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AETHRA NEXUS: DESIGN OF A BASKETBALL INTERNATIONAL ARENA IN SURABAYA CITY WITH A DECONSTRUCTIVIST ARCHITECTURE APPROACH

Femas Dwi Ramadhani [1*], Respati Wikantiyoso[1], Hery Budiyanto[1], Junianto[1]

[1] Architecture Study Program, Faculty of Engineering, Universitas Merdeka Malang
Jl. Puncak Jaya 36, Malang, 65146, Indonesia
**Email of Corresponding Author: femasdramadhani11@gmail.com*

ABSTRACT

The design of the "Aethra Nexus" Basketball International Arena in Surabaya is motivated by the need for an international-standard sports facility capable of strengthening the city's identity while supporting the national basketball ecosystem. Surabaya was selected due to its strong fan base, adequate infrastructure, strategic position as Indonesia's second-largest metropolitan city, and the active support of both government and private sectors in advancing the sports industry. This project adopts a deconstructivist architectural approach to generate an iconic form that is dynamic and expressive, while incorporating the infinity symbol (∞) as a representation of continuity, global connectivity, and limitless potential in the regeneration of athletes and sports culture. The concept also responds to critical issues such as unequal global access, excessive commercialization, athlete pressure, organizational stagnation, and gender disparities within the basketball community. Design innovation is realized through the application of sustainable design principles, the exploration of advanced materials, and the integration of a forest trail connected to an urban forest, serving as a recreational and ecological element that enhances spatial experience. This arena is expected to function as a hub for competition, collaboration, and continuous development, contributing to improved athletic performance, the growth of the creative economy, and the enhancement of Surabaya's sports tourism appeal.

Keywords: Basketball International Arena; Deconstructivist Architecture; Infinity Concept; Sustinable Design

INTRODUCTION

Indonesia has experienced rapid development in the field of sports, particularly basketball. The achievements of national athletes in various international competitions indicate that the coaching and development system within this sport has progressed significantly. However, the availability of international-standard competition facilities within the country remains limited. This condition hinders the organization of global tournaments and constrains athletes' preparation for international events. Therefore, the design of an International Basketball Arena is expected to address the existing gap in facility provision, strengthen urban identity through an iconic, dynamic, and expressive architectural form, incorporate a modern sustainable design approach, function as a landmark, and enhance the city's overall image.

The design of sports facilities, especially international-standard arenas, has evolved beyond serving merely as venues for competition and has become an essential component of urban infrastructure networks that support social, economic, and cultural activities. Sports arenas not only function as platforms for athletic events, but also contribute to the formation of inclusive public spaces, create dynamic social experiences, and reinforce a city's identity within the global context. According to contemporary studies on sports facility design, arenas must be responsive to user needs, environmental integration, and functional adaptability in response to evolving times and the demands of modern audiences (Akhmanova, 2025).

Within this context, Surabaya, as one of Indonesia's largest urban centers, possesses strong potential to host an international basketball arena designed not only as a sports facility but also as a globally competitive city icon. Surabaya has demonstrated a strong fan base and solid institutional support for sports development, making the design of the "Aethra Nexus" Basketball International Arena a relevant and urgent topic. A deconstructivist architectural approach is selected to create a dynamic and expressive form that reflects continuity and global connectivity, while also responding to contemporary issues such as unequal access to international-standard facilities and the need for sustainable athlete regeneration (Adhima Faidir & Ashadi, 2024).

The identification of issues concerning the role of sports arena architecture and its design response indicates that the development of sports facilities should not merely meet functional standards, but must also consider social, cultural, and aesthetic integration within contemporary urbanism. Therefore, this study aims to explore innovative design solutions through a deconstructivist architectural approach in order to create an international-class basketball arena that is sustainable, inclusive, and possesses high urban value.

LOCATION DESCRIPTION

The site selection for the "Aethra Nexus" Basketball International Arena in Surabaya was conducted by considering urban planning principles and the demand for international-scale sports facilities. The selected location must align with the Surabaya Spatial Plan (RTRW), particularly within zones designated for the development of public facilities, sports districts, commercial-service areas, or strategic urban zones. This ensures that the arena's development does not conflict with land-use regulations and is able to support the strengthening of Surabaya's role as a regional activity center (Figure 1).

Figure 1. Surabaya City Development Area Map

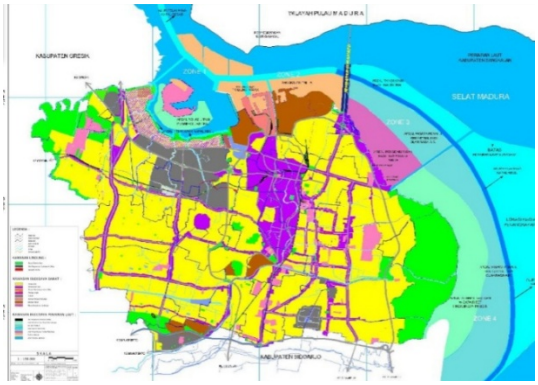

Figure 2. Surabaya City Spatial Plan (RTRW) Map

In terms of land availability, the site is planned to be located within an area of sufficient size to accommodate the arena's primary requirements, parking zones, public open spaces, and supporting facilities such as plazas, commercial areas, and integrated pedestrian pathways. In addition, accessibility and public transportation infrastructure constitute key considerations, as an international arena requires high connectivity to major road networks, mass transit systems, and convenient access from various parts of the city as well as from outside the region, including direct links to airports, terminals, and accommodation centers (Figure 2). From an environmental carrying capacity perspective, the location is selected within an area characterized by stable land conditions, situated outside flood-prone zones, and possessing potential integration with urban green spaces to support the sustainability concept. Therefore, the site selection process not only fulfills regulatory and technical requirements, but also contributes to the development of a representative, well-integrated, and sustainable sports facility that supports the long-term growth of Surabaya.

The selected site for the design is located on Jl. Jawar, Surabaya, Pakal District, Surabaya City, at coordinates -7.231205, 112.616571. The site has a total area of approximately 48.9 hectares, with existing conditions in the form of relatively open and undeveloped fishpond land (Figures 3–4). Based on the RDTR mapping identification, Site A is designated as SPU (Other), thereby allowing the development of large-scale public facility functions. Under the main site regulations, the maximum Building Coverage Ratio (KDB) is set at 50% or equivalent to 14.2 hectares, the maximum Floor Area Ratio (KLB) is 1.5 or equivalent to 42.3 hectares, and the minimum Green Open Space Ratio (KDH) is 20% or approximately 5.64 hectares. Furthermore, within the area development plan, the site is also allocated for an urban forest area of 6.5 hectares, which has the potential to become a major supporting element in strengthening green space provision and reinforcing the sustainability concept of the development area.

Figure 3. Existing Site Map

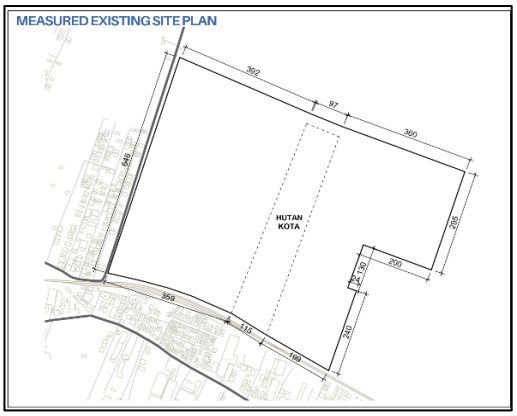

Figure 4. Measured Existing Site Plan

From an accessibility perspective, the site has direct connectivity to the collector road network, namely Jl. Jawar Surabaya, which runs along the edge of the site, thereby supporting convenient access from various directions within the city. The availability of a large land area and the existing fishpond conditions provide high flexibility for building massing development, vehicle circulation planning, and the creation of public open spaces. However, the environmental conditions in Pakal District present several challenges that must be addressed through appropriate design strategies, such as the potential for annual flooding caused by overflow from rivers and fishpond areas, air pollution issues resulting from heavy vehicle traffic and infrastructure projects, as well as contamination from liquid waste generated by small-scale home industries. In addition, the presence of the Benowo Waste-to-Energy Power Plant (PLTSa Benowo) may also generate emission impacts that could increase the risk of health disturbances, particularly acute respiratory

infections (ISPA) among children. Suboptimal drainage infrastructure further contributes to waterlogging during heavy rainfall, therefore requiring the site design to implement an adaptive and sustainable water and environmental management system.

THE SITE ANALYSIS

The site analysis process was conducted by identifying the existing conditions of the site, which subsequently generated several design responses aimed at addressing existing issues while developing the site's potential (Figure 5). The site conditions, which are generally divided into two separate areas separated by an urban forest, require design responses that are well integrated. The analysis resulted in an integrated spatial planning concept to support user mobility.

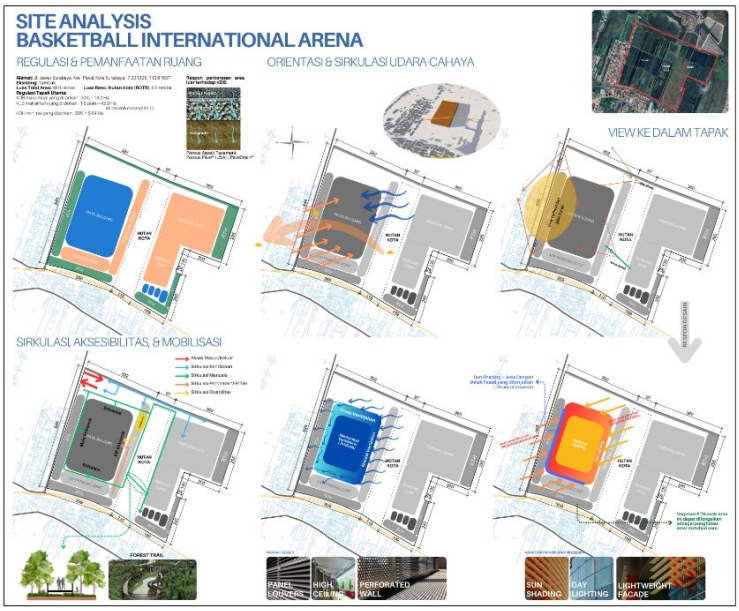

Figure 5. Site Analysis

The existing orientation and climatic issues require the building to be properly shaded while ensuring optimal circulation of natural light and airflow. The design response to orientation and climate involves spatial configuration, the arrangement of openings, and the selection of materials that are adaptive to tropical climatic conditions. The aesthetic approach is based on an analysis of the building's and site's visibility potential from strategic points and directions.

CONCEPTUAL APPROACH AND WARFARE THEME

The design of the International Aethra Nexus Basketball Arena is formulated through the integration of synergistic spatial planning, sustainable design, and the creation of a boundless spatial experience as the primary strategies to address contemporary challenges in large-scale sports facilities. Spatial integration within the context of sustainable architecture refers to the unification of competition spaces, training facilities, and public areas into a holistic structure that is responsive to the dynamic activities of users, while considering ecological, economic, and social aspects that support long-term spatial quality (Figure 6). Studies on sustainable public space design indicate that the simultaneous integration of ecological, social, and economic factors serves as a foundation for creating a durable and highly functional built environment, enhancing ecological stability and the well-being of the arena's user community (Jung et al., 2025). Furthermore, the principle of shaping a boundless spatial experience emphasizes the arrangement of architectural elements that facilitate visual continuity and user mobility, allowing space to function not only in

a practical sense but also as a medium of interactive experience that enriches user engagement with both the physical and social environment.

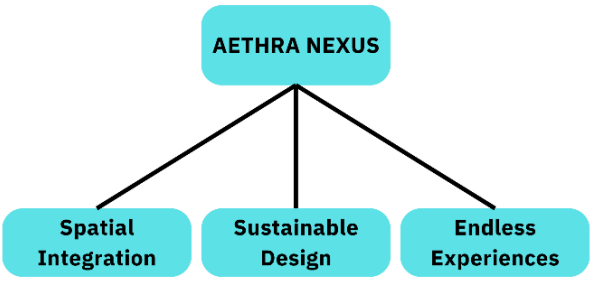

Figure 6. Core Concept

The integrated urban forest strategy within the Aethra Nexus design area is developed as part of a conceptual approach that positions green elements as ecological infrastructure interconnected throughout the entire site. This concept functions not only as an open space, but also as an environmental system that enhances microclimatic quality and user comfort. Water elements within the urban forest area are designed as part of a flood mitigation strategy by maximizing the land's capacity to absorb and retain water, as well as reducing surface runoff, thereby ensuring that the area remains sustainable despite being located in an environment prone to waterlogging.

Spatial integration is also realized through a user-friendly and inclusive pedestrian network that connects all activity zones to public spaces such as the view deck, which provides visual experiences and direct interaction with the landscape (Figure 7). This approach aligns with the principles of nature-based solutions, emphasizing that the integration of vegetation and water systems in site planning can strengthen environmental resilience while simultaneously enhancing the overall spatial experience in a holistic manner (Davis & Naumann, 2017).

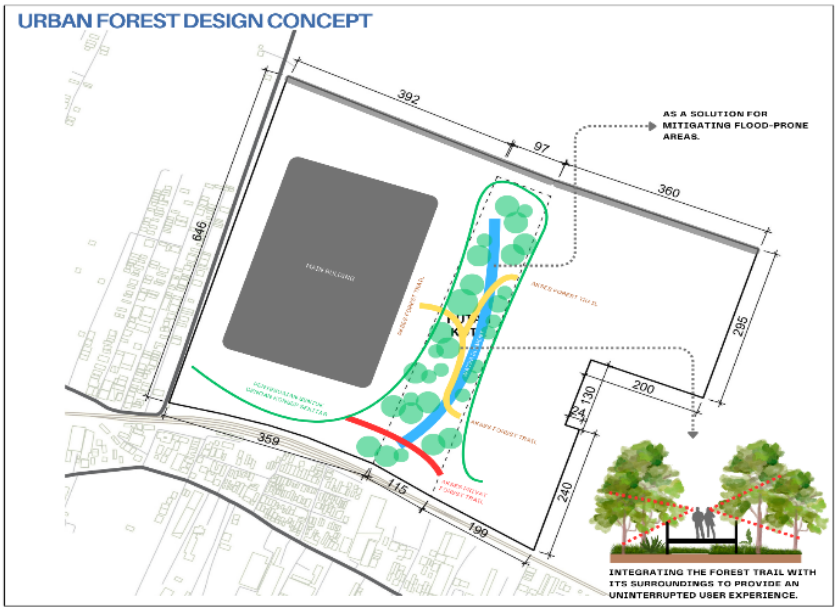

Figure 7. Urban Forest Design Concept

The infinity (∞) concept in the design of Aethra Nexus is interpreted as a symbol of boundlessness, representing something without limits that transcends space, time, and human

experience. This meaning reflects continuously growing potential, continuity, and a spirit of constant development without end. The infinity form is then applied as the fundamental design idea of the international basketball arena, symbolizing enduring unity and sportsmanship, where the two primary curves represent two opposing teams, yet remain within a single unified competition space (Figure 8). This concept is further reinforced through a deconstructivist architectural approach, which presents a dynamic, fragmented, and asymmetrical mass composition as an expression of movement and energy that is strongly associated with the sport of basketball.

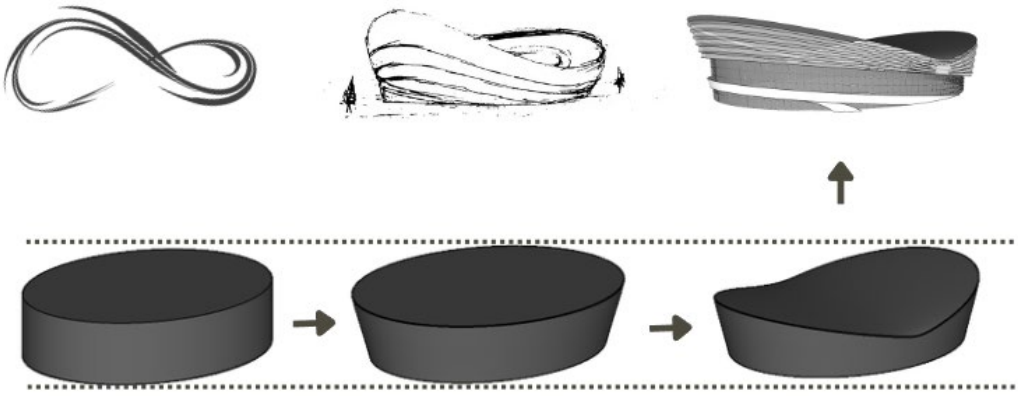

Figure 8. Form Transformation

Through a deconstructivist language, the infinity symbol is not translated rigidly, but is instead processed into a form that appears alive, as if it is in motion and continuously flowing (Jelena, M, 2016; Elkadi, H, 2005). Deconstruction in architecture enables a plurality of meanings and subjective representations that transcend conventional boundaries. In the context of Surabaya, this concept becomes a representation of the city's enduring spirit, ranging from the legacy of struggle embodied by the City of Heroes, the ongoing regeneration of young athletes, to the basketball community that remains interconnected and continuously evolving (Katzer, N, 2010). Modern sports architecture plays a role as a catalyst for urban regeneration and the formation of a sustainable collective identity (Evan, G, 2015; Wegeland & Hognestad, 2021).

Thus, Aethra Nexus is not merely a venue for competition, but also a space that unites the past, the present, and future aspirations into a single continuous experience (Kiuri, M, & Teller, J, 2012). Contemporary stadiums function as a graphic medium of heritage that articulates temporal and spatial experiences, connecting collective memory with future visions (Harland, R. G., & Elbardawil, Shaima, 2024). Circular design in sports architecture creates potential for sustainability and long-term relevance. Through this approach, sports venues are transformed into cultural landmarks that strengthen urban identity and maintain the continuity of community values across generations (Evan, Graeme, 2015).

DESIGN THEME

The design theme of the Aethra Nexus Basketball International Arena is developed as an elaboration of the main concept of spatial integration, sustainable design, and a boundless experience, combined with the infinity symbol (∞) and a deconstructivist architectural approach. This theme positions the arena as an international sports facility that not only functions as a venue for competition, but also as a center of public activity that is socially, ecologically, and urbanly interconnected. The infinity form is interpreted as a continuous spatial flow, creating connectivity between functions such as the main arena, training facilities, community spaces, commercial areas,

and public plazas. The deconstructivist approach further strengthens the thematic character through fragmented massing, sharp angles, and dynamic compositions that reflect the energy of competition and the rapid movements inherent in basketball.

The implementation of the theme is realized through site development by adopting an integrated urban forest concept as the primary element of sustainability. Green elements are distributed as a landscape network that merges with the entire area, creating ecological corridors while reducing heat and pollution. Water elements are designed as part of a flood control system through retention ponds, bioswales, and infiltration areas capable of retaining stormwater runoff and minimizing waterlogging. Spatial integration within the site is reinforced by inclusive and user-friendly pedestrian pathways that connect all zones to the view deck as a key experiential point, allowing users to enjoy a comprehensive panorama of both the urban forest and the arena. Therefore, this design theme forms an iconic, adaptive, and sustainable arena, while delivering a continuously flowing and boundless spatial experience as a representation of Surabaya's future identity.

IMPLEMENTATION OF CONCEPT IN DESIGN

The following illustration demonstrates the implementation of the design concept of the Aethra Nexus Basketball International Arena, illustrating how the principles of spatial integration, sustainable design, and a boundless spatial experience are translated into architectural design elements and site planning strategies (Figure 9).

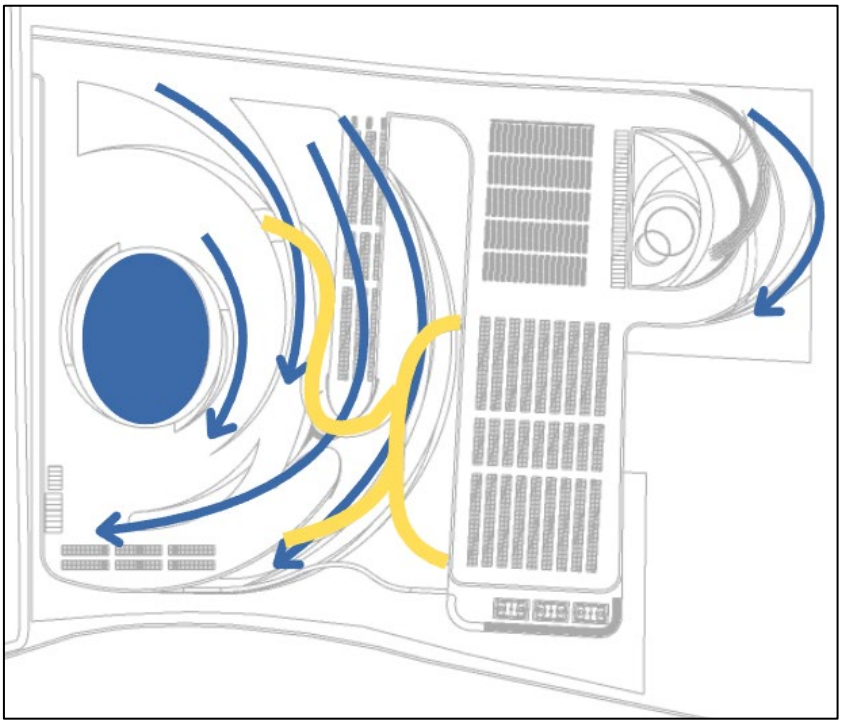

Figure 9. Site Plan Concept

This section highlights the process of transforming conceptual ideas into tangible design strategies, including the development of building massing based on the infinity symbol (∞) through a deconstructivist architectural approach, the arrangement of integrated zoning and circulation systems, and the implementation of an urban forest system and water elements as

ecological solutions. This implementation aims to create an international sports arena that is not only visually iconic, but also adaptive, inclusive, and sustainable in supporting both sporting activities and public space development in Surabaya.

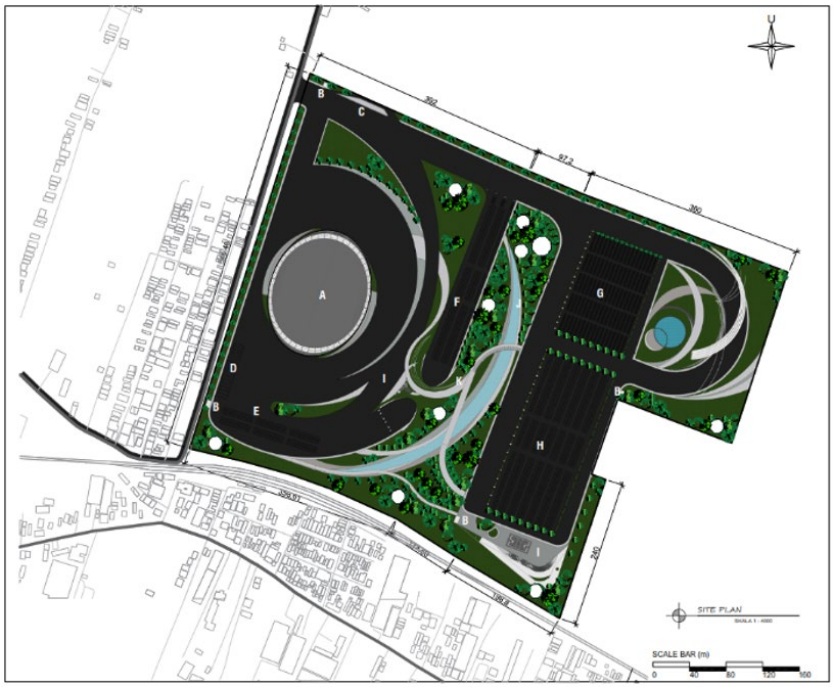

Figure 10. Site Plan

The site plan concept of the Aethra Nexus Basketball International Arena is designed based on the idea of forming a vortex or activity core emerging from the movement patterns within the area, representing the vital center of the arena's primary function, namely basketball competitions. This core symbolizes a source of energy and continuously rotating dynamics, illustrating an ongoing process as an expression of boundlessness (Figure 10). The movement pattern is then translated into flowing curved elements, forming a dynamic spatial composition while simultaneously representing the infinity symbol (∞). This concept is further reinforced through the design of a curved forest trail that follows the natural rhythm of the landscape, creating a more reflective and gradual walking experience, allowing visitors to explore each part of the site slowly and develop an emotional connection with the environment. Thus, the site plan functions not only as an organizer of circulation and zoning, but also as a narrative medium that reinforces the arena's identity as a global activity hub in constant motion without limits.

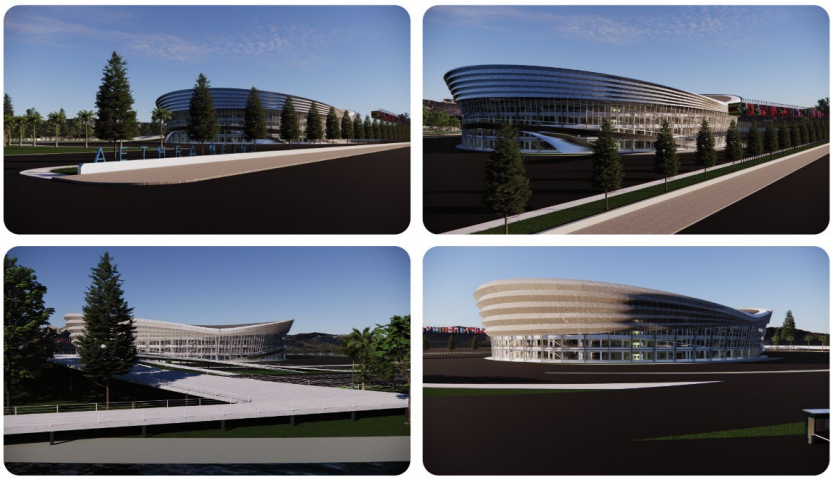

Figure 11. Aethra Nexus Basketball International Arena Façade

The façade of the Aethra Nexus Basketball International Arena is designed as an expression of the infinity (∞) concept, representing boundless movement, continuity, and the competitive energy of basketball, manifested through dynamic and flowing curved mass forms (Figure 11). The façade composition features layers of horizontal lines that create an aerodynamic impression while reinforcing the futuristic character of the building. In terms of materiality, the lower portion utilizes a glass curtain wall to enhance transparency and openness, allowing interior activities to be visually perceived from the outside, while the upper portion is enveloped in perforated metal as a secondary skin that functions both as an aesthetic element and a climatic response. This system is capable of reducing solar heat gain, controlling natural daylight penetration, and generating façade shadows and textures that shift according to the viewing angle. The combination of these two materials emphasizes the deconstructivist approach through the contrast between solid and transparent elements, while establishing an iconic, adaptive, and sustainable architectural identity for the arena.

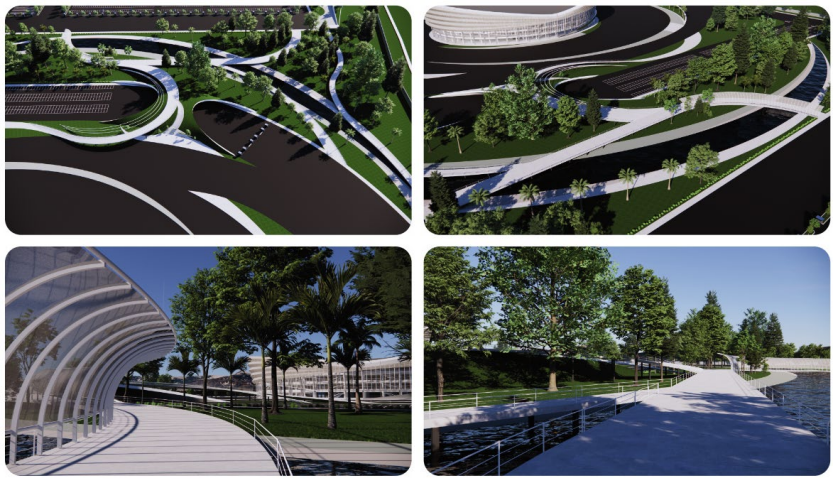

Figure 12. Urban Forest Design

The urban forest design within the Aethra Nexus area is developed as the primary landscape element integrated with the site's spatial and circulation system, forming a green corridor that serves both ecological and recreational functions. The forest trail pathway is designed with curved and flowing patterns that follow the natural character of the landscape, creating a dynamic and non-monotonous walking experience, as if guiding visitors into a boundless spatial sequence

(Figure 12). The presence of water elements surrounding the pedestrian route functions as a retention system and runoff control mechanism, enabling the area to respond sustainably to potential waterlogging conditions.

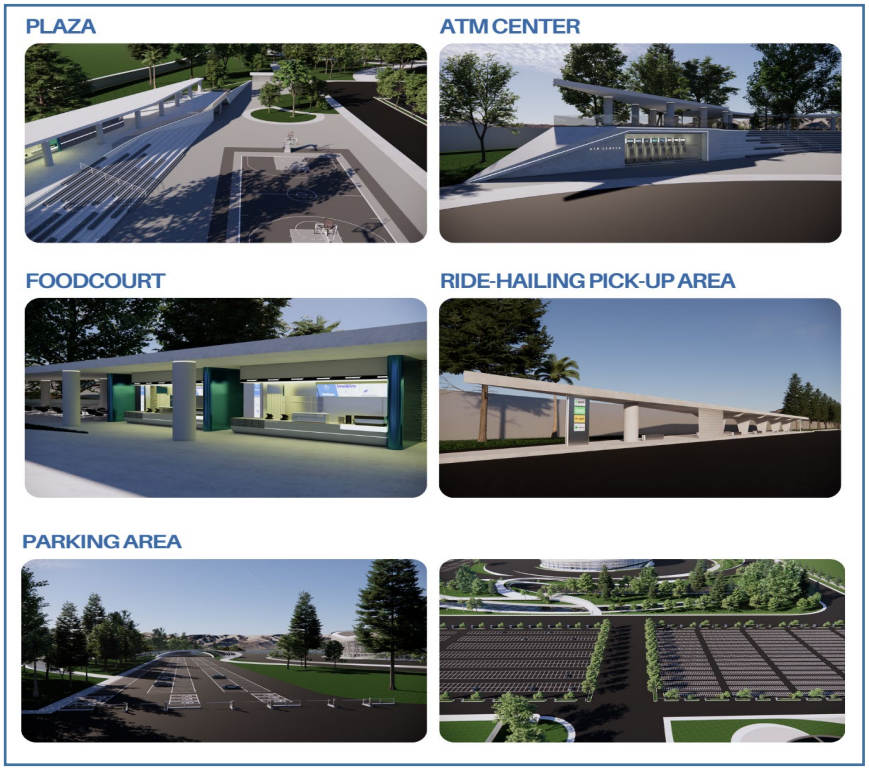

Figure 13. External Public Facilities

The inclusive pedestrian pathways are equipped with railings and user-friendly access, connecting public areas to strategic viewing points such as the view deck, which enables direct visual interaction between users and the green landscape, water bodies, and the arena's building mass. Thus, this urban forest functions not only as a green open space, but also as a spatial experience medium that holistically integrates ecological aspects, comfort, and the identity of the area (Figure 13).

The outdoor facilities of the Aethra Nexus Basketball International Arena are designed as public supporting facilities that accommodate visitor activities while reinforcing the character of the area. The plaza serves as a flexible public space for gatherings and events, supported by an ATM center and a food court as service amenities. The access system is enhanced through a well-organized ride-hailing pick-up area to ensure safe and smooth circulation. In addition, the site provides a large-scale parking area with an organized parking layout and integrated vegetation as a buffer. All of these elements are designed with bold forms, inclined planes, and fragmented compositions as an application of deconstructivist architecture, creating a dynamic and iconic impression in the outdoor environment.

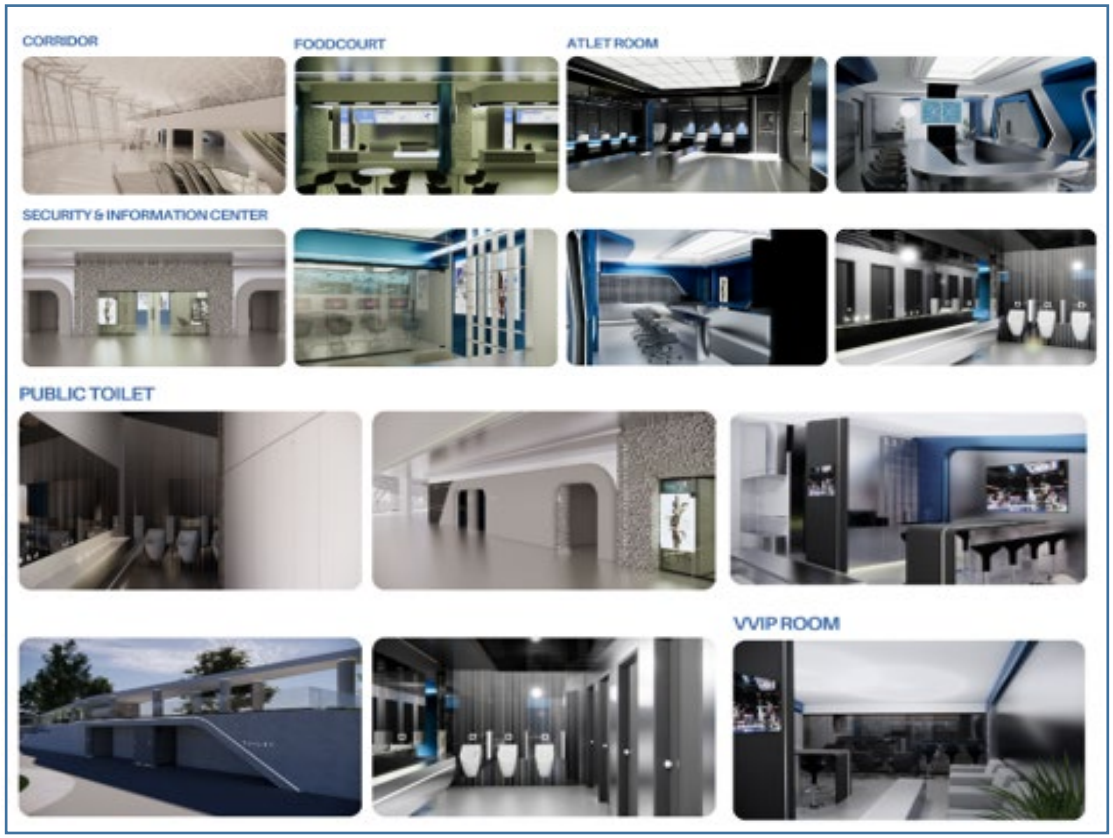

Figure 14. Internal Facilities

The main area of the Basketball International Arena is designed as the main space accommodating an international-standard competition court and spectator stands with a capacity of up to 20,000 people, enabling the venue to host global-scale events. The grandstand configuration is arranged in tiered levels and fully surrounds the court to provide an optimal visual experience from every viewpoint, while also reinforcing an intense and immersive competitive atmosphere. The seating layout is designed by considering sightline distance, tribune slope, and efficient circulation access through spectator corridors and stairways, thereby supporting safe and orderly crowd movement (Figure 15).

Figure 15. Main Arena (Seating Bowl)

The arena space is reinforced by a long-span roof structure based on a space frame system, which allows the competition area to remain column-free while creating an interior impression that is spacious, monumental, and futuristic. The integration of lighting elements and audiovisual systems enhances the quality of the sports performance, positioning the arena not only as a competition venue but also as a spectacle space that represents the identity of international sports and the spirit of boundless sportsmanship.

The construction system of the Aethra Nexus Basketball International Arena is designed not only to meet long-span structural requirements, but also to represent the three main core concepts: spatial integration, sustainable design, and a boundless experience. The space frame roof structure enables the formation of a vast column-free arena, allowing the court, tribunes, and circulation areas to be visually and functionally connected within a unified spatial composition (Figure 16).

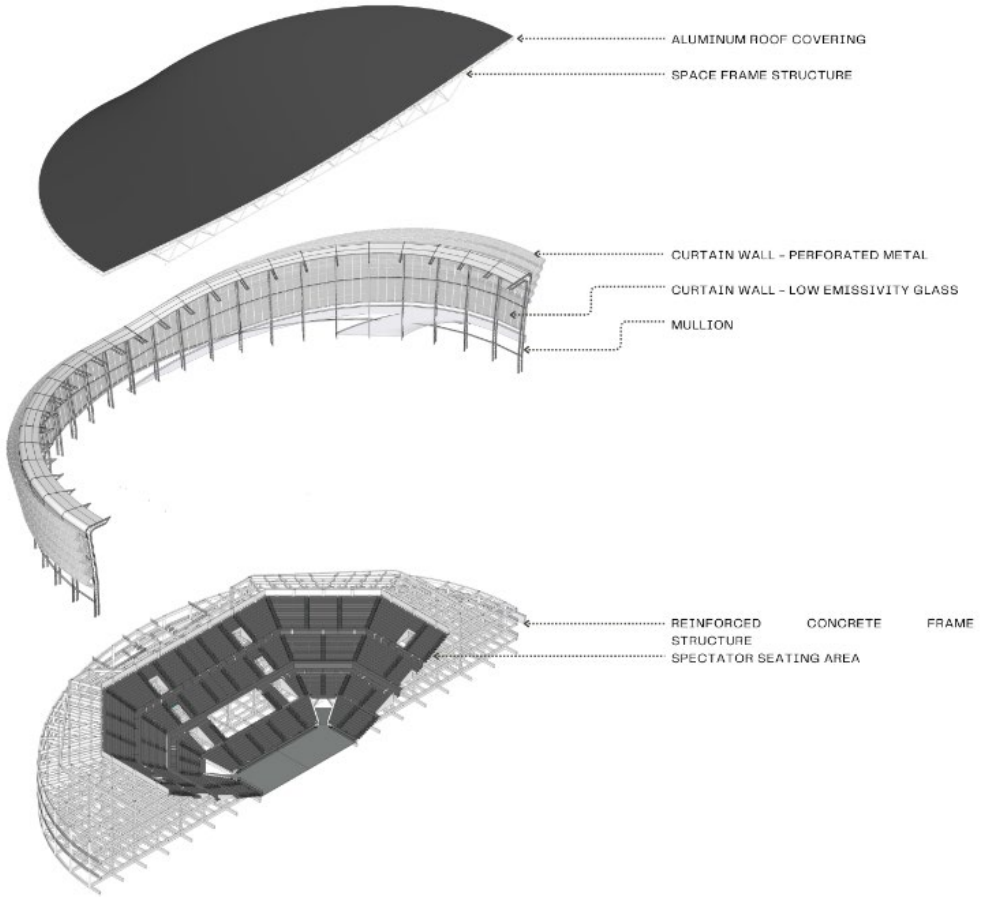

Figure 16. Stadium Structure Diagram

From a sustainability perspective, the use of lightweight and corrosion-resistant aluminum roof covering improves structural efficiency and building durability. The building envelope employs a combination of low-e curtain wall glass and perforated metal as a secondary skin to control heat gain while maximizing natural daylight. The concept of a boundless experience is further reinforced through façade transparency, which establishes a strong relationship between the arena's interior and the surrounding landscape, while the reinforced concrete structure of the tribunes ensures building stability in safely accommodating large spectator capacity.

CONCLUSION AND SUGGESTIONS

The design of the Aethra Nexus Basketball International Arena in Surabaya demonstrates that the demand for an international-scale sports facility can be addressed through the integration of symbolic and functional concepts, sustainability principles, and an adaptive structural system capable of accommodating long-span spatial requirements. The infinity (∞) concept, combined with a deconstructivist architectural approach, generates a dynamic and iconic arena form while representing the spirit of boundless sportsmanship. Spatial integration is achieved through connectivity between primary and supporting functions, flowing circulation pathways, and a continuous spatial experience linking the arena, plaza, and the urban forest area as both an ecological and social element. Structurally, the application of a space frame roof system enables the creation of a column-free arena space, supporting a capacity of 20,000 spectators with optimal visual quality, while reinforcing the monumental and open character of the interior environment.

For further development, this design is recommended to be complemented by more in-depth technical studies regarding the efficiency of the space frame structure as a long-span element as well as a building envelope-forming component, including detailed joint analysis, construction methods, and material durability in response to tropical climate conditions and wind loads. In addition, sustainability strategies should be strengthened through more specific planning of water and energy management systems, such as optimizing water retention within the urban forest area, maximizing natural daylight through the curtain wall system, and applying perforated metal as a passive thermal control element. Simulation studies of spectator and vehicle circulation at maximum capacity should also be conducted to ensure that access systems, evacuation procedures, and spatial comfort can operate optimally under various international-scale event scenarios.

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REGULATION:

FIBA Venue Guide, 2023

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