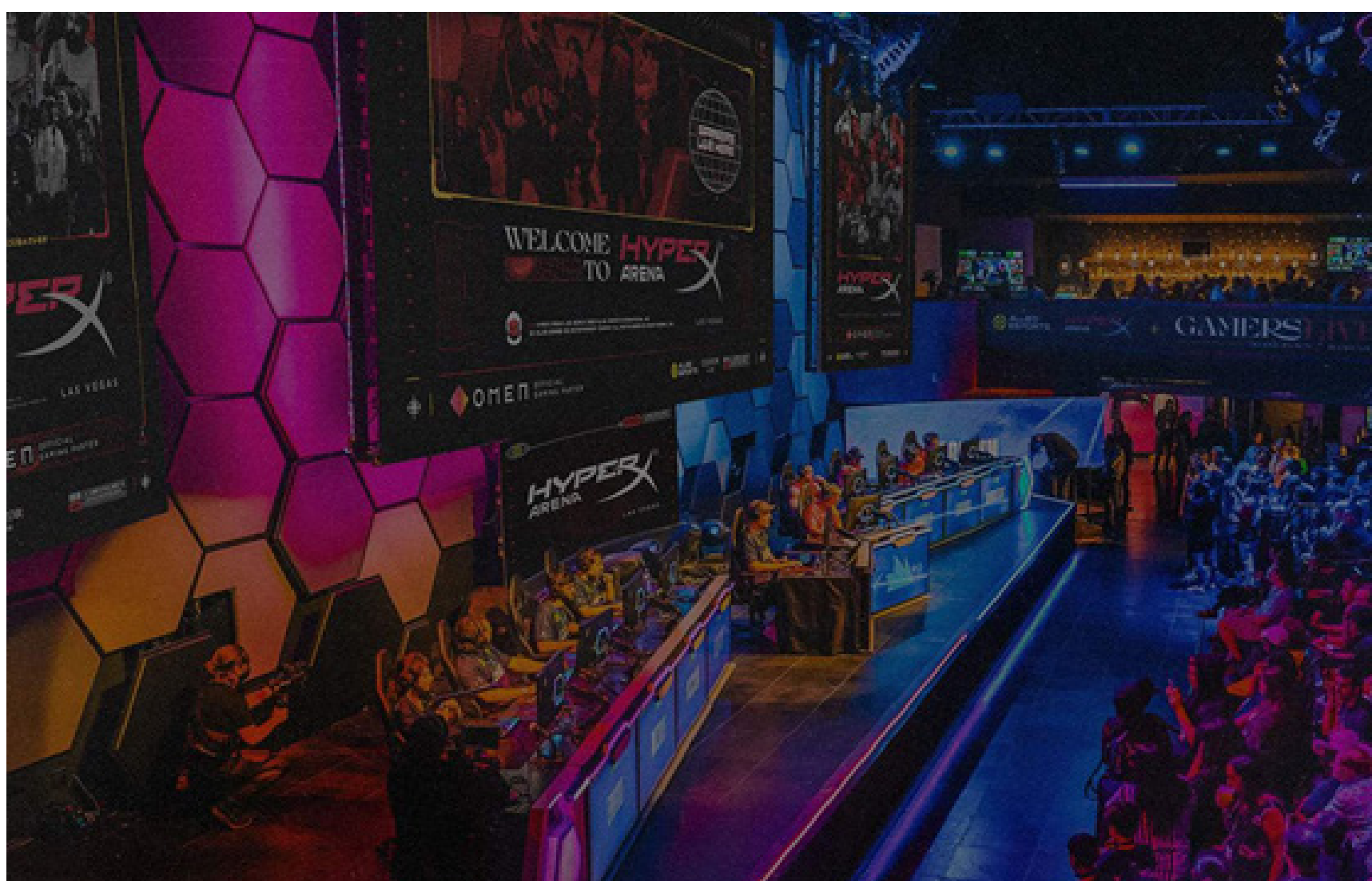
1. ARKNEMESIS GAMING



LOCATION: NUNGAMBAKAM, CHENNAI
TPOLOGY: GAMING HUB
AREA: 6500 SQ. FT
INDIA’S LARGEST GAMING HUB

- **Facilities:**
 - High-end gaming desktops, PlayStations, Xbox.
 - Large screens (72-inch & projectors) for gaming.
 - Central air-conditioned space with false ceiling & focused lighting.
 - Additional amenities: Cafeteria, lounge, pool table rooms, toilets.
- **ACCESS AND USAGE**
 - Gaming facilities: Open to all on an hourly basis.
 - Pool table room: Exclusive to club members.
 - Cafeteria setup: Transformed for 2-player tournaments with projector screens.

2. HYPER-X ARENA



LOCATION: Philadelphia, Pennsylvania
TPOLOGY: Arena
AREA: 60,000 sq.ft
DESIGNER: Populus Architect

- **Architectural Features**
 - Modern & High-Tech Design**
 - Designed for esports and live broadcasting, featuring an immersive digital environment.
 - Advanced lighting and acoustics enhance gameplay and event production.
 - Flexible & Multi-Purpose Layout**
 - Configurable spaces can accommodate upto 1,000 attendees, supporting both small meetups and large-scale tournaments.
 - Modular seating and stage setups allow for dynamic event customization.
- **FACILITIES DETAILS**
 - 3 VIP Rooms + BOSS LEVEL Suite
 - 4 Open Lounge Areas
 - Lobby Gaming Area
 - Immersive Dome Room
 - 2 Full-Service Bars
 - 2 Full-Service Bars
 - Buyout Capacity 1,000
 - Broadcast Center & Studio
 - 50-foot LED Video Wall

3. FUSION ARENA



LOCATION: Philadelphia, Pennsylvania
TPOLOGY: Arena
AREA: 60,000 sq.ft
DESIGNER: Populus Architect

- **Architectural Design:**
 - Exterior design references gaming hardware.
 - Dynamic, sleek skin that symbolizes esports' global rise.
- **Seating and Viewing Experience:**
 - 3,500 seats with USB ports and customized chairs.
 - Private lounges and real-time game stats delivered to patrons.
 - Two balcony bars, club seats, loges, and exclusive suites for varied viewing experiences.
 - 25,000 sq. ft. theatre-style event space with bird’s-eye social areas and dynamic views.
- **STRENGTHS:**
 - Futuristic Design
 - High-Tech Interactive Spaces
 - Dedicated Training & Operations Hub
- **WEAKNESSES:**
 - Limited Multi-Use Flexibility:**
 - Acoustic & Visual Management Challenges:**
 - High Energy Consumption:**

TECHNO HUB

(Hub For Digital Gaming And Animation Center)

NAME: BIRENDRA CHHOSOKOSO
Fifth year B.Arch/ 760111
Khwopa Engineering College
Libali,Bhaktapur

TECHNO HUB (LITERATURE REVIEW)

INTRODUCTION

- The evolution of the society towards modernisation and innovation of technologies, create a new interest for this era which is electronic sport. Therefore, the rapid growth of technology makes the new generation to participate in E-sports rather than traditional sports.
- E-Sport has meaning of electronic sports,Which the aspecct of sport is all facilliated by electronic system. E-sport is a gaming platfrom for online gamers of various categories.
- The definition of eSport is a sport that does not compete physically but is more concerned with strategy and competed online via computer, so play-ers from each team can compete without face to face.

What is E-Sports ?

Simply defined, esports is playing video games competitively. This however is a very rudimentary description. Cambridge defines esports as the activity of playing computer games against other people on the internet, often for money, and often watched by other people using the internet , at special organized events.

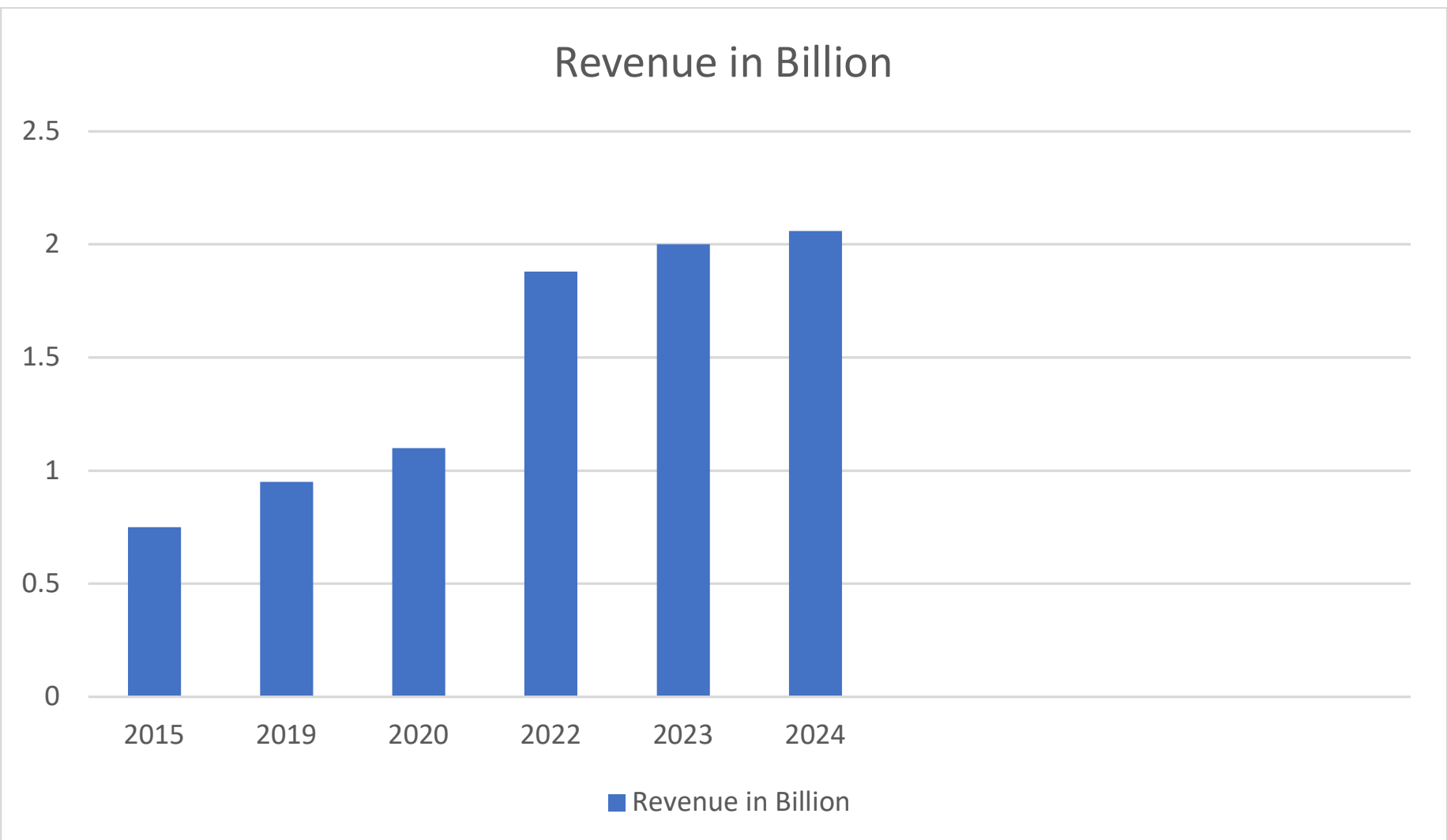
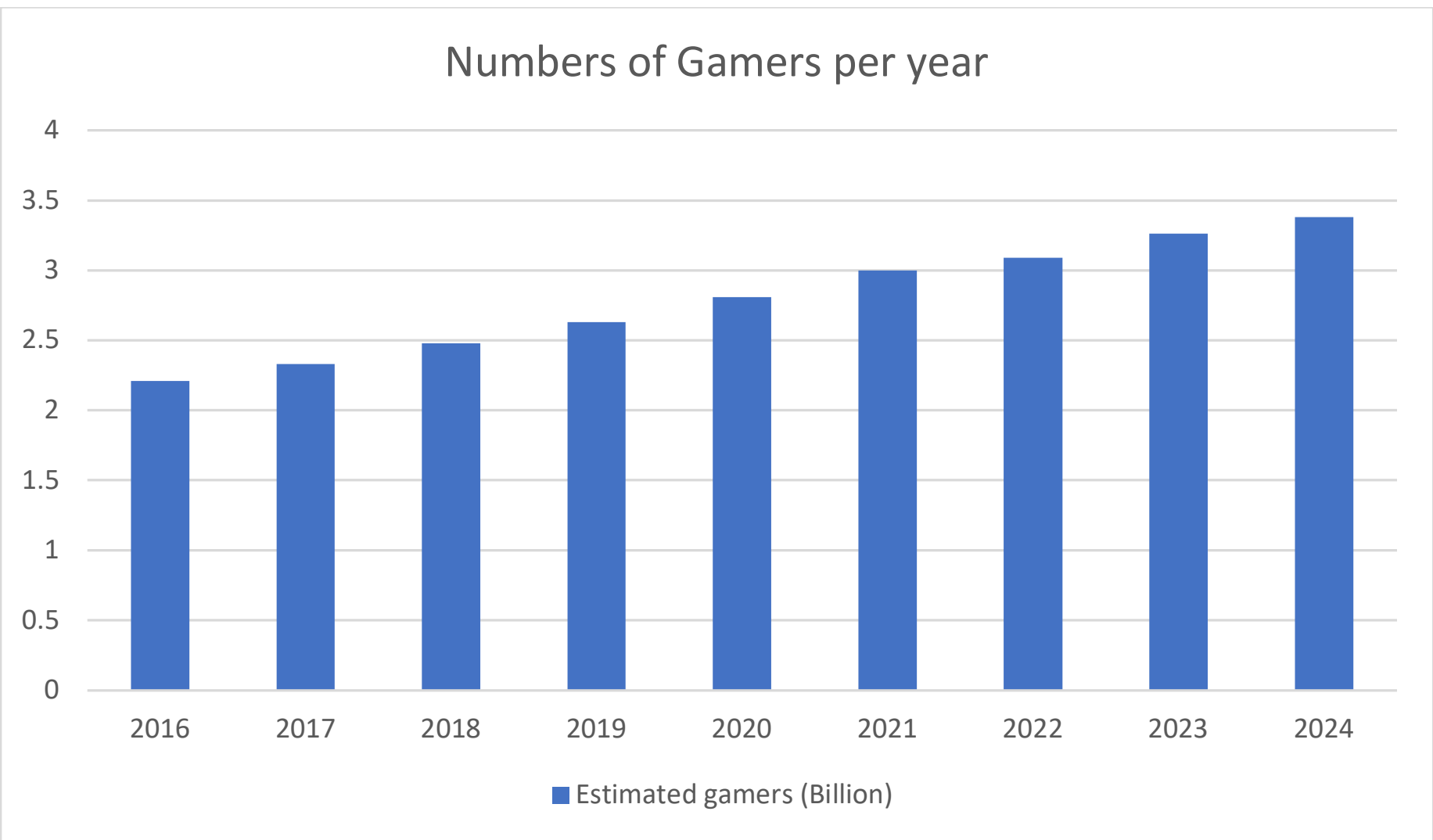
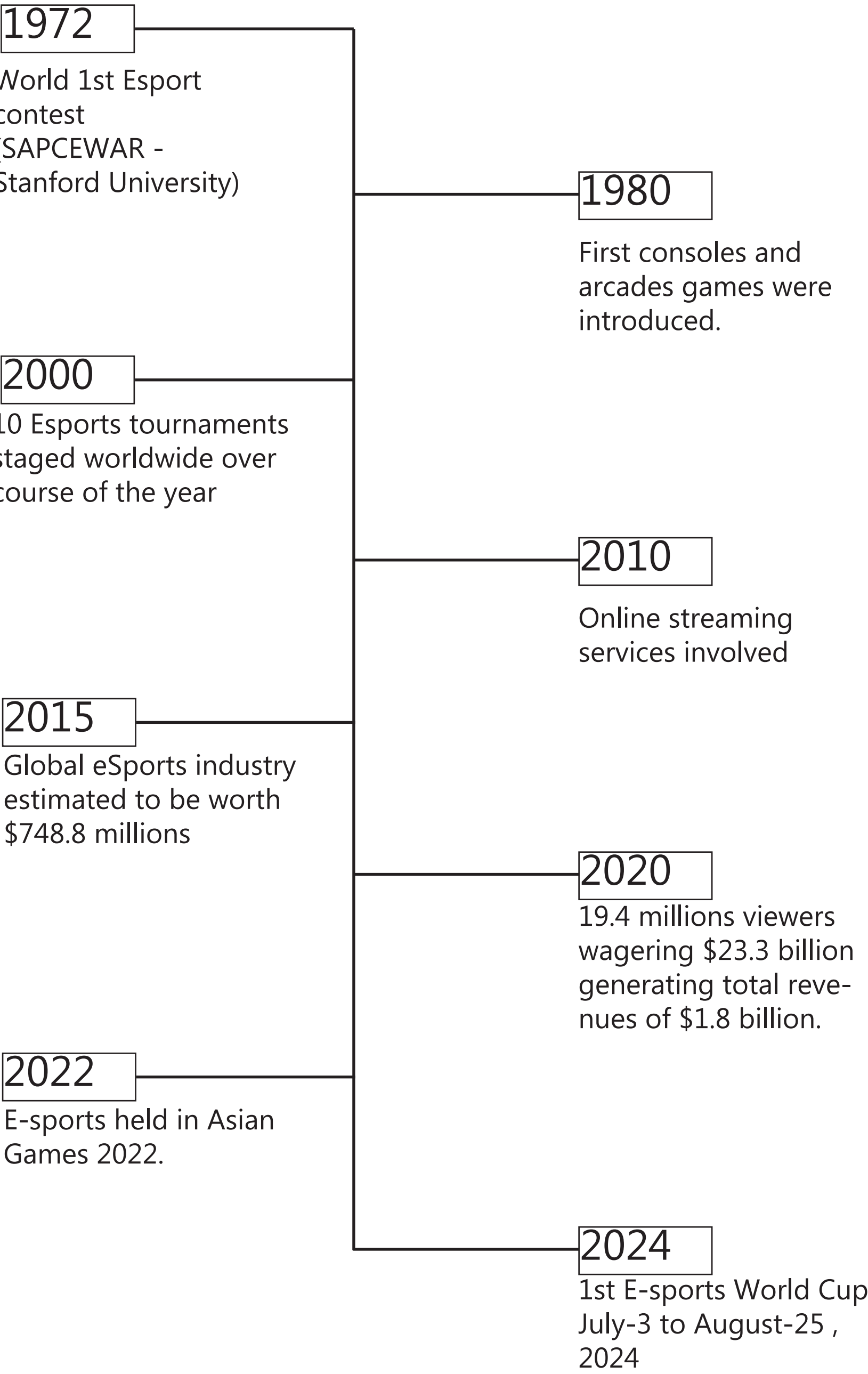


Pic: Esport world cup -Riyadh, Saudi Arabia

Gaming Context In Nepal

- Nepal has approximately 16.9 million gamers as of 2024.
- Majority of gamers are aged 18-34, with a male-dominated player base (~83.6%).
- Nepal has 171 professional esports players, earning over \$1.68 mil-lion in tournaments.
- Domestic and International Competition
- Online streaming
- Game Developer

Evolution of Gaming:



source: <https://prioridata.com>



Pic: DRS Gaming (PUBG Mobile Global Championship



Pic: Nepali Game Developed by Ashim Shakya



Pic: National Championship held on Feb 20-22

TECHNO HUB

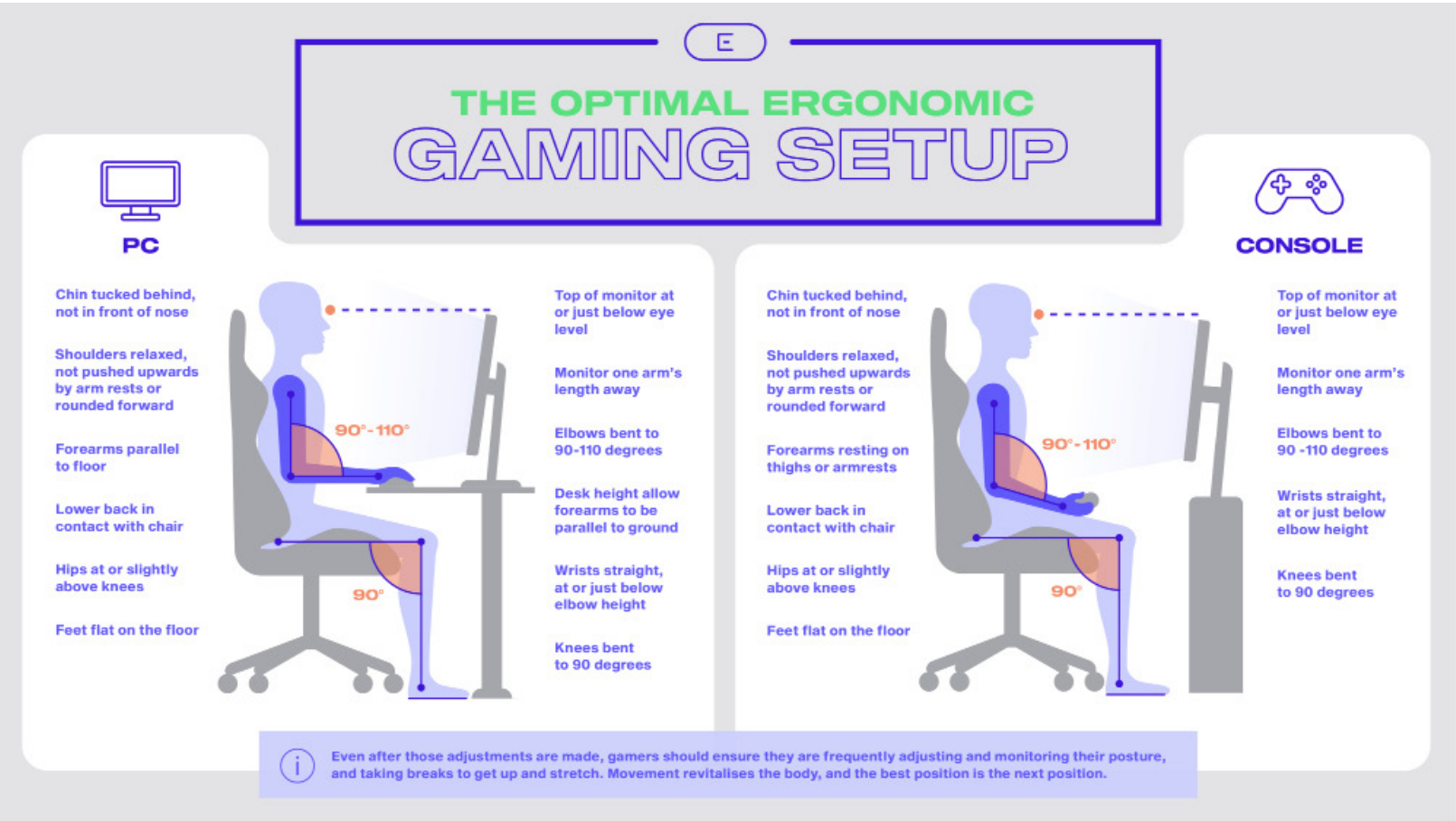
(Hub For Digital Gaming And Animation Center)

NAME: BIRENDRA CHHOSOKOSO
Fifth year B.Arch/ 760111
Khwopa Engineering College
Libali,Bhaktapur

Design Consideration

1. Training Room

- Ergonomic Gaming Setup
- Adjustable desk and chair
- Screen and Display
- Medium Displays: 50-65 inches
- Large Displays: 75-98 inches



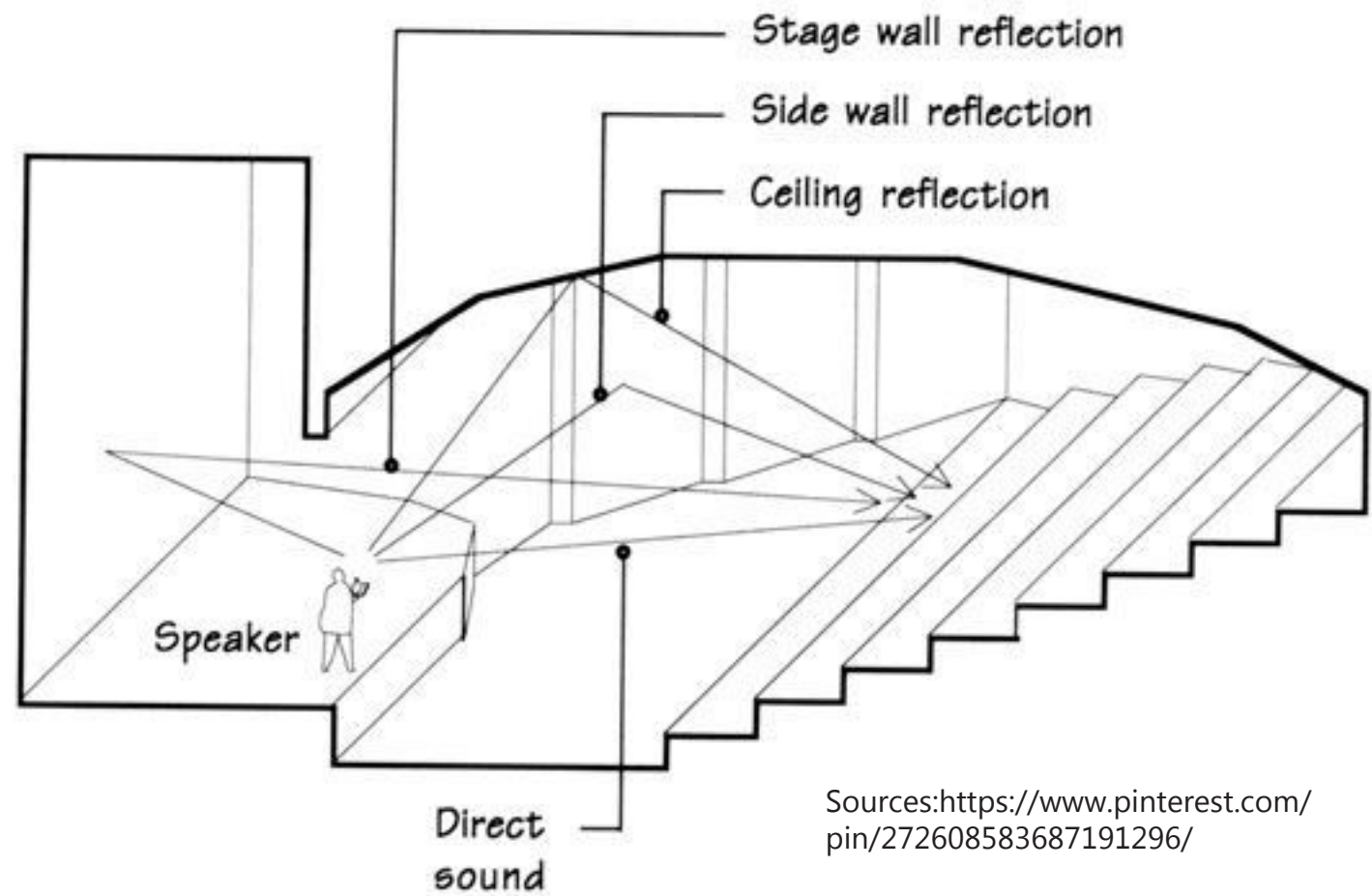
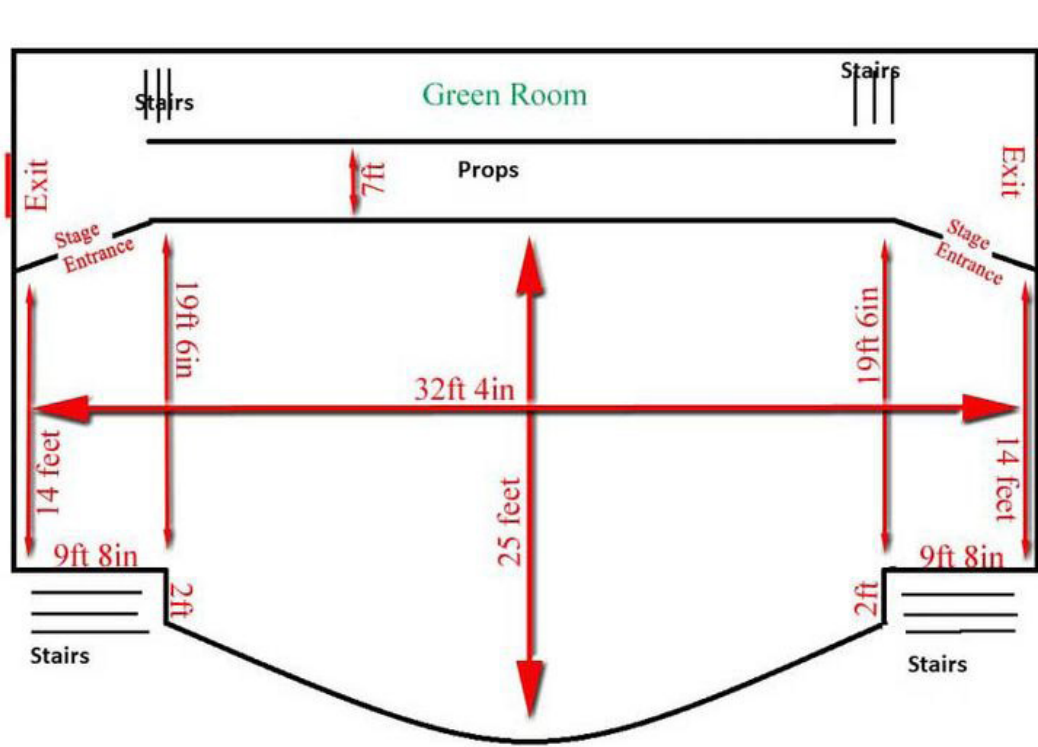
Sources:<https://www.klp99mall.com>

2. Competition Arena

- Gaming Station (Players Pods)

Type of Gaming	Mobile Gaming	PC Gaming	Console Gaming
Required Dimensions	<ul style="list-style-type: none">• Each player's area: 1.2m x 0.6m• Table height: 0.7m–0.75m (standard desk height).• Clearance behind players for movement: 1.5m.	<ul style="list-style-type: none">• Player area: 1.5m (width) x 0.8m (depth).• Clearance between rows (for team layouts): 1.8m–2m to allow for movement and wiring.	<ul style="list-style-type: none">• Player area: 1.3m (width) x 0.7m (depth).• Clearance behind players: 1.5m–2m for ease of movement and cable management.
Technical consideration	<ul style="list-style-type: none">• Lightning charging ports for mobile devices.• Anti-glare screen shields and proper lighting to avoid screen reflections.	<ul style="list-style-type: none">• High-performance PCs with minimal latency and consistent power supply.• Noise-canceling headsets for team communication.	<ul style="list-style-type: none">• Large, high-refresh-rate TVs or monitors with minimal input lag.• Sturdy surfaces to hold consoles securely.• Adequate ventilation for console cooling.

3. Stage Area

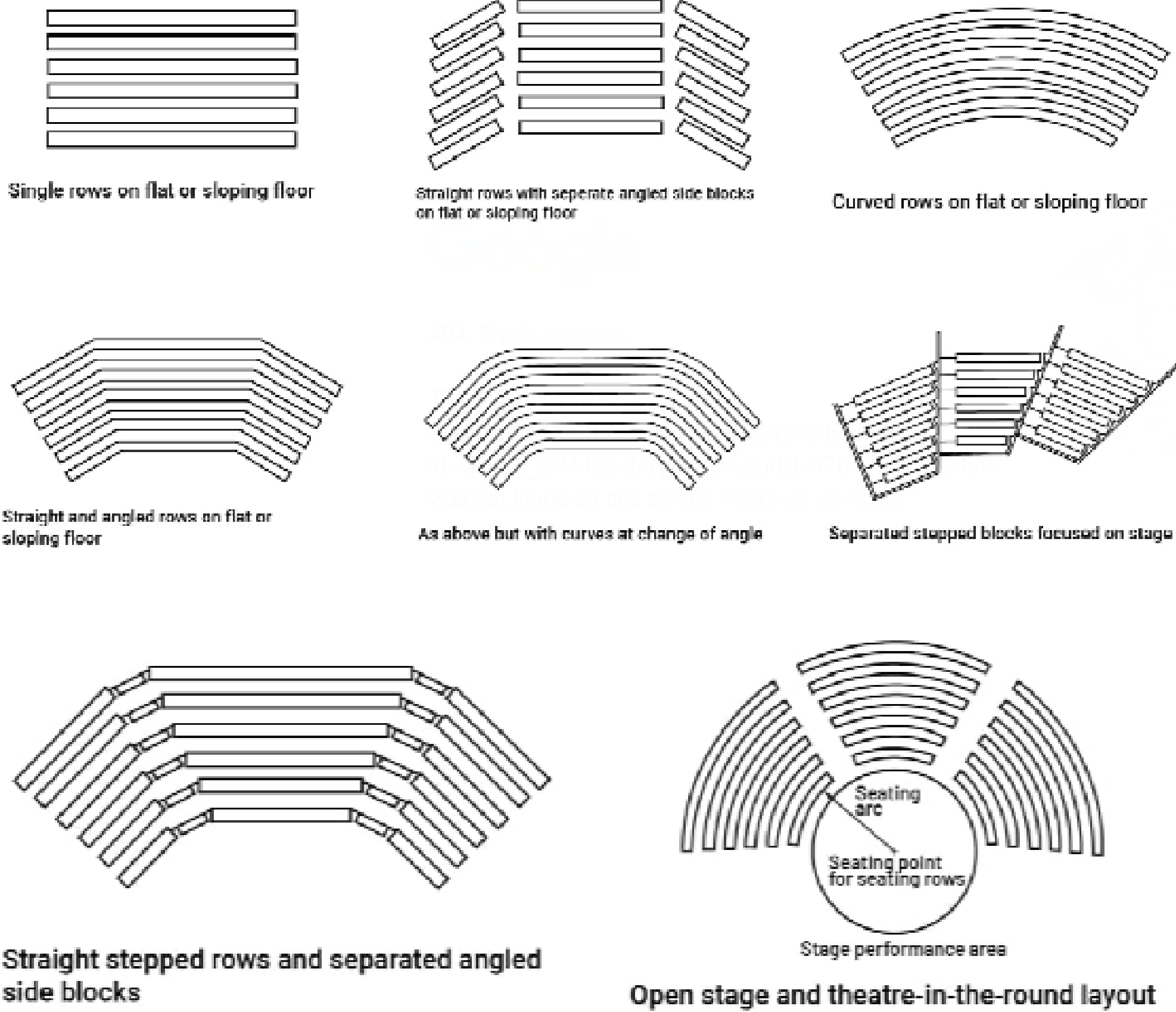


Sources:<https://www.pinterest.com/pin/272608583687191296/>

-The stage should be elevated, typically 1-1.5 meters above the ground to ensure visibility. For larger arenas, players should be positioned in a raised area, with clear sightlines for every spectator.

4. Audience zone

To ensure that every spectator, whether seated in the front row or the farthest corner, has a clear and comfortable view of the action, the arena layout must be carefully planned.



Sources:<https://laykarchitect.com/auditorium-introduction-design-consideration/>

5. Screen and Display

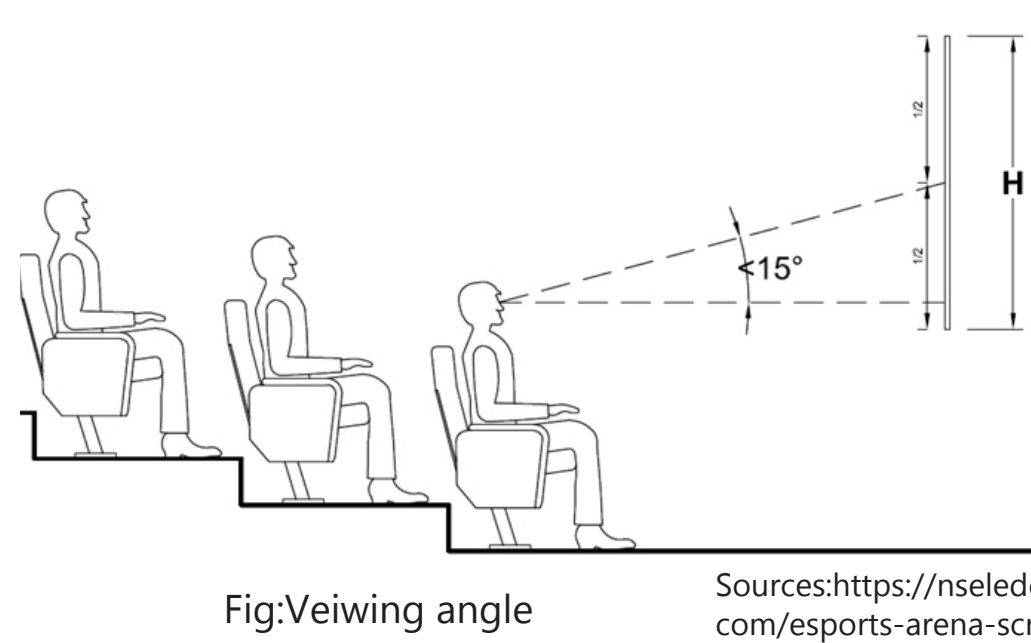
- LED Screen
- Curved Screen
- Larged Format Displays(LFDs)
- Projection Technology

Why Are LED Screens Superior for Esports Arenas?

- Durability
- Programing Light Control
- Power saving Potential
- More presentable

Technical Considerations for Esports Arena Screens

- Screen Brightness and contrast
- Refresh rate (120 Hz, 144 Hz)
- Colour Reproduction
- Video Stability
- Veiwing angle
- Integration with other systems



- The size of the screen needs to be large enough. But size isn't always about going big. You also have to consider the right fit based on the arena's dimensions.

6. Broadcasting Booths

- Should be elevated and ideally positioned directly behind the player stage.
- Allowing commentators to view the game without obstruction.
- Broadcasting booth should be large enough to accommodate 2-3 commentators, with space for microphones, computers, and monitors.
- The standard size for a broadcast booth is typically around 3m x 3m.

7. Video Control Room(VCR)

- Should be equipped with video mixers, signal routers, and the necessary equipment for live feed switching between different camera angles.
- should also be soundproofed to avoid any interruptions from the rest of the arena.
- 5m x 7m can accommodate multiple operators, with space for large monitors, servers, and control panels.

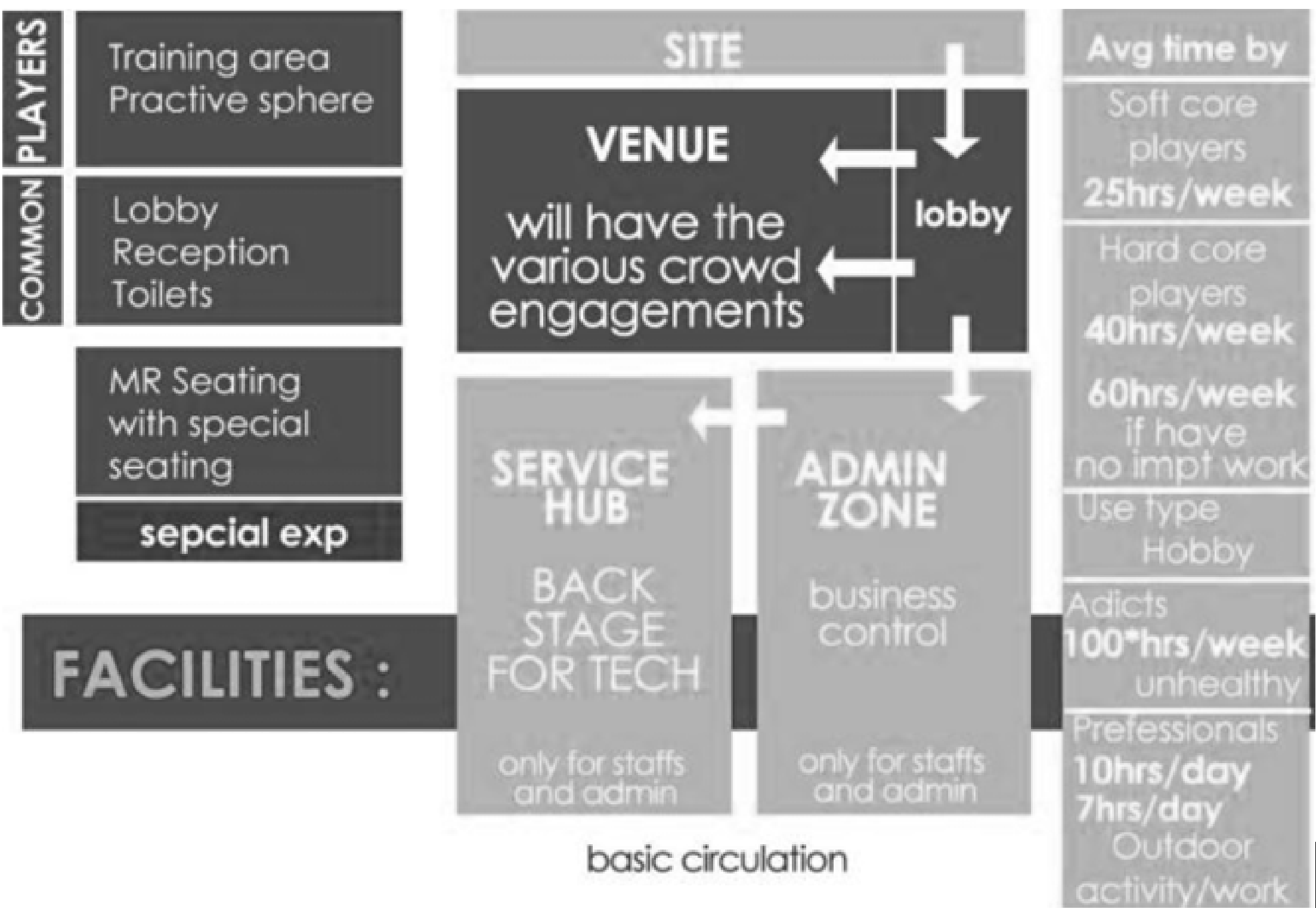
8. Backstage Area

-Technical Support Area

- Should have large desks, monitor setups, and equipment racks for technical teams.
- should have easy access to the stage and be large enough to accommodate a team of 4-6 technicians.
- Size: 4m x 6m

9. Players Preparation and Rest Area

- Players need spaces to relax, prepare, and focus before matches.
- Gaming stations for practice and warm-ups.
- Quiet Space for focus and relaxation.
- Size: 3m x 3m Per station



10. Lighting

• Lighting for players:

- Task lighting at gaming stations
- LED lights with adjustable color temperatures (3500K–5000K)
- Backlighting or ambient lighting can help reduce the contrast between the brightly lit screens and darker surroundings.

• Theatrical Lighting for Spectators:

- Use dynamic lighting, such as LED stage lights or RGB fixtures.
- Change colors and patterns based on game progress or event branding.

• Stage Lighting:

- Main stage lighting system should include spotlights, floodlights, and ambient LED strips to highlight players and equipment.
- Moving lights and customizable colors can be used for dramatic effects during player introductions or match victories.

11. Acoustic Treatment

- NRC 0.7 or Higher
- Adding Mass
- Sealing Gaps
- Floating Floors
- Double Glazed Window

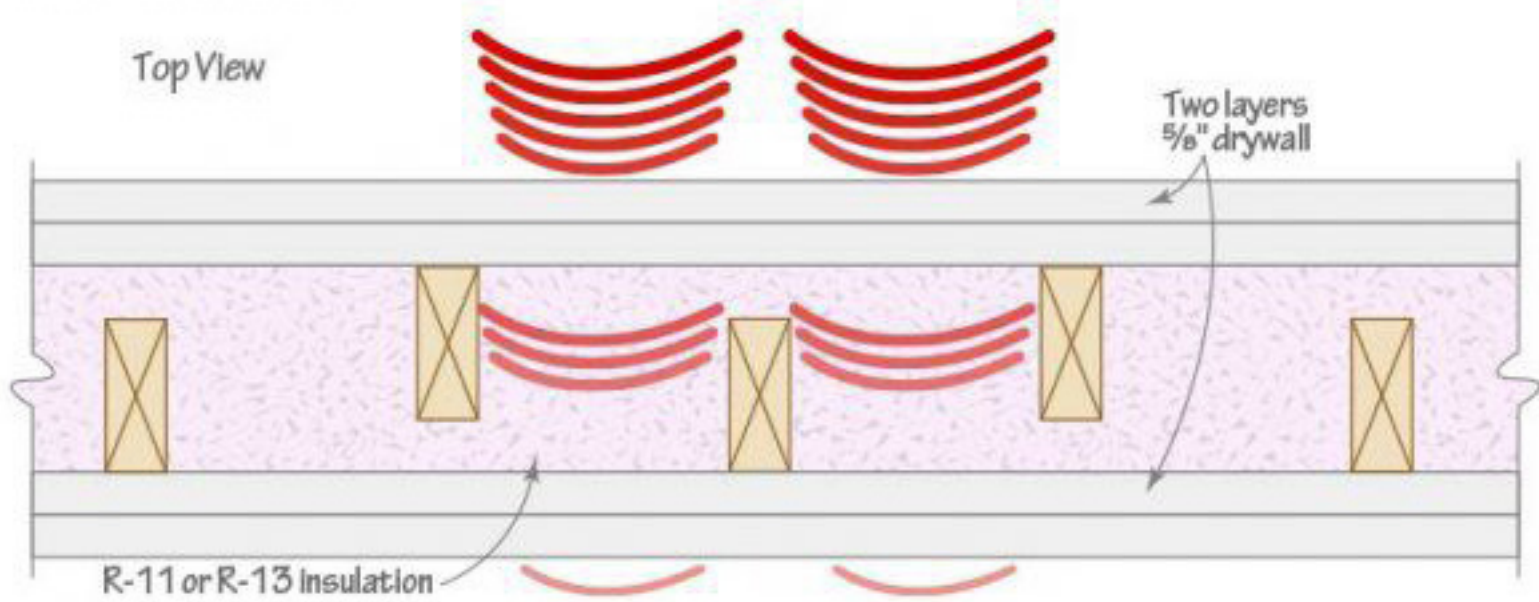


Fig:Adding mass

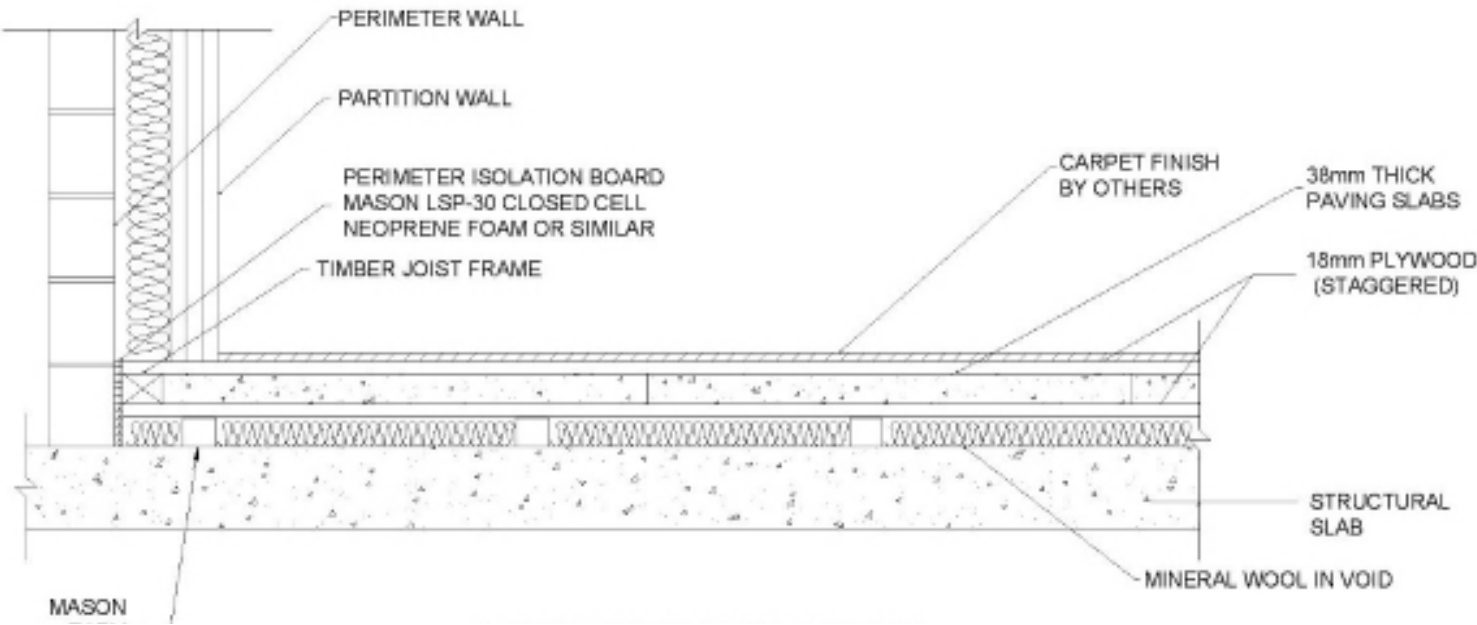


Fig:Floating floor

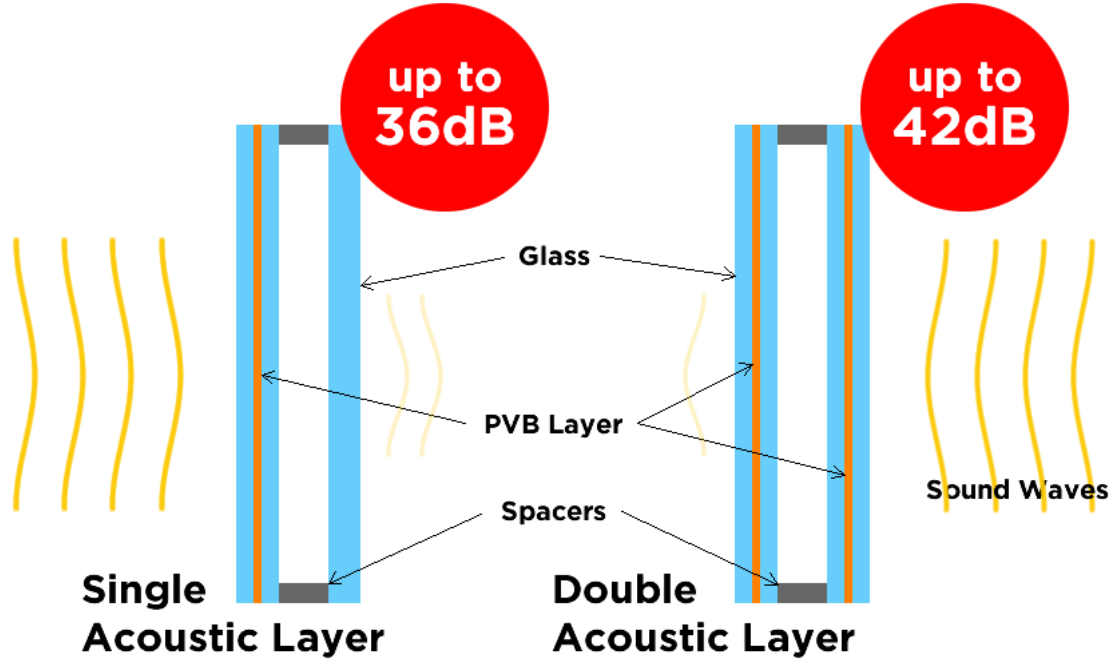
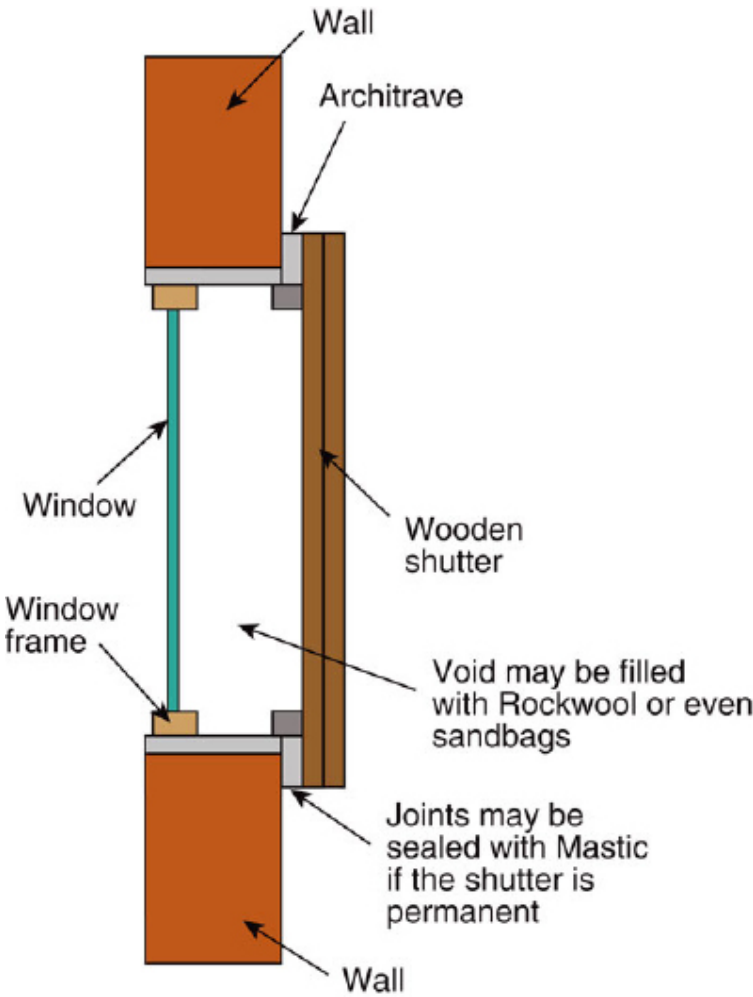


Fig:Double-Glazed Window





MASTER PLAN
SITE AREA: 34575.62 m²(69-11-3-0)
BUILT UP AREA: 10703.46 m² (31%)

SECTION AT A-A



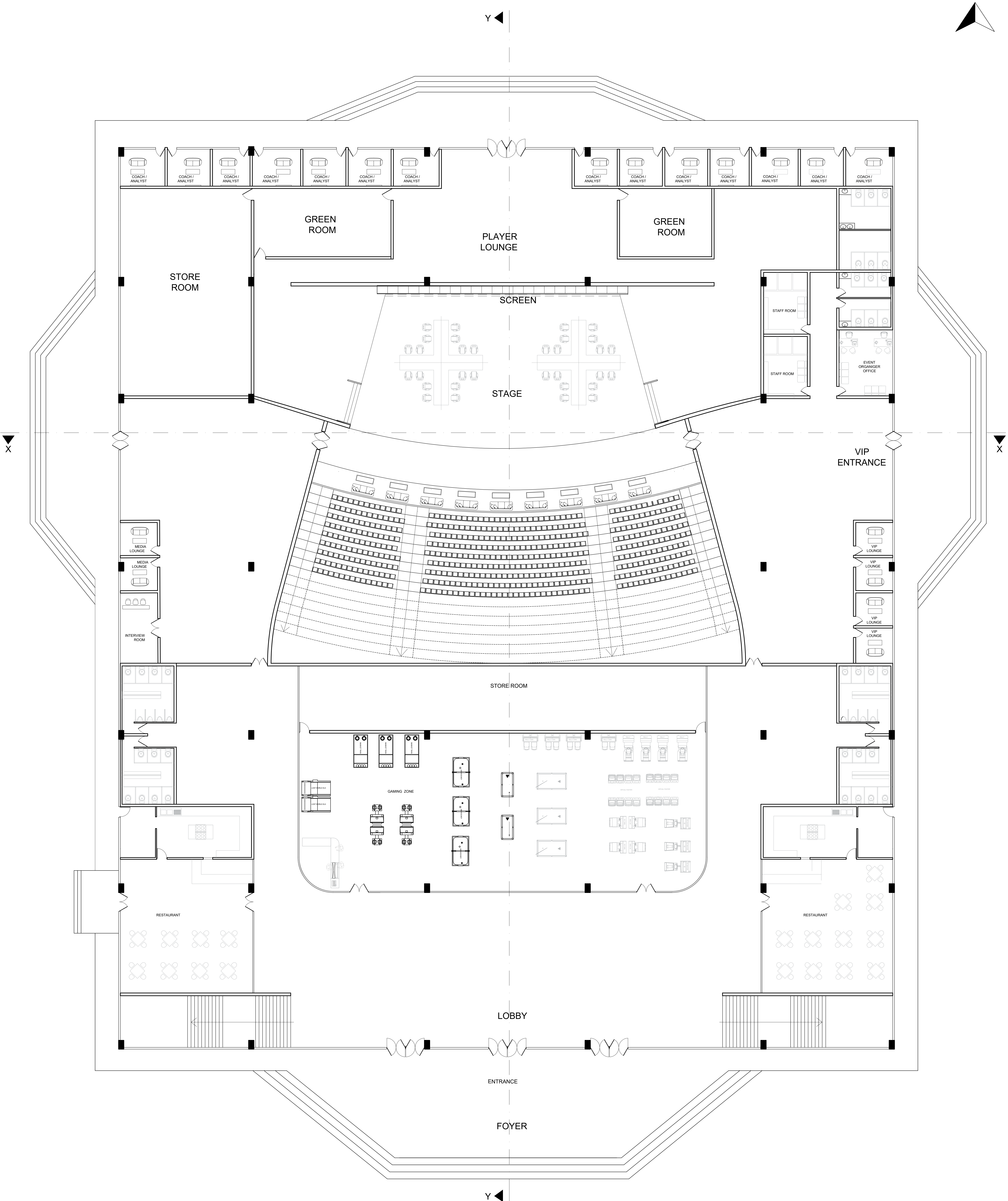
- INDEX**
- GUARD HOUSE
 - TICKET COUNTER
 - ARENA
 - MARKET PLACE
 - BOOT CAMP
 - ADMINISTRATION
 - RECREATIONAL BLOCK
 - POWER BACKUP

PARKING
AREA: 6154.29 m² (17.8%)
No of 4 Wheelers: 100
(15%-20% of Visitors)
No of 2 Wheelers: 650
(60%-65% of Visitors)

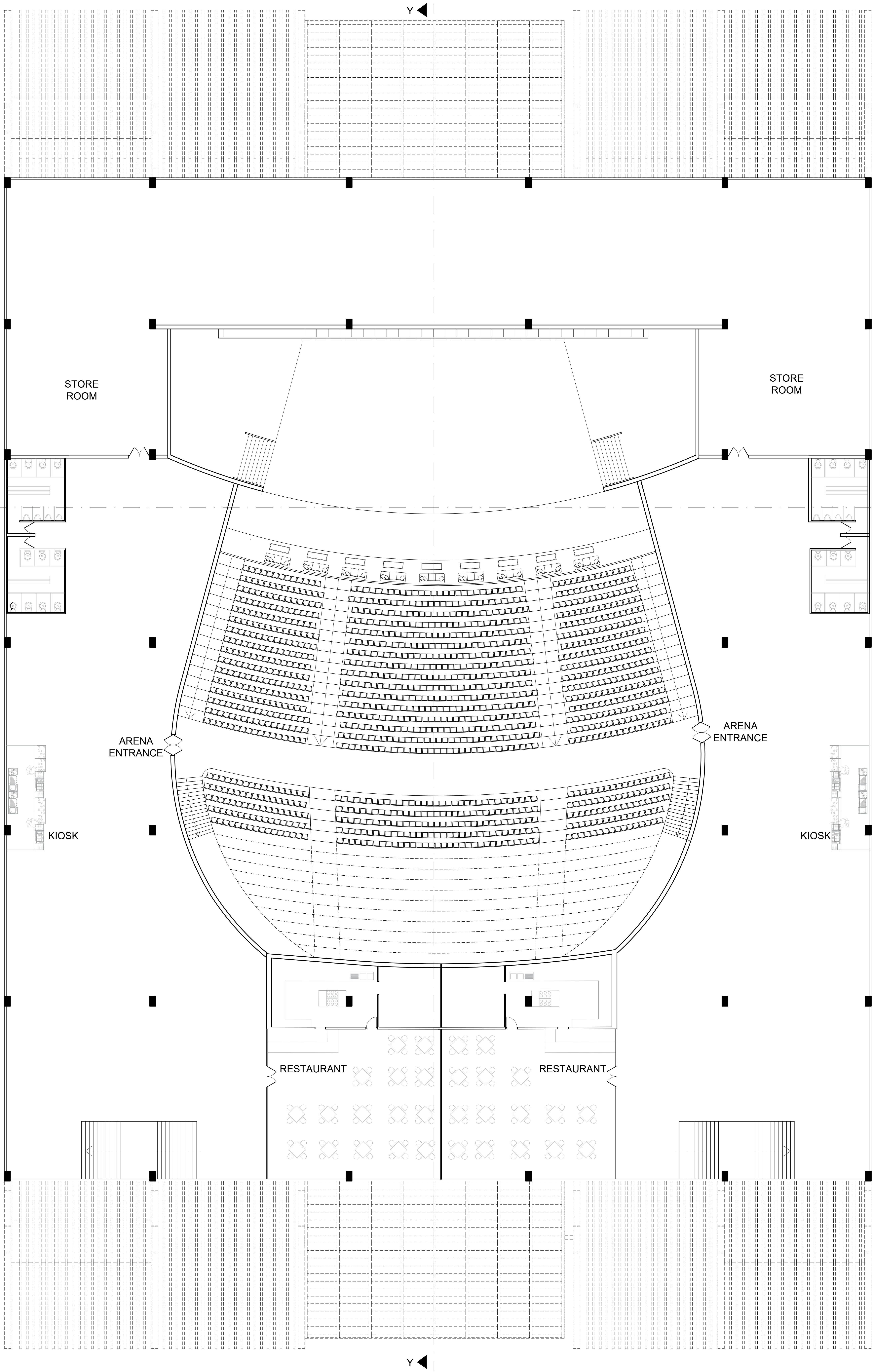
SITE PLAN
SITE AREA: 34575.62 m²(69-11-3-0)



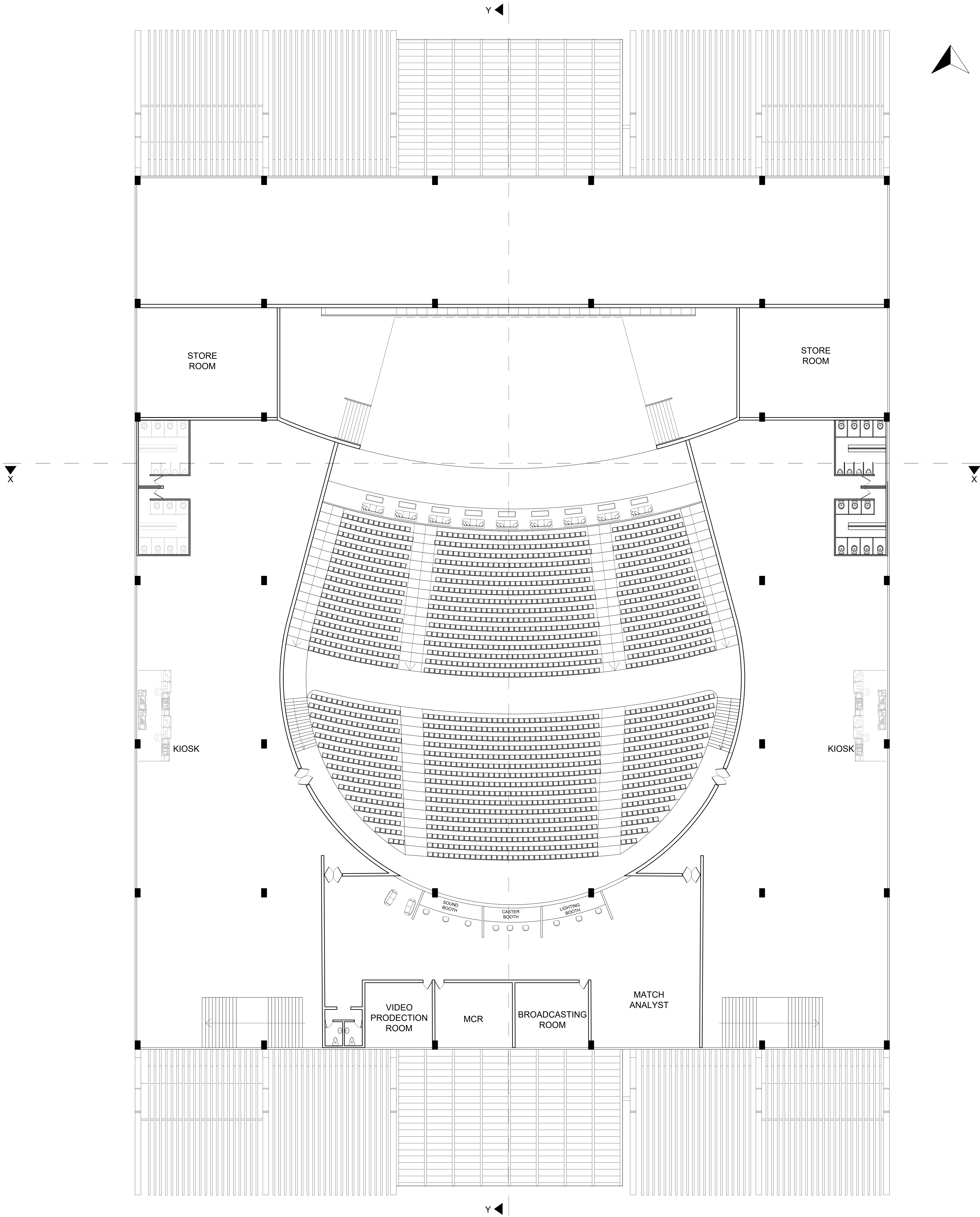
SECTION AT B-B



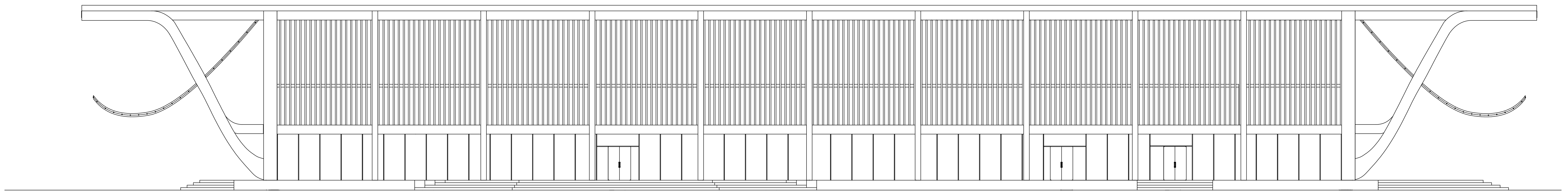
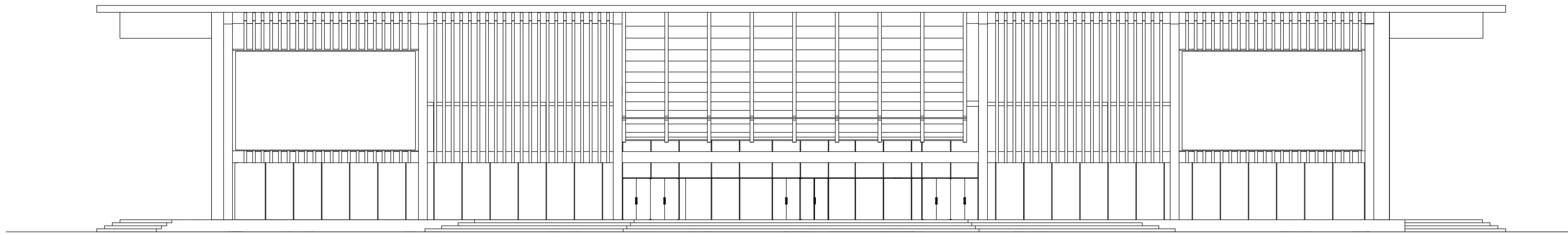
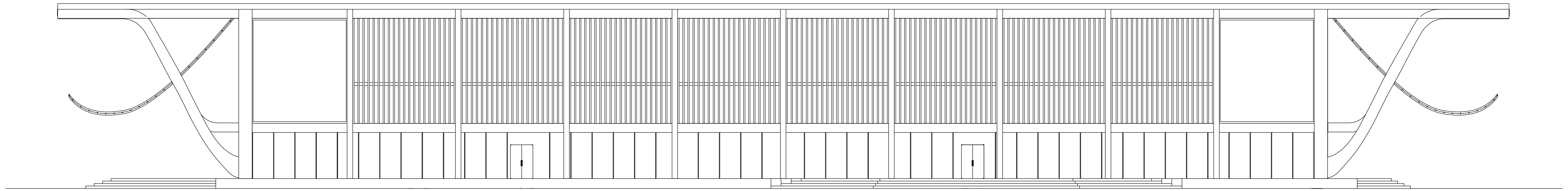
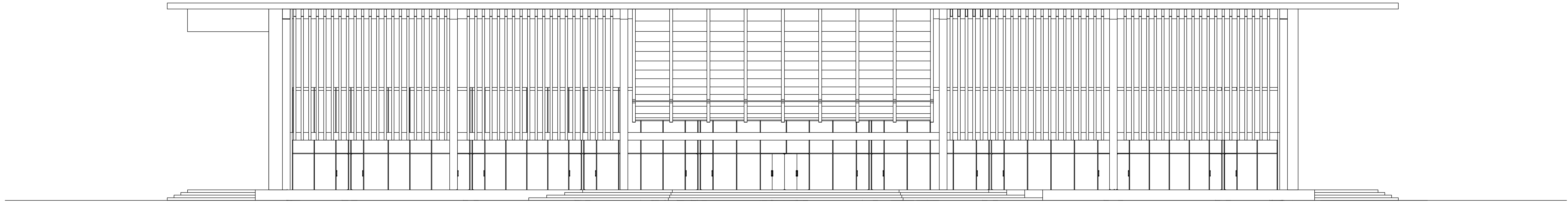
GROUND FLOOR PLAN
AREA : 5857.37 SQ.M



FIRST FLOOR PLAN
AREA : 4367.13 SQ.M



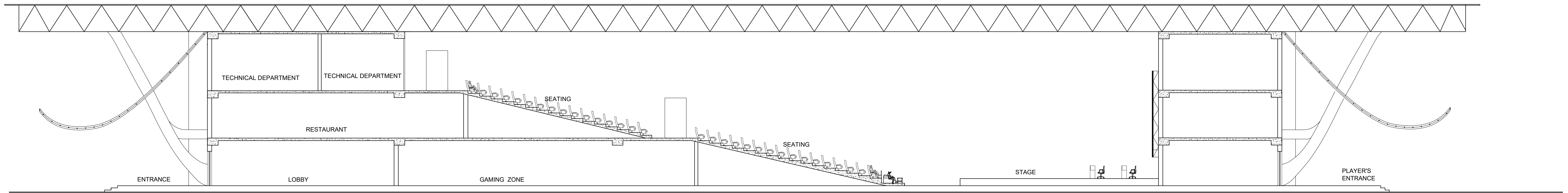
SECOND FLOOR PLAN
AREA : 4367.13 SQ.M



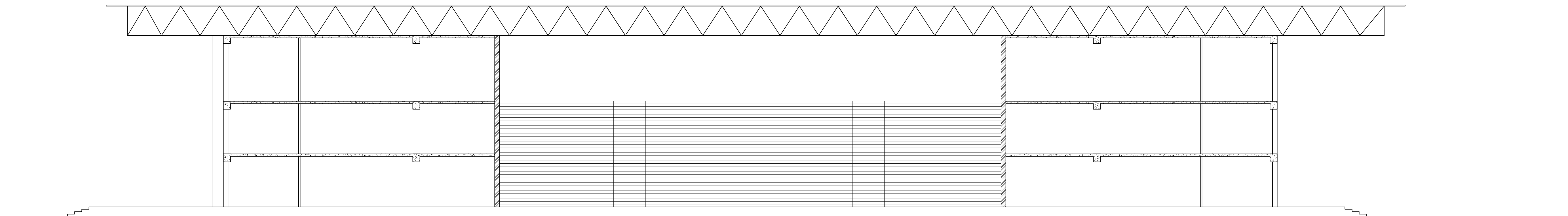
PURBANCHAL UNIVERSITY
KHWOPA ENGINEERING COLLEGE
DEPARTMENT OF ARCHITECTURE
LIBALI, BHAKTAPUR

THESIS: TECHNO HUB
(HUB FOR DIGITAL GAMING)

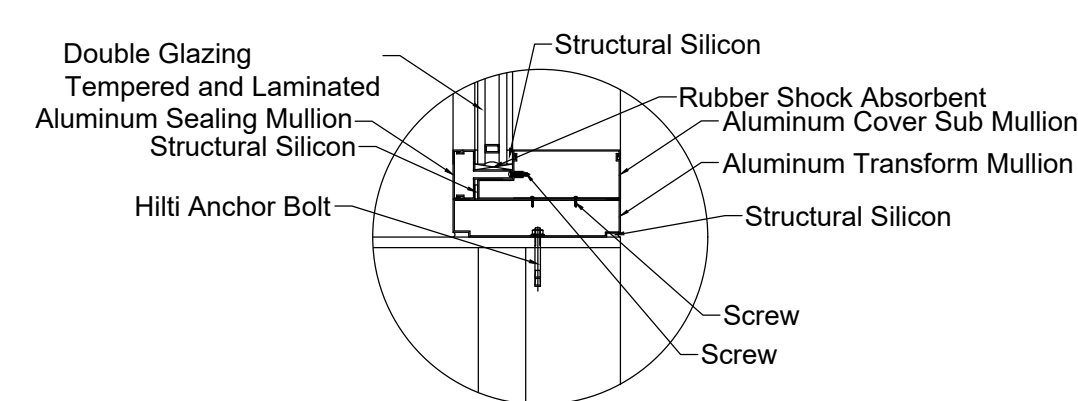
NAME : BIRENDRA CHHOSOKOSO
ROLL NO: 760111
SCALE : 1:100



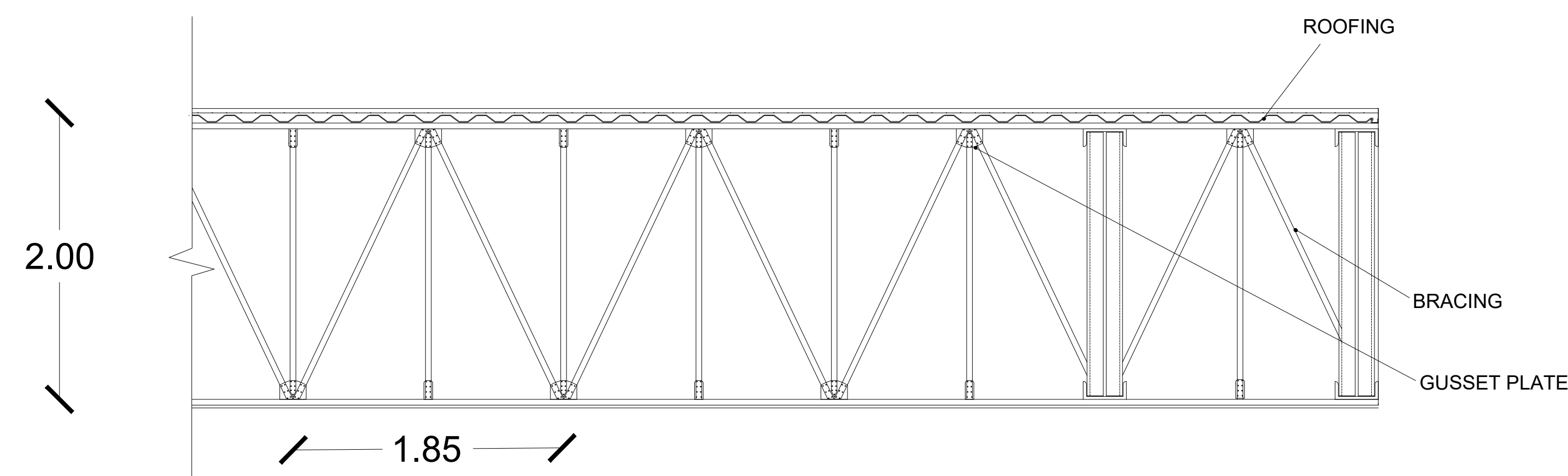
SECTION AT Y-Y



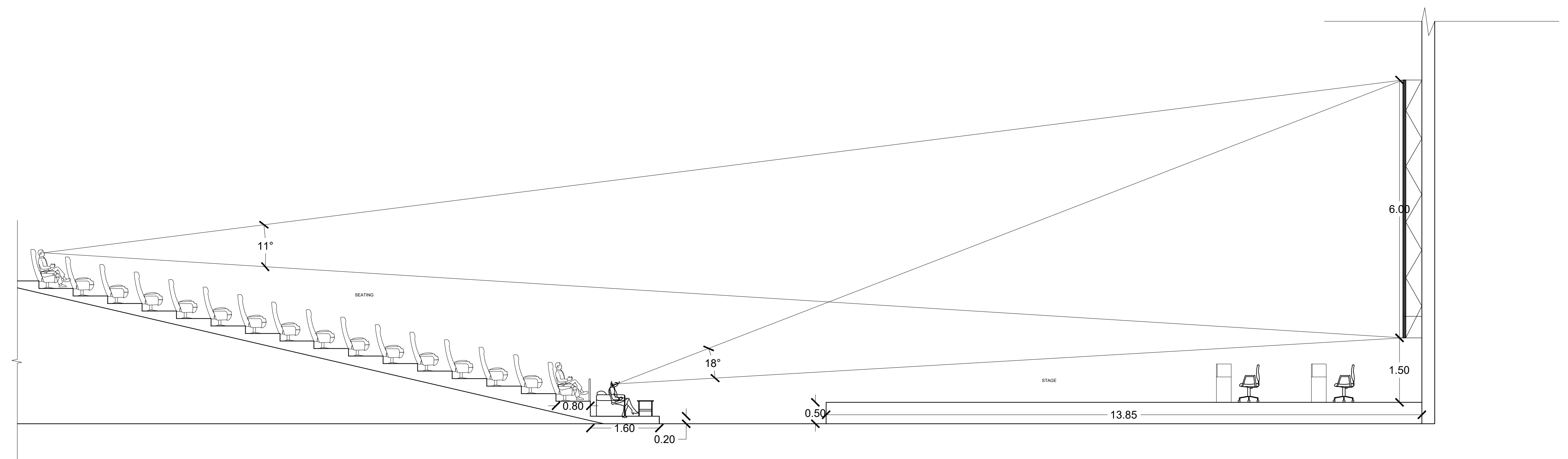
SECTION AT X-X



Detail WALL SECTION
Scale: 1:10

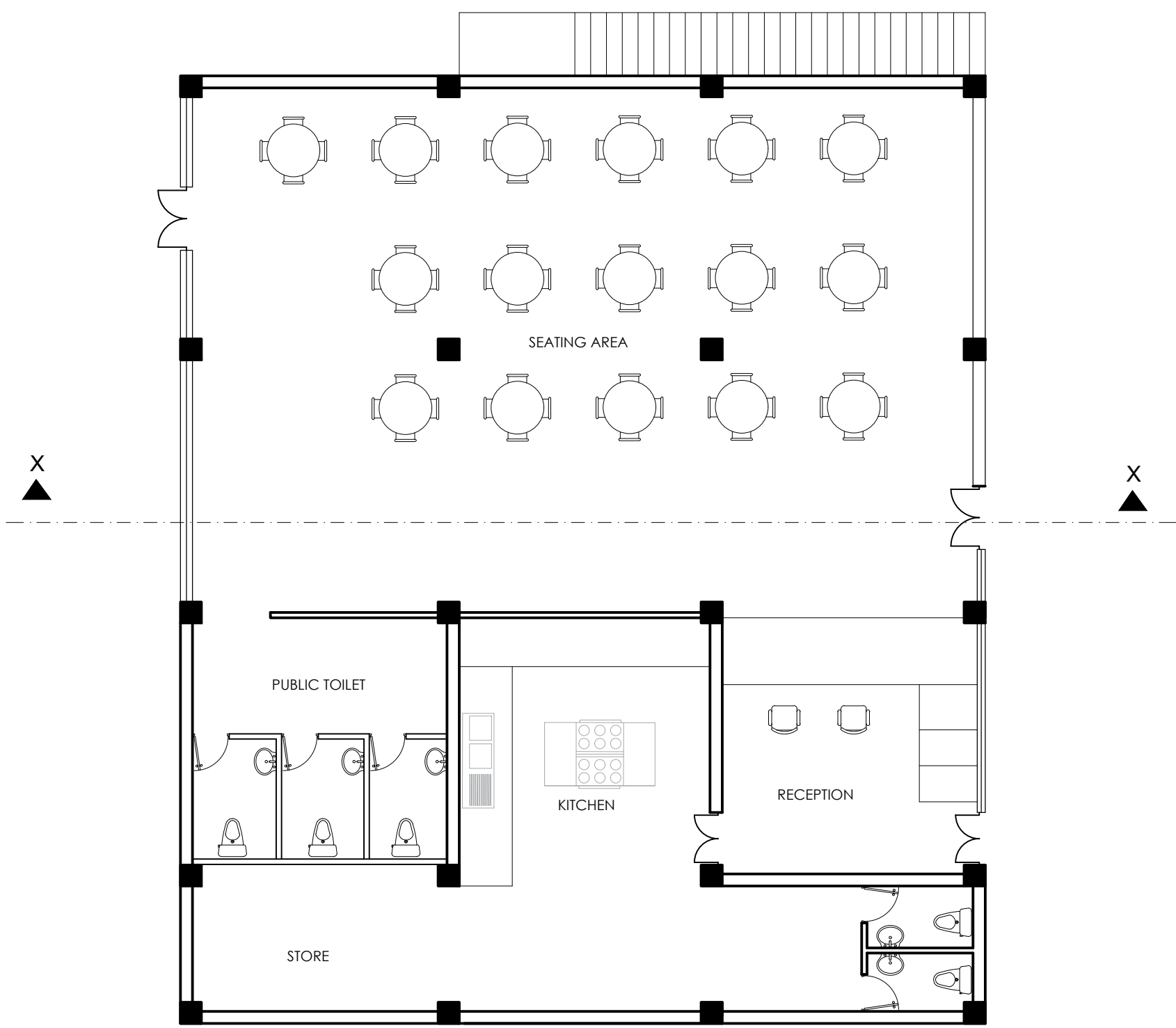


Detail ROOF SECTION
Scale: 1:25

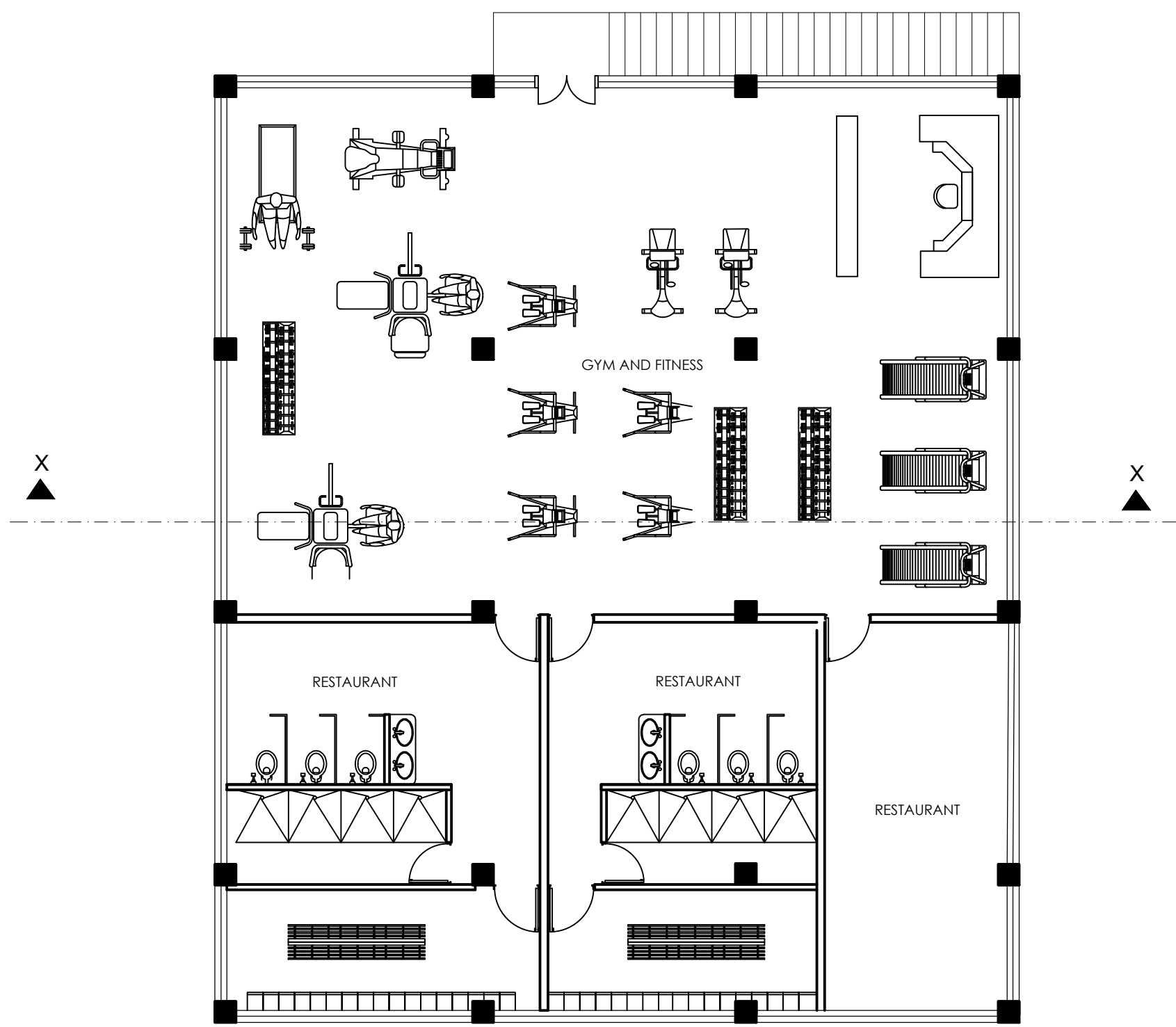


DETAIL SECTION OF
SEATING ARRANGEMENT
SCALE 1:50

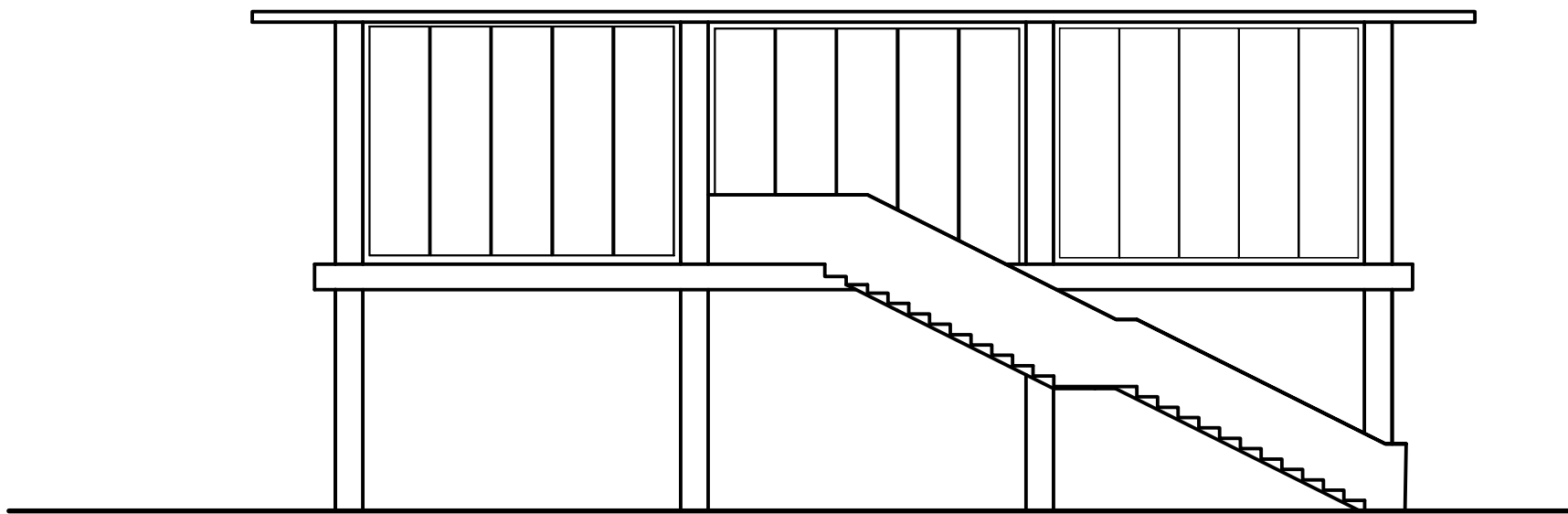
FITNESS BLOCK



GROUND FLOOR PLAN
AREA : 275.54 SQ.M



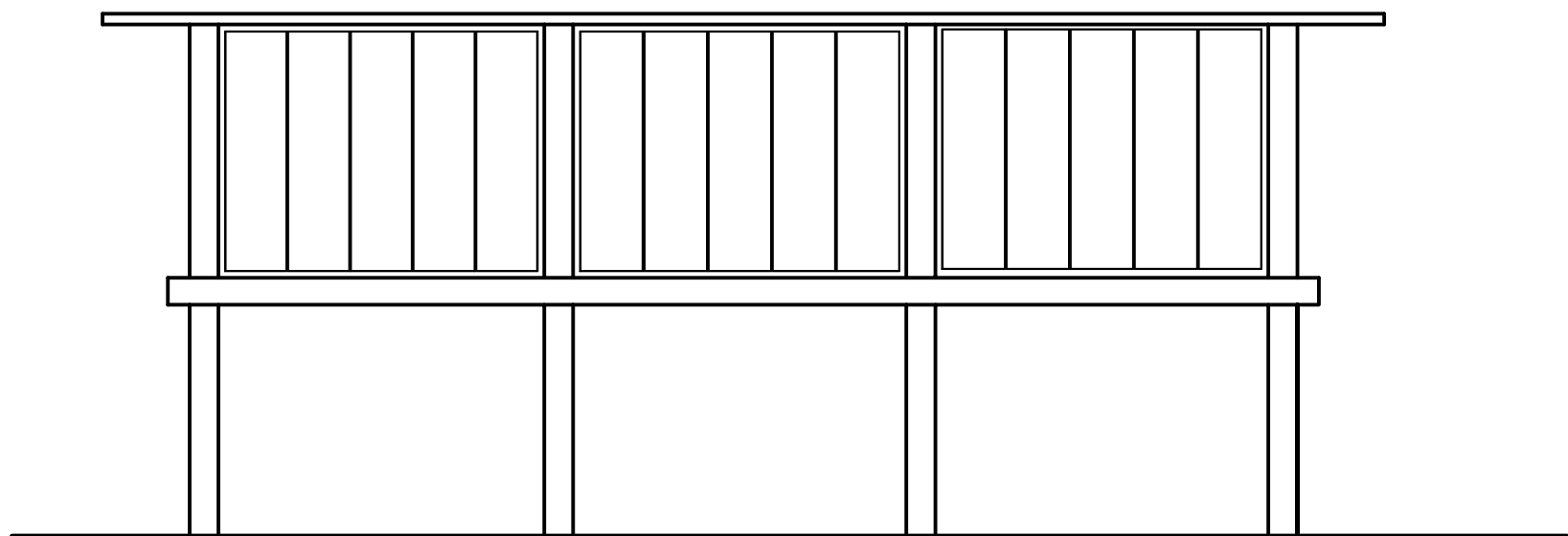
FIRST FLOOR PLAN
AREA : 275.54 SQ.M



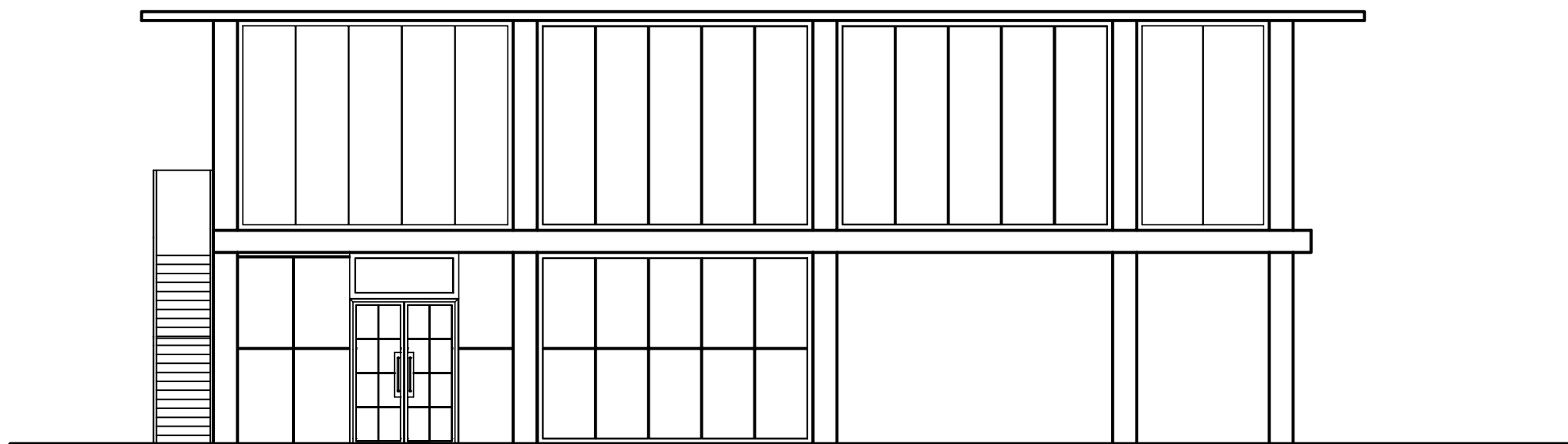
NORTH ELEVATION



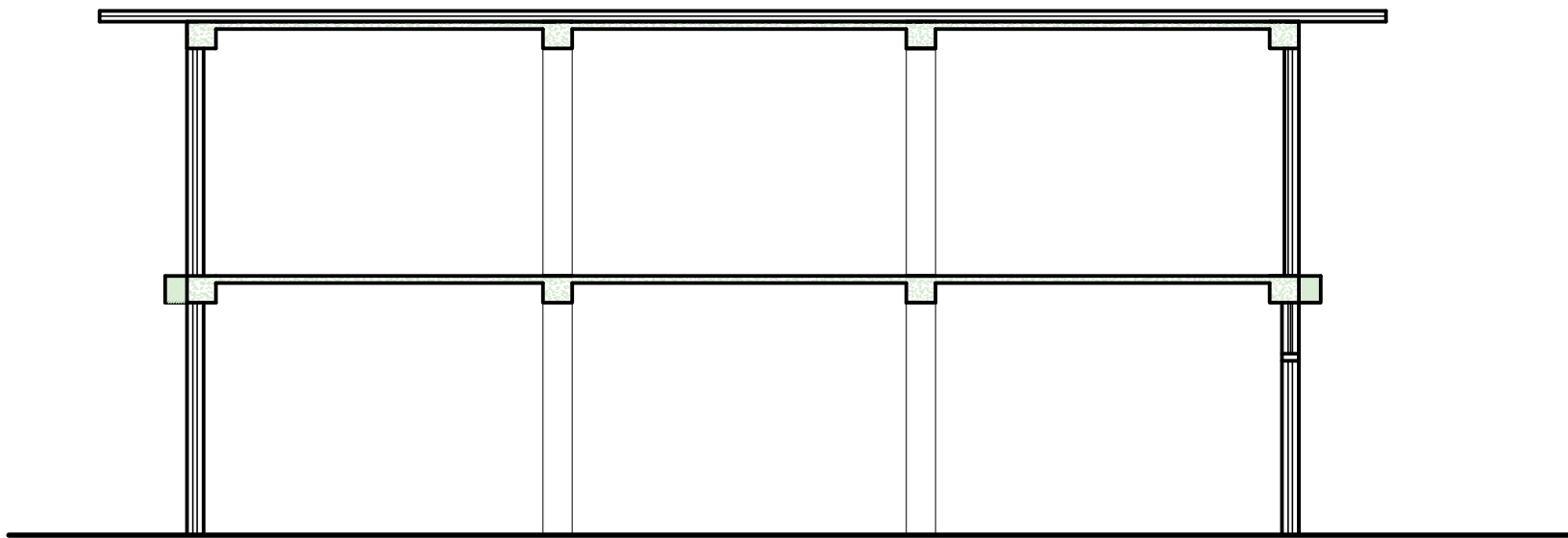
EAST ELEVATION



SOUTH ELEVATION

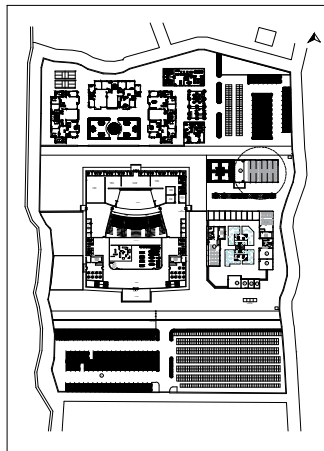
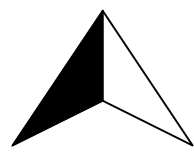


WEST ELEVATION

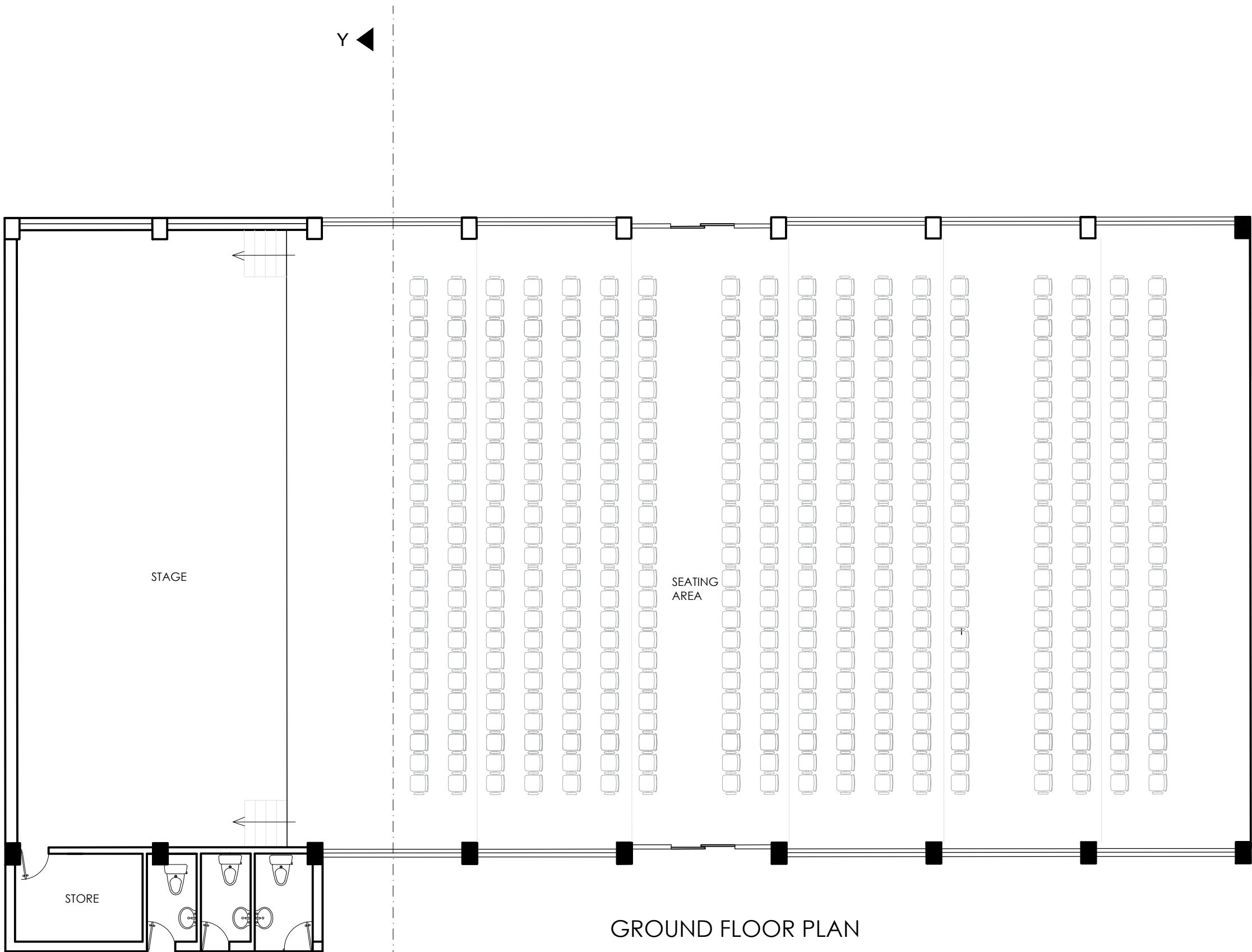


SECTION AT X-X

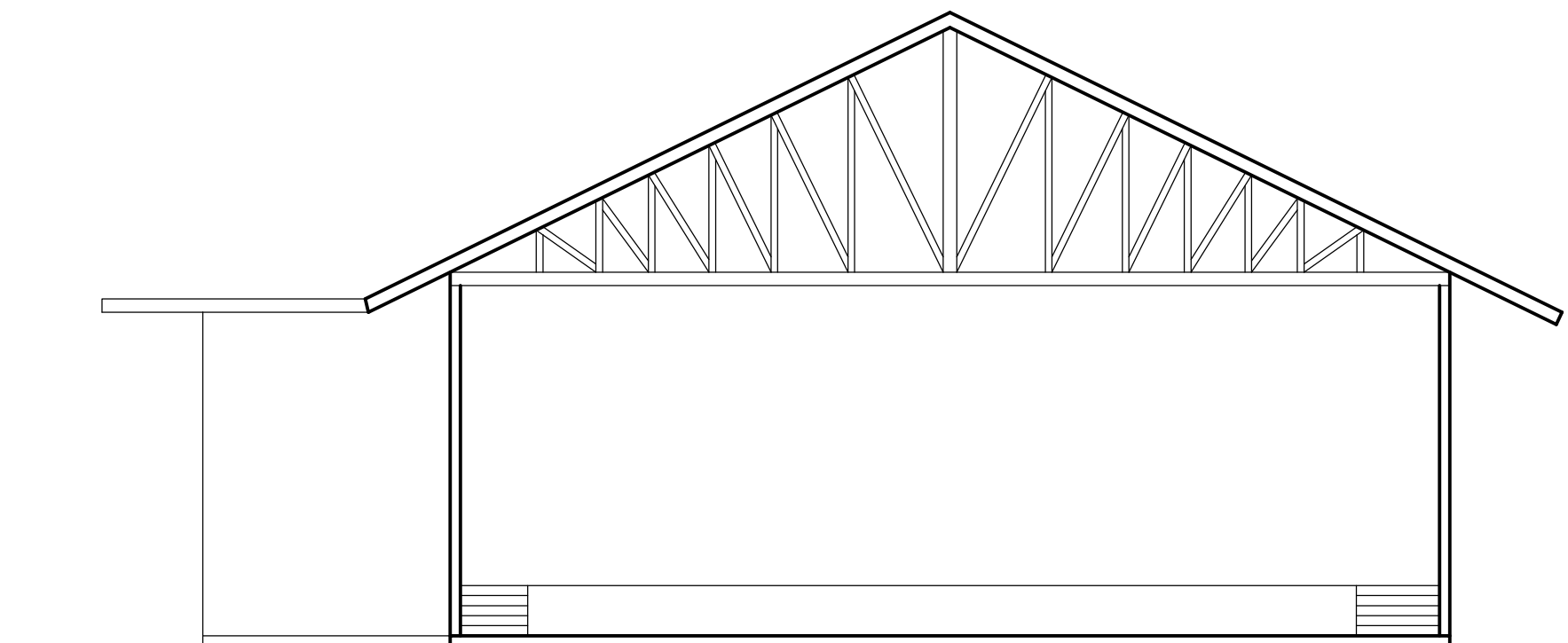
CONFERENCE HALL



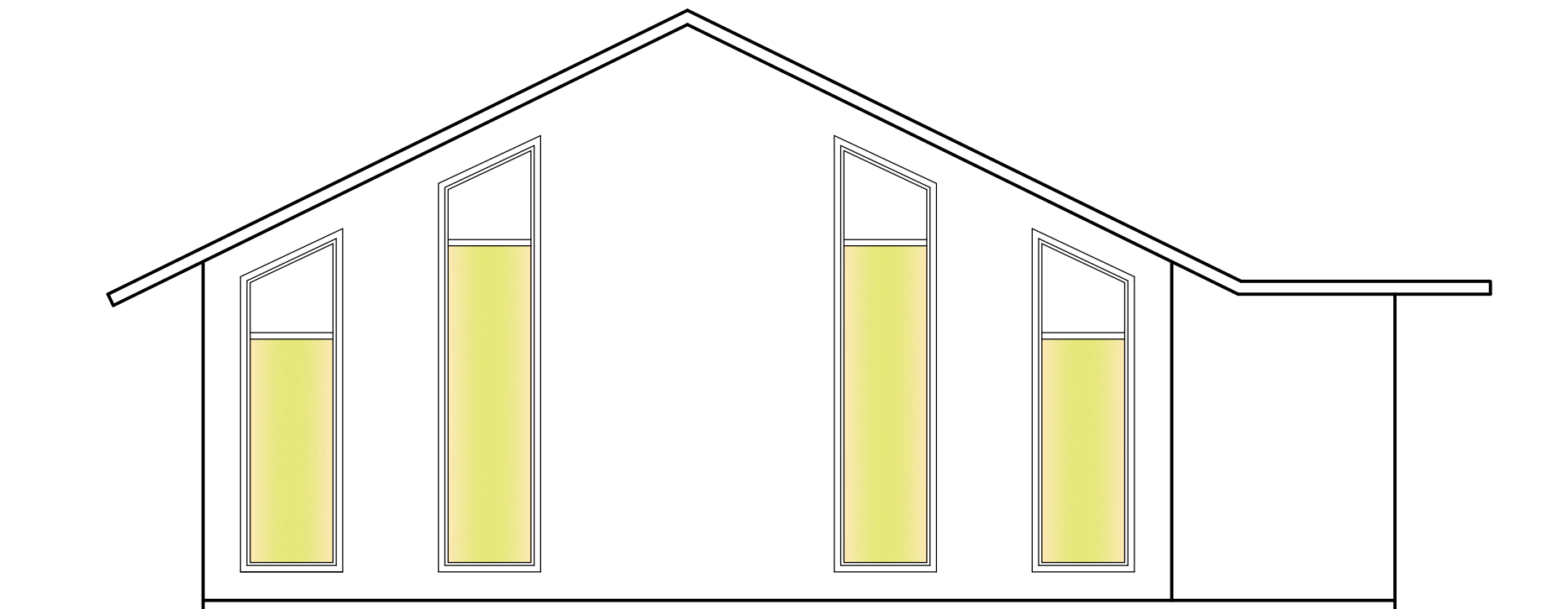
KEY MAP



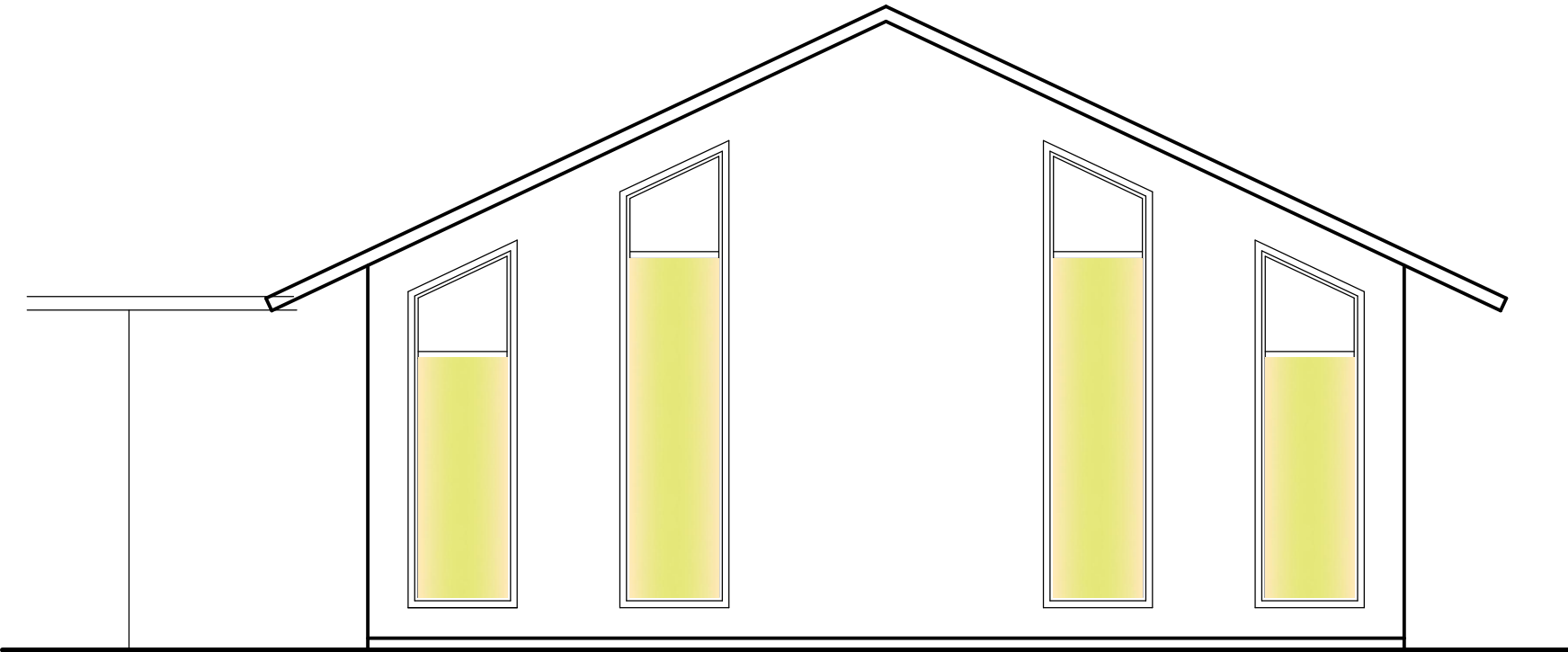
GROUND FLOOR PLAN
AREA : 474.28 SQ.M
CAPACITY : 400



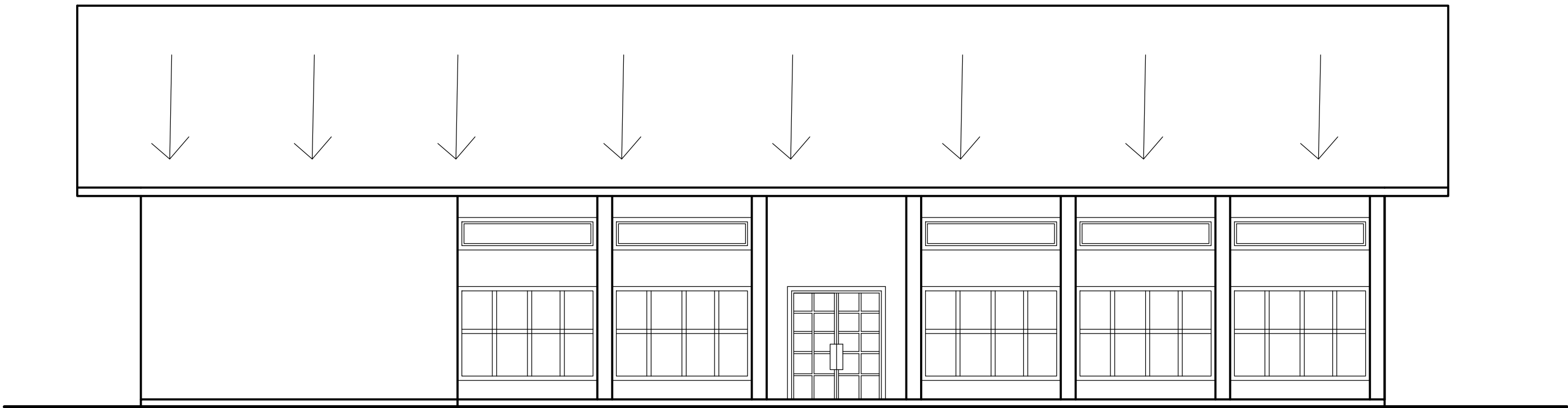
SECTION AT Y-Y



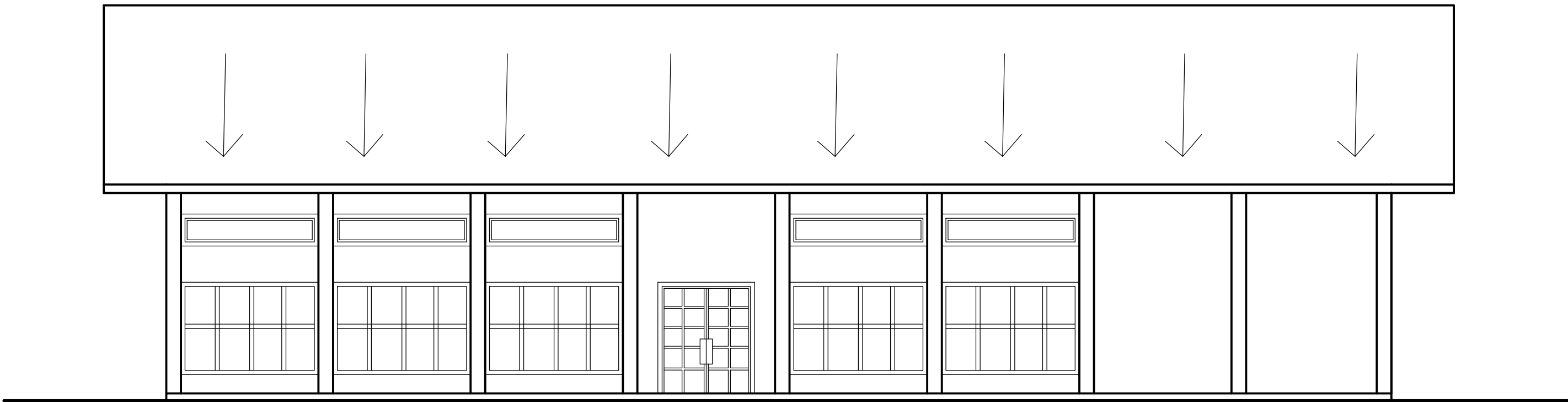
WEST ELEVATION



EAST ELEVATION



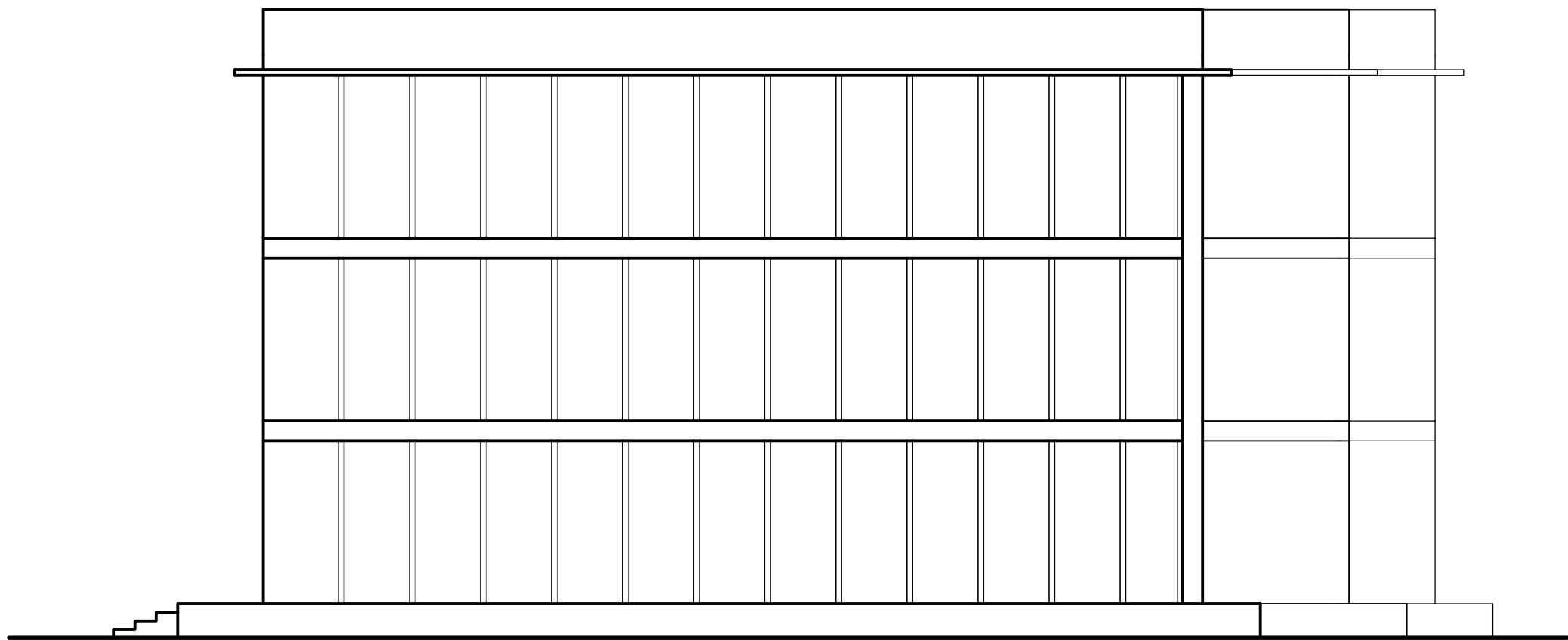
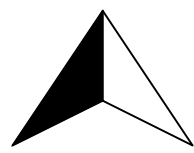
SOUTH ELEVATION



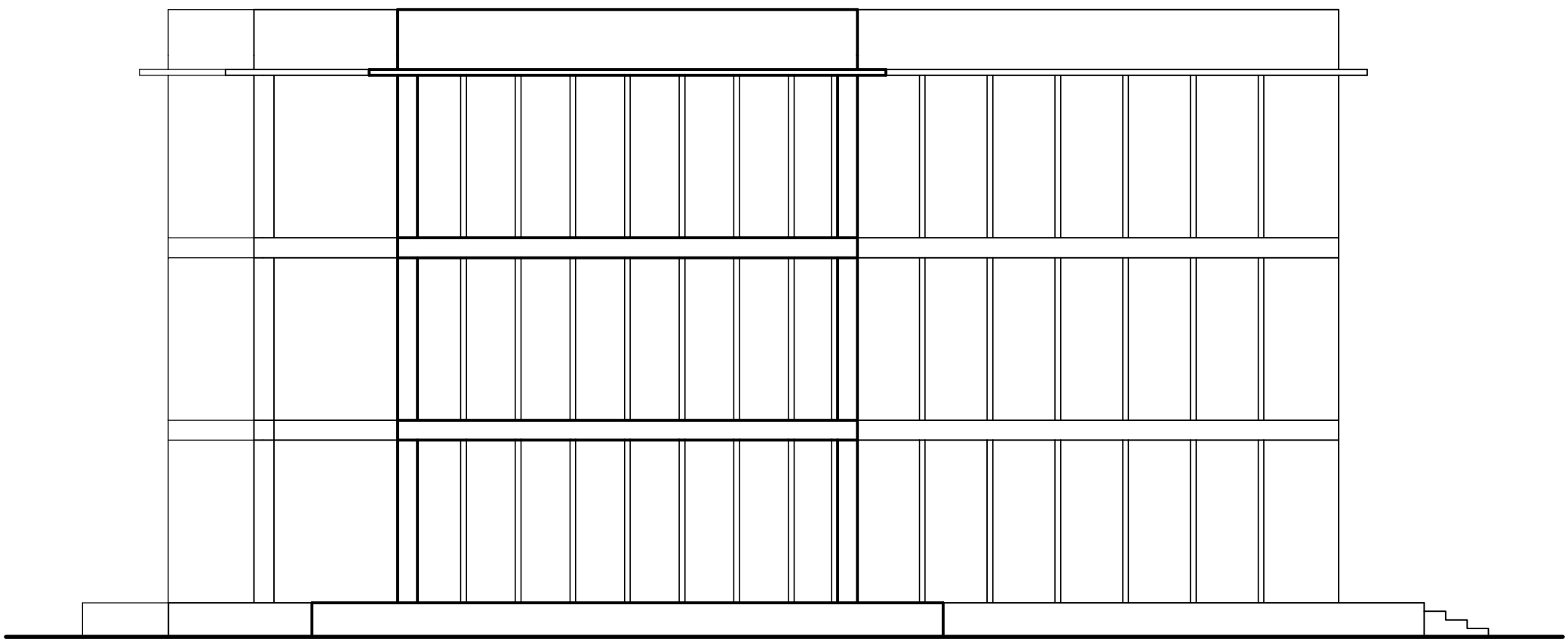
NORTH ELEVATION

BOOT CAMP (ACCOMODATION)

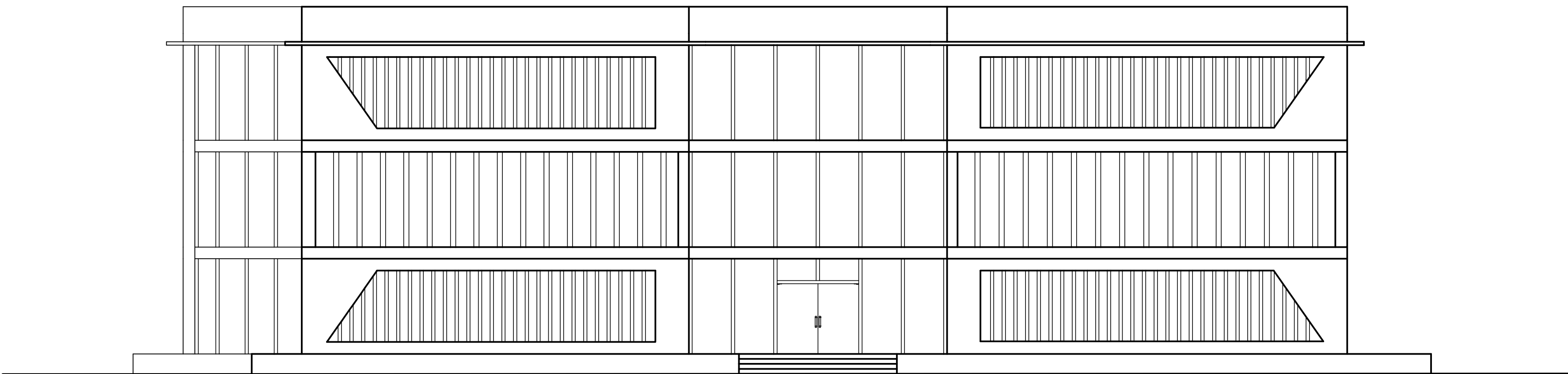
NO OF UNIT: 18



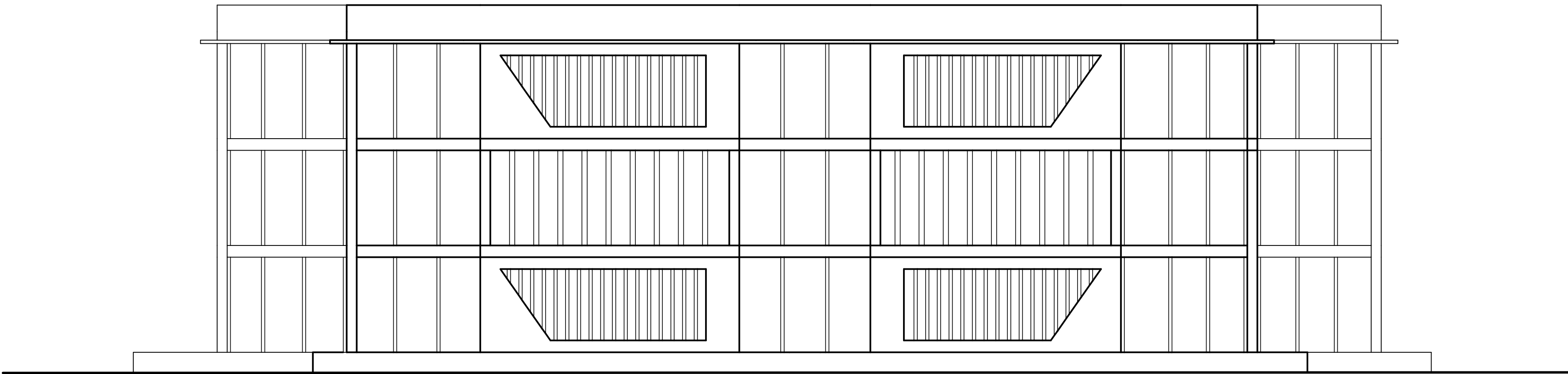
NORTH ELEVATION



SOUTH ELEVATION



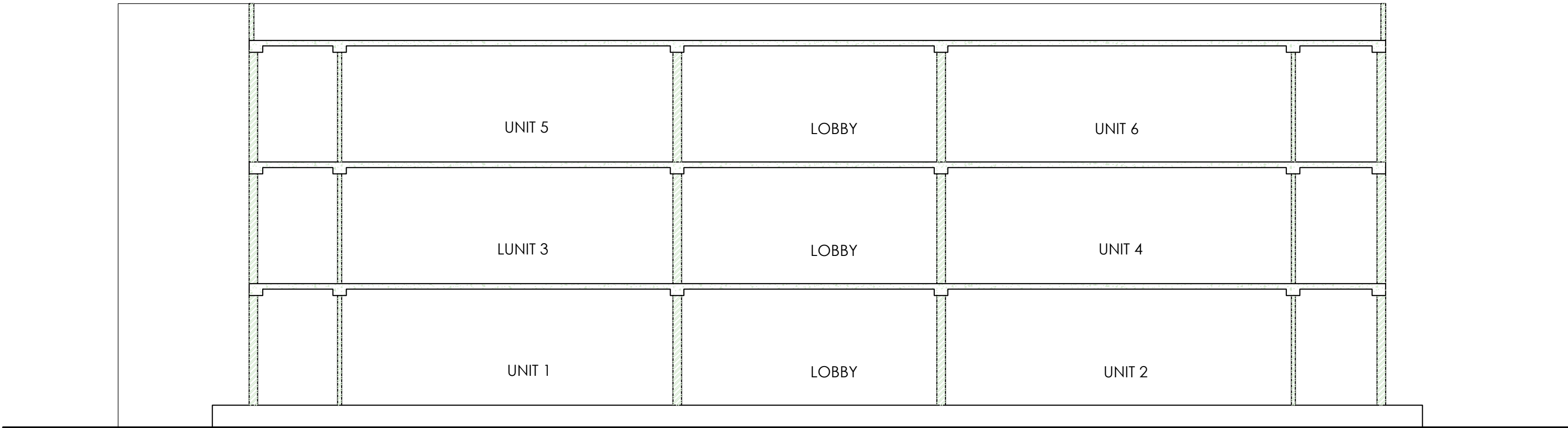
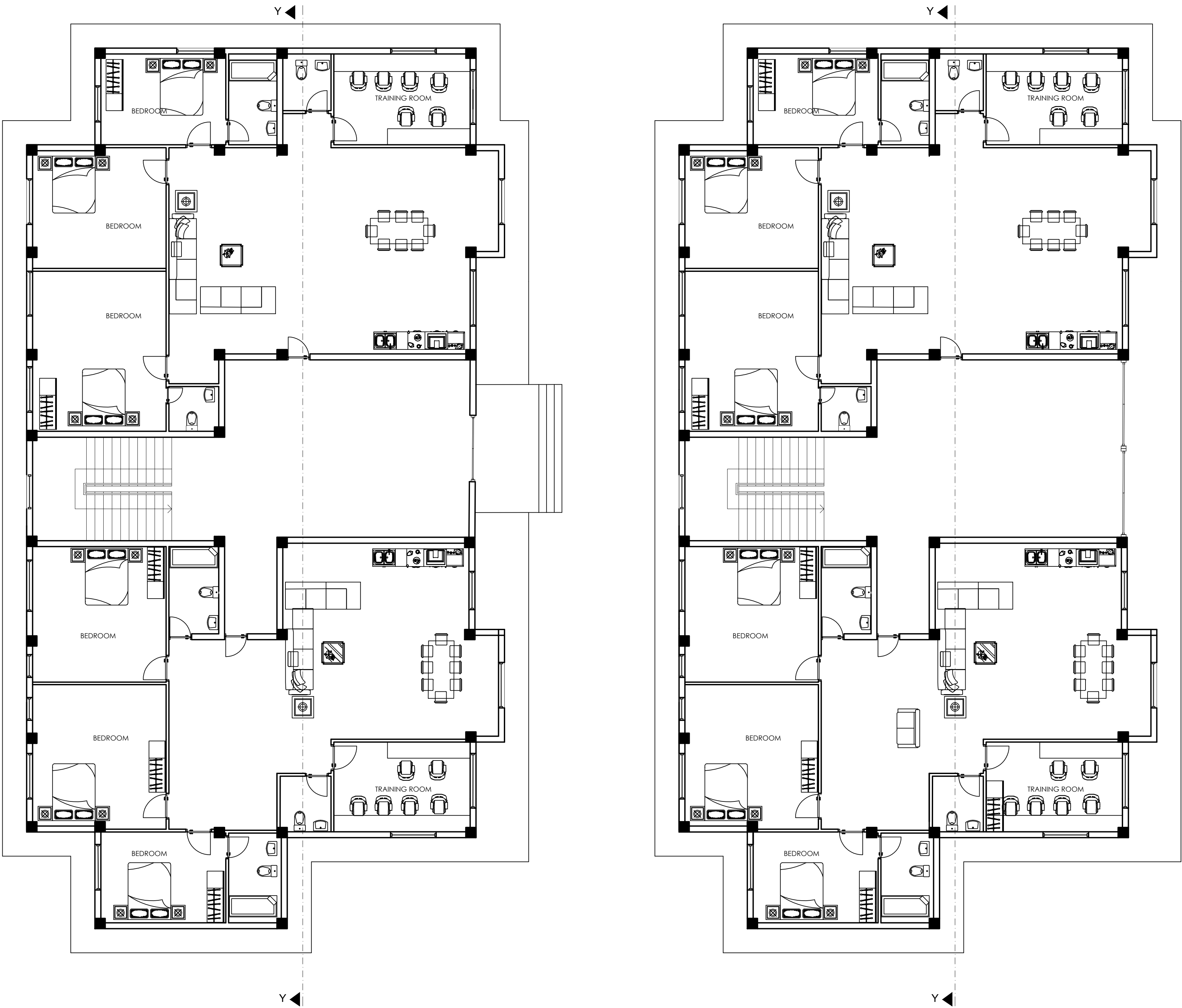
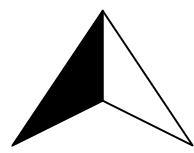
EAST ELEVATION



WEST ELEVATION

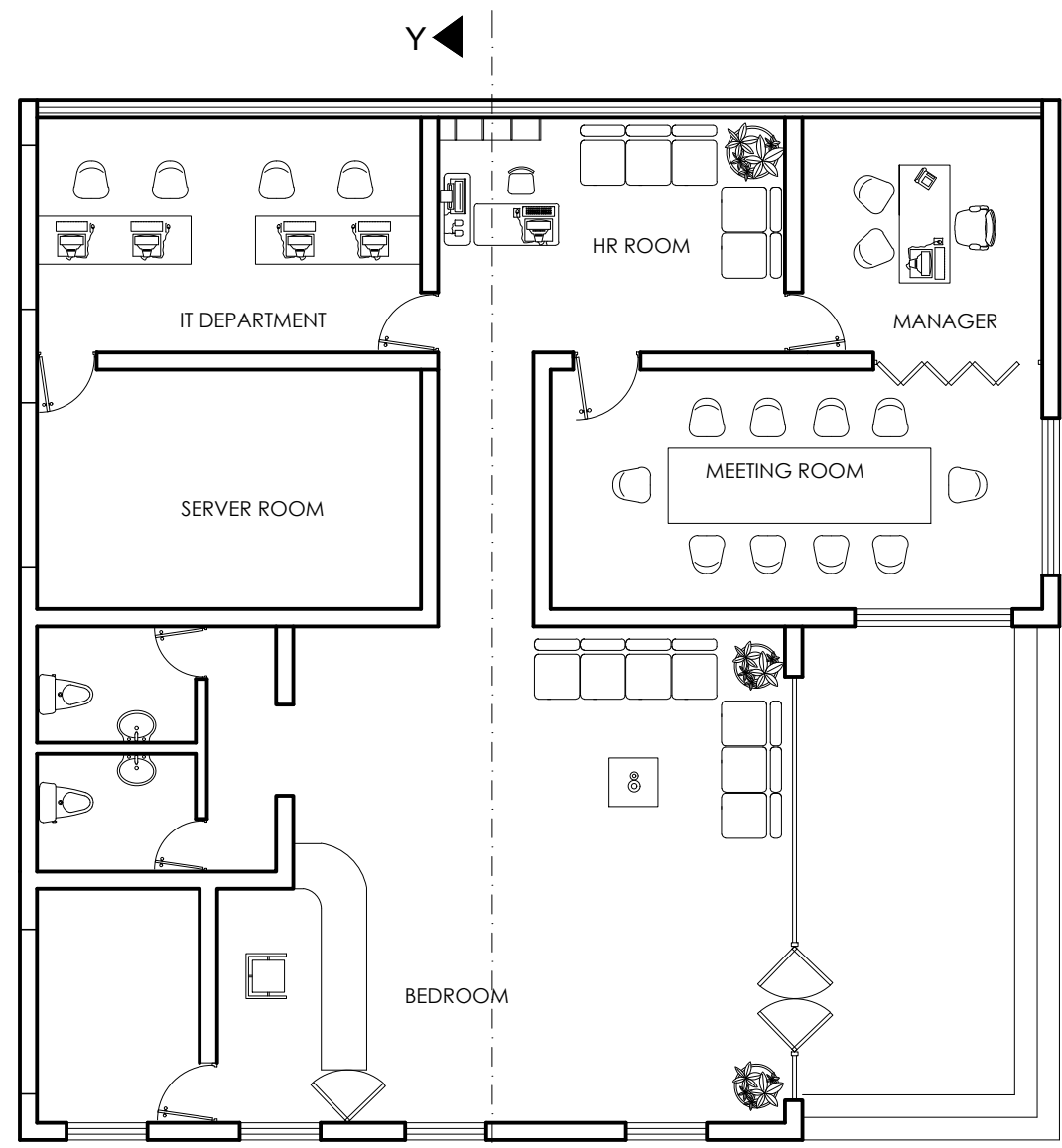
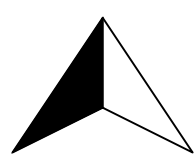
BOOT CAMP (ACCOMODATION)

NO OF UNIT: 18

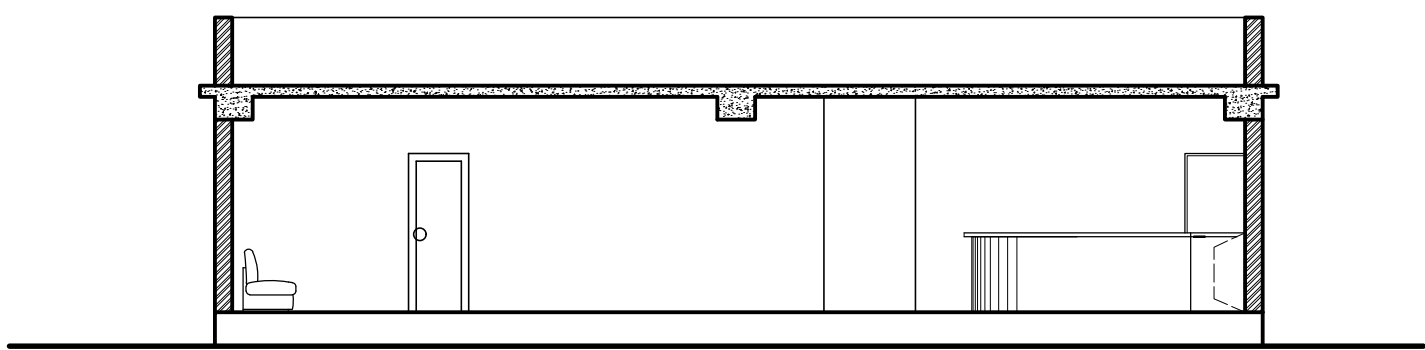


SECTION AT Y-Y

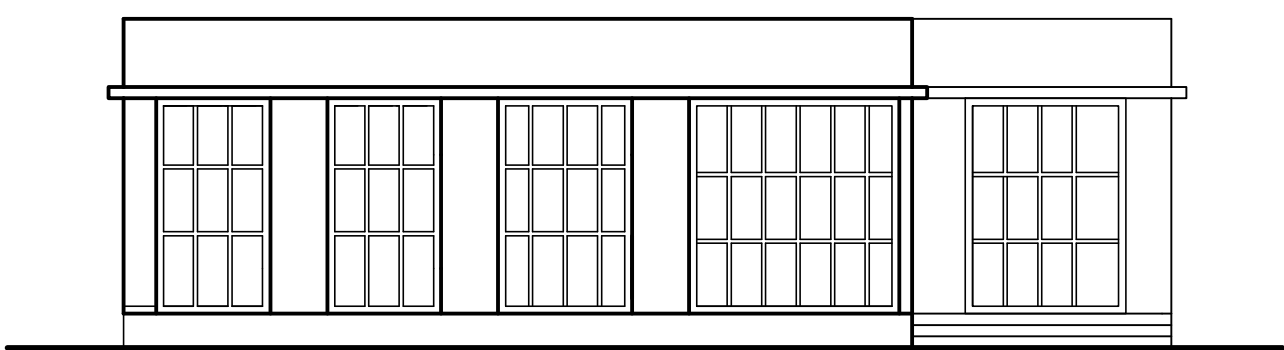
ADMINISTRATION BLOCK



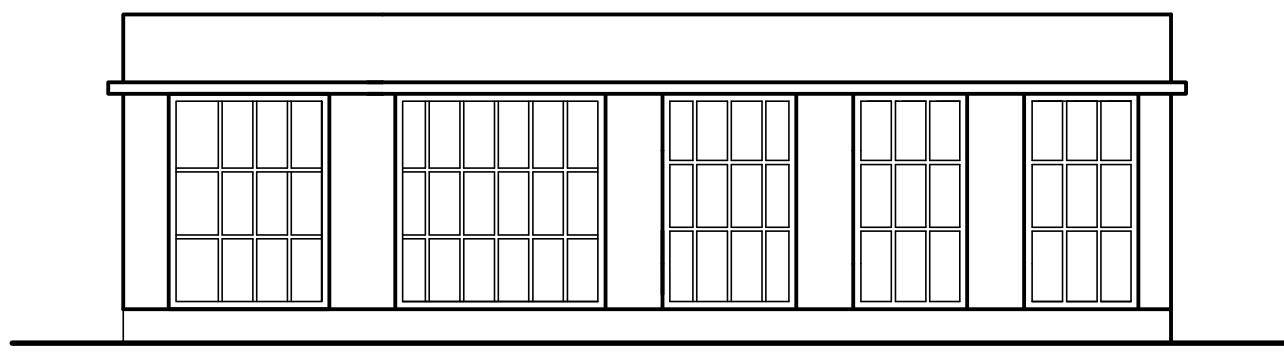
GROUND FLOOR PLAN
AREA : 192.09 SQ.M



SECTION AT Y-Y



SOUTH ELEVATION



EAST ELEVATION



WEST ELEVATION

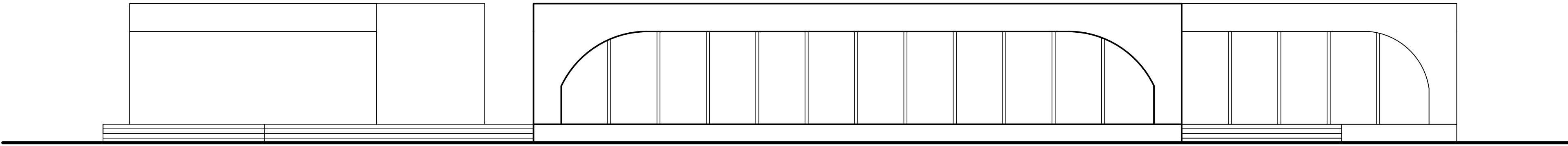


3D VIEW

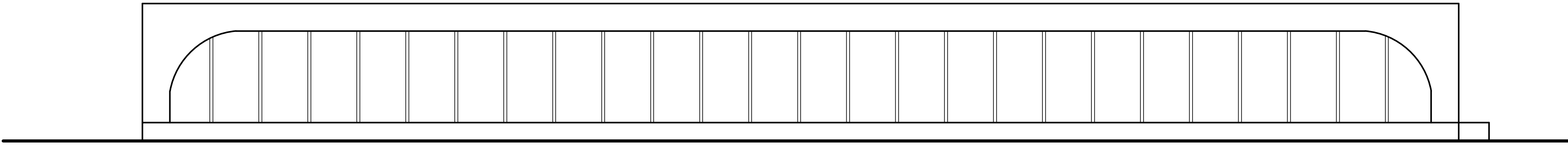
MARKET PLACE



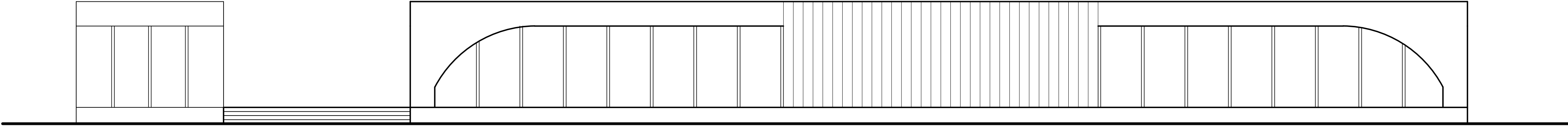
SECTION AT X-X



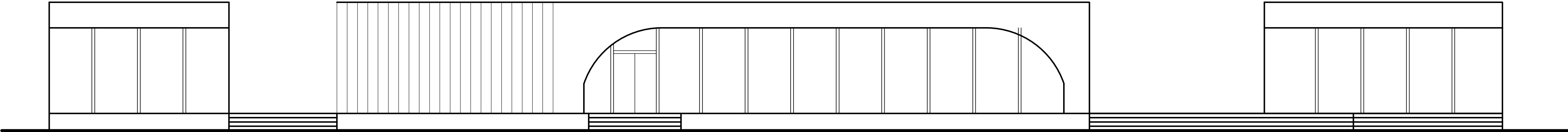
SOUTH ELEVATION



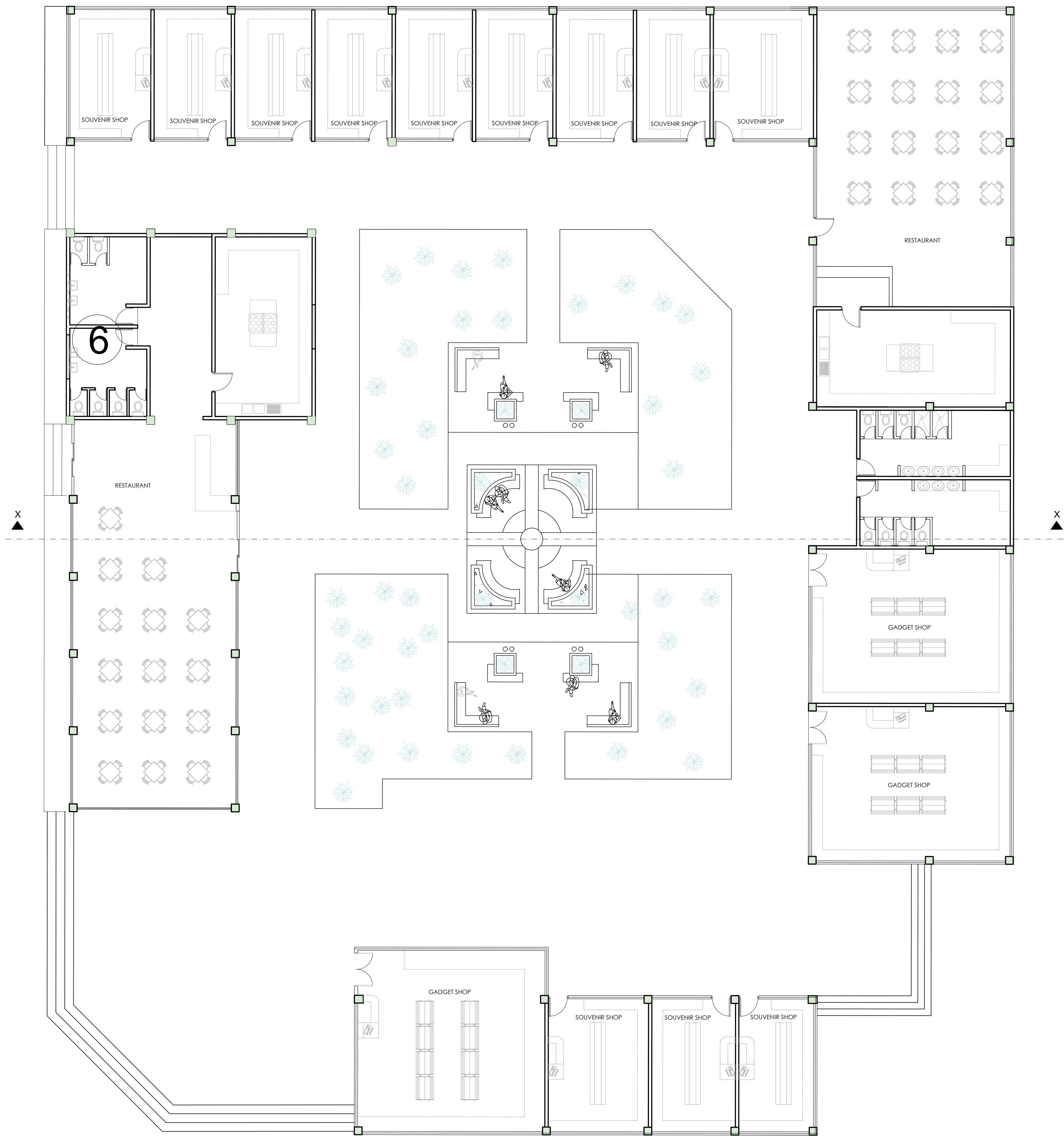
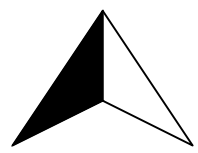
NORTH ELEVATION



EAST ELEVATION



WEST ELEVATION



GROUND FLOOR PLAN
AREA : 2162.26 SQ.M