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ARUNIKA: THE ENHANCEMENT OF KAED COURTYARDS THROUGH MULTI-MOTION DESIGN FOR WELLNESS AND LEISURE

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ABSTRACT

Courtyards in the Kulliyyah of Architecture and Environmental Design (KAED) at IIUM serve as transitional and communal spaces that enhance interaction, comfort, and identity within academic environments. However, the KAED courtyards are currently underutilised, offering limited inclusivity, comfort, and spatial character. This project aims to transform the KAED Courtyard (Gallery) and KAED Courtyard (Café) into vibrant, climate-responsive, and multifunctional hubs that reflect the faculty's creative spirit and foster community engagement. A multidisciplinary methodology, including site analysis, user observation, precedent studies, design development, and cost evaluation had guided the formulation of the "Multi-Motion" concept. The proposed design introduces interactive gathering zones, varied seating arrangements, greenery, and water features to enhance comfort, inclusivity, and environmental responsiveness, while prioritising cost-effective materials and solutions. This approach upgrades the KAED Courtyards into dynamic, sustainable, and financially feasible community spaces.

Keywords: KAED courtyard, courtyard design, multi-motion, wellness & leisure
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PROJECT INTRODUCTION

This study reports on upgrading the KAED Courtyard (Gallery) and KAED Courtyard (Café) at the Kulliyyah of Architecture and Environmental Design (KAED). The project responds to maximise of under utilised spaces, enhance courtyard's aesthetic and identity, which create a vibrant and inclusive gathering spaces. Through a multidisciplinary approach, students from different fields collaborate to propose innovative solutions to enhance functionality, improve comfort, and strengthen the courtyards' character, integrating their expertise by combining architectural design, landscape planning, interior aesthetics, and user experience strategies into a cohesive redesign process. The redesign integrates climate-responsive strategies and introduces flexible uses. By transforming the courtyards into welcoming and dynamic spaces, the project aims to foster creativity, interaction, and sustainability, while positioning the courtyards as important hubs of community life within KAED.



Figure 1 KAED Courtyard (gallery)
(Source: Authors, 2025)



Figure 2 KAED Courtyard (cafe)
(Source: Authors, 2025)

METHODOLOGY

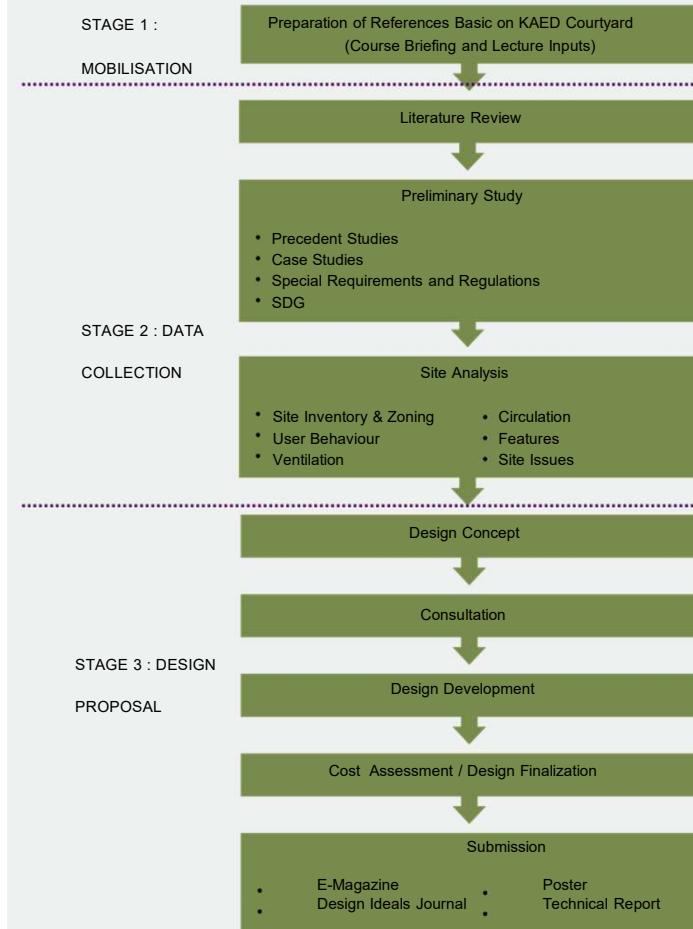


Figure 3: Methodology

LITERATURE REVIEW

COURTYARD DESIGN IN ARCHITECTURE

Courtyard design in architecture plays a crucial role in enhancing social interaction, environmental comfort, and aesthetic appeal. Courtyard brings environmental and thermal benefit by enhance thermal comfort, especially in hot climates, by regulating microclimates and providing shade (Ucer et al., 2024). Studies indicate that square-shaped courtyards with optimal height-to-width ratios can improve energy efficiency and reduce reliance on mechanical cooling systems (Patherya & Lau, 2012). In modern architecture, courtyards have evolved in their function and form such the design of courtyards fosters social interaction and community bonding, contributing positively to psychological well-being (Juba & Bogenç, 2024).

HUMAN MOVEMENT AND SPACE INTERACTION

The design of courtyards significantly influences human movement and social interactions by shaping user experiences within these spaces. Courtyards serve as multifunctional areas that enhance social interaction, psychological well-being, and environmental comfort. Spatial configuration directly impacts movement among users (Vedhajanani & Amirtham, 2024). Observation studies on human movement in well-organized environments show that clear pathways encourage exploration and interaction, increasing dwell time (Atef et al., 2023). Comprehensive courtyards promote lingering, as eye-tracking studies reveal users are drawn to these spaces for social interaction and relaxation (Sun, 2024). Psychological benefits include improved mental health, recovery, and well-being through social activities and community bonding (McIntosh & Jenkin, 2022).

GREEN & CLIMATE-RESPONSIVE DESIGN

Green and climate-responsive design principles are essential for building sustainable communities, focusing on minimising environmental impact while enhancing the quality of life for residents. These principles integrate energy efficiency, resource conservation, and community well-being into the architectural process. Adopting this principles into design can influence local microclimates, enhancing thermal comfort through strategic design elements such as vegetation and water features (Ucer et al., 2024).

CAMPUS COURTYARDS AS SOCIAL HUBS

Campus courtyards play a significant role in fostering social interactions and community building among students by providing spaces that encourage engagement, comfort, and a sense of belonging. These outdoor spaces are integral to the physical environment of a university, influencing student behavior and interaction patterns. The design and features of these courtyards, such as seating arrangements, visibility, and accessibility, are crucial in promoting social opportunities and informal gatherings. Courtyards with seating, shade, and visibility are preferred by students, as they offer opportunities for social interaction and informal gatherings (Hasan et al., 2024). The spatial layout and design of these areas significantly affect how students use the space, with a preference for areas that facilitate easy movement and visibility.

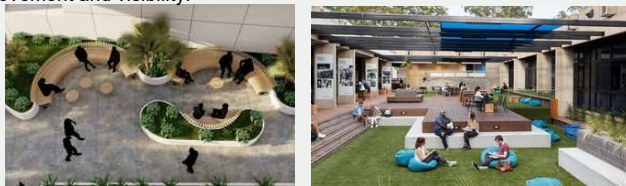


Figure 4: Campus courtyard as social hub, fostering social interaction, movement among students (Source: Pinterest.com)

CASE STUDY AND PRECEDENT STUDY

1) ROOFTOP GARDEN TRX, KUALA LUMPUR

The TRX Rooftop Park, completed in 2020 as part of the 70-acre Tun Razak Exchange development, spans approximately 10 acres (435,600 ft²), making it one of the largest rooftop parks in Southeast Asia. Designed as a multifunctional recreational hub, the elevated park integrates lush greenery with the urban core, featuring jogging tracks, walking paths, open lawns, shaded pavilions, and water elements. Its elevated design not only offers panoramic views of the Kuala Lumpur skyline but also mitigates the urban heat island effect, creating a healthier microclimate. The project follows contemporary biophilic design principles by merging modern infrastructure with nature to enhance user well-being. Sustainable strategies such as rainwater harvesting, energy-efficient lighting, and low-maintenance tropical planting further strengthen its ecological performance. By transforming an underutilised rooftop into a vibrant, community-centered urban oasis, TRX Rooftop Park exemplifies how urban design can align with Sustainable Development Goals 11 (Sustainable Cities and Communities) and 3 (Good Health and Well-Being).



Figure 5: TRX Rooftop Park offering elevated greenery within the KL skyline. (Source: OCULUS, 2024)

2) TAMAN TASIK TITIWANGSA, KUALA LUMPUR

Taman Tasik Titivangsa, covering approximately 95 hectares (234 acres / ~10 million ft²), underwent a major redevelopment by Dewan Bandaraya Kuala Lumpur (DBKL) and officially reopened in December 2019. The transformation introduced upgraded jogging and cycling tracks, children's playgrounds, shaded pavilions, and water-based recreational features, making it one of the city's most inclusive and dynamic public parks. The design prioritizes accessibility with barrier-free circulation, clear zoning, and spaces that cater to families, students, and sports enthusiasts alike.

Through its integration of landscaped lawns, shaded walkways, and diverse activity zones, the park enhances comfort in Malaysia's tropical climate while strengthening its role as a social hub. The redevelopment strongly supports SDG 3 (Good Health and Well-Being) and SDG 11 (Sustainable Cities and Communities) by promoting active living, inclusivity, and sustainable urban recreation.



Figure 6: Redeveloped Taman Tasik Titivangsa highlighting upgraded community facilities, cycling tracks, and shaded gathering zones. (Source: iStock, 2025)

3) ALIBABA XIXI CAMPUS (PARK C), HANGZHOU – ASPECT STUDIOS

The Alibaba Xixi Campus Park C, completed in 2019, spans approximately 22 hectares (54 acres / ~2.3 million ft²) and was designed by ASPECT Studios as part of Alibaba's headquarters expansion in Hangzhou. The design takes inspiration from the nearby Xixi Wetlands, weaving ecological systems into the corporate environment through water gardens, ecological corridors, pedestrian bridges, and shaded seating areas. These elements encourage social interaction, relaxation, and outdoor work, creating a landscape that balances productivity with well-being. Sustainability is at the core of the project, with strategies such as native planting, wetland restoration, and natural stormwater management that regulate the microclimate and increase biodiversity. The park not only enhances the ecological value of the campus but also provides employees with restorative green spaces that foster creativity and collaboration. By merging nature with workplace culture, Alibaba Xixi Campus Park C demonstrates how corporate landscapes can support both ecological resilience and human health, aligning with SDG 3 (Good Health and Well-Being), SDG 11 (Sustainable Cities and Communities), and SDG 15 (Life on Land).



Figure 7: Alibaba Xixi Campus Park C combining wetland-inspired landscapes with workplace and social functions. (Source: world and landscape architect, 2022)

4) TOM LEE PARK, MEMPHIS – SCAPE + STUDIO GANG

Tom Lee Park, a 30-acre (1.3 million ft²) riverfront park in Memphis, reopened in September 2023 after a \$60 million redesign by SCAPE in collaboration with Studio Gang. Situated along the Mississippi River, the project transforms a historic public space into a resilient, inclusive, and ecologically rich urban park. The redesign introduces flexible event lawns, shaded pavilions, ecological wetlands, and extensive walking and cycling trails that accommodate both everyday recreation and large-scale civic gatherings.

A central focus of the project is climate resilience, achieved through flood-tolerant landscapes, native plantings, and stormwater management strategies that protect the riverfront while improving biodiversity. At the same time, the park emphasizes cultural identity and inclusivity, offering spaces that reflect Memphis' diverse communities and history. By blending ecological restoration with accessible and vibrant social programming, Tom Lee Park stands as a model for resilient waterfront design, supporting SDG 11 (Sustainable Cities and Communities) and SDG 13 (Climate Action).



Figure 8: Tom Lee Park redesigned riverfront featuring event lawns, wetlands, and inclusive public spaces. (Source: world and landscape architect, 2023)

SITE ANALYSIS AND FINDING

The KAED Courtyards, located at the heart of the Kulliyah of Architecture and Environmental Design (KAED), IIUM, serve as transitional and communal spaces surrounded by lecture rooms, studios, and circulation corridors. Their central placement makes them highly accessible to both students and staff, positioning the courtyards as potential hubs for interaction, rest, and academic activities. Despite this strategic location, the courtyards are currently underutilised, functioning more as circulation spaces rather than vibrant communal areas. The North (A) and South (B) Courtyards consist mainly of tiled flooring with limited softscape elements, resulting in spaces that feel rigid and exposed. Existing furniture is sparse and inconsistent, offering little comfort or incentive for prolonged use. Shaded areas are minimal, making the courtyards uncomfortable during peak daylight hours, while heavy rainfall renders the space unusable due to a lack of sheltered zones. Ventilation remains adequate due to their open-air design, yet the absence of weather protection limits flexibility throughout the day and across different seasons.



Figure 9: Top View of KAED Courtyard (A) Gallery (Source: Authors, 2025)

User observation indicates that the majority of students and staff simply pass through the courtyards between classes rather than occupying them for meaningful purposes. On occasion, small groups use the space for waiting, casual conversations, or quick meals, but the lack of greenery, shade, and comfortable seating discourages extended stays. The courtyards therefore fail to reflect the dynamic identity of KAED, where creativity, collaboration, and cultural expression are central to academic life.

In their current state, the courtyards present several challenges: minimal greenery, weak spatial identity, poor comfort levels, and a heavy reliance on circulation patterns. However, these challenges also highlight opportunities. With thoughtful redesign, the courtyards can be transformed into multifunctional spaces that balance circulation with relaxation, integrate biophilic design elements, and provide inclusive, shaded zones for learning, socialising, and community events.

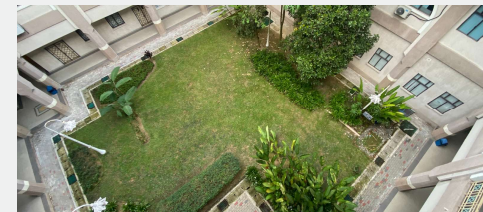


Figure 10: Top View of KAED Courtyard (B) cafeteria (Source: Authors, 2025)

SWOT ANALYSIS

Categories	Descriptions
Strength	Strategic Location , The KAED Courtyards are positioned at the core of the faculty, directly linked to studios, lecture rooms, and circulation corridors, making them one of the most accessible and visible spaces for students and staff.
Weakness	Lack of Comfort , The courtyards lack shaded areas, proper seating, and weather protection, discouraging users from staying longer than necessary and limiting their potential as social or learning spaces.
Opportunities	Potential for Transformation , The large, open areas provide flexibility and the opportunity to be reimagined as multifunctional zones that can accommodate discussions, relaxation, exhibitions, or small events, enhancing the vibrancy of KAED life.
Threats	Environmental Challenges , The courtyards are overly exposed to direct sunlight and heavy rainfall, making them uncomfortable during peak hours and unusable during wet weather, while the absence of greenery further reduces climate resilience.

Figure 11: Table of SWOT Analysis

Site Zoning

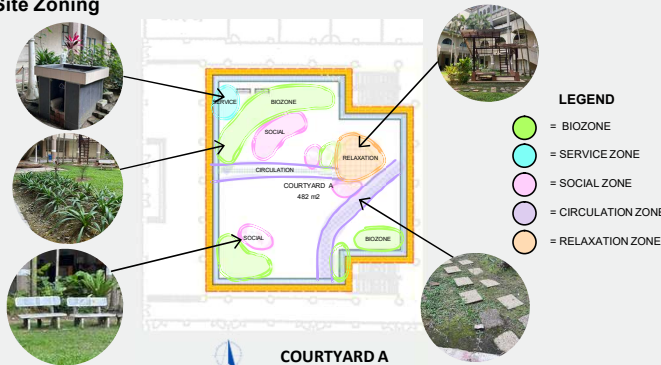


Figure 12: Courtyard A is located closer to the main lecture halls and frequently acts as a transitional route for students moving between classes. Circulation dominates the central portion of the courtyard, while the edges remain underutilised, with only a few scattered seating areas.

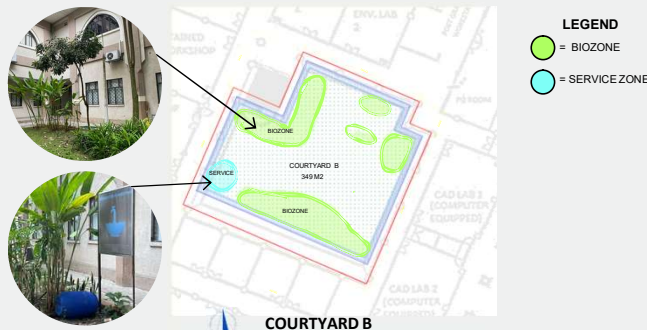


Figure 13: Courtyard B is slightly more enclosed, surrounded by studios and workshop, giving it the potential to become a quieter, more intimate gathering zone.

DESIGN CONCEPT

Concept : Multi Motion

The Multi-Motion concept is inspired by continuous human interaction with nature, reflecting the diverse movements of users—walking, gathering, exercising, and socializing within the KAED Courtyard (Gallery) and Courtyard (Café). Central to this concept is the idea of dynamic pathways that support fluid pedestrian movement, flexible zones that adapt to different social activities, and layered circulation that accommodates both fast and slow patterns of behaviour. The built environment is therefore designed to respond to and enhance natural elements, creating spaces that are vibrant, climate-responsive, and socially meaningful. Insights from precedent studies were directly embedded into the design development: features from the TRX Rooftop Garden, particularly its shaded pavilions and strategies to reduce the urban heat island effect, informed the approach to microclimate mitigation and canopy placement in Courtyard A. Similarly, Taman Tasik Titiwangsa's clear pedestrian zoning and barrier-free circulation guided the configuration of these dynamic pathways and the overall structuring of movement flows across both courtyards. With these influences, Courtyard A is envisioned as a larger, high-circulation zone composed of flexible activity areas supported by shaded structures, tree planting, and open gathering spaces. In contrast, Courtyard B offers a smaller, cozier environment enriched with shrubs, palms, and comfortable seating, forming a more intimate layer within the overall circulation system. Together, these spaces create a balanced courtyard system that integrates active engagement with quiet retreat. The verse in Surah An-Nahl (16:15), often interpreted as a metaphor for stability within motion, further reinforces the conceptual interplay between movement and grounding.

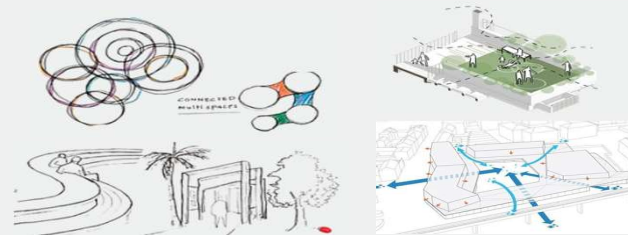


Figure 14: Waterfall scenery
(Source : CentralPark.com)

Through Multi-Motion concept, courtyard design supports Sustainable Development Goals such as SDG 3 (Good Health and Well-Being) by encouraging relaxation, social interaction, and stress relief through greenery and shaded spaces. It aligns with SDG 7 (Affordable and Clean Energy) by maximising natural ventilation, shading, and daylight to reduce energy use. At the same time, it reflects SDG 12 (Responsible Consumption and Production) through the use of durable, eco-friendly materials and efficient water features, ensuring sustainable practices within the KAED courtyards.



Figure 15: The related SDGs that align with the project

DESIGN DEVELOPMENT , BUBBLE DIAGRAM PROCESS AND RELATIONSHIP CHART

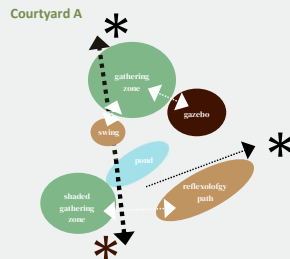


Figure 16: Bubble diagram courtyard A

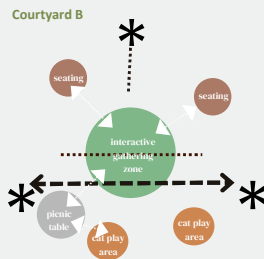


Figure 17: Bubble diagram courtyard B

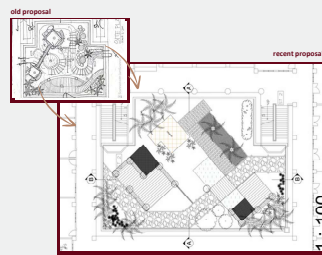


Figure 18: Design development courtyard A

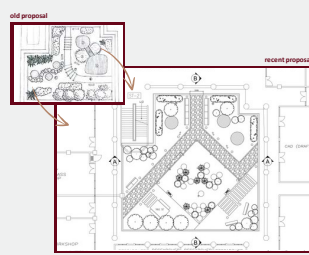


Figure 19: Design development courtyard B

IDEA DEVELOPMENT

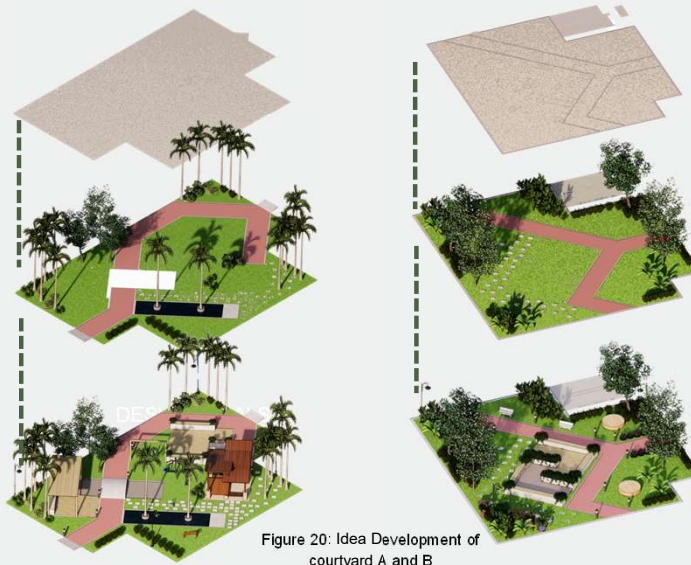


Figure 20: Idea Development of courtyard A and B

DESIGN FINALISATION

The concept of "Multi-Motion" is fully realised in the finalised design of the KAED Courtyards, where spaces are intentionally clustered into zones that encourage distinct behavioural patterns. The central gathering area facilitates the "gathering" motion, acting as the heart of the courtyards and extending outward to gazebos, swings, picnic tables, seating clusters, and a reflective pond, each designed to support moments of rest, play, and social interaction. Circulation patterns are carefully layered to balance efficiency and exploration. Direct, linear pathways support the "transition" motion, enabling users to move quickly between gallery spaces and activity zones. In contrast, looping routes encourage the "exploration" motion, guiding users around landscape features and activity nodes, creating movement that is both purposeful and leisurely. The integration of natural and built elements enhances comfort, usability, and cultural identity. Shaded seating and tree canopies improve microclimate response, while water features and greenery enhance sensory experience. Meanwhile, gazebos, pathways, and outdoor furniture anchor "pause-and-engage" motions, inviting users to sit, converse, or observe. Overall, the design creates a coherent and engaging environment that transforms the courtyards into vibrant communal hubs — inclusive, flexible, and expressive of KAED's creative spirit, while clearly translating the Multi-Motion concept into physical, functional spatial experiences.



Figure 21: Axonometric view of Courtyard A



Figure 22: Axonometric view of Courtyard B

COURTYARD A



Figure 23: A,B Perspective Views of Entrance



Figure 24: C,D Perspective Views of Gathering Zone



Figure 25 :E,F Perspective Views of Swing and pond



Figure 26: G,H Perspective Views of Shaded Gathering Zone and Reflexology Path

COURTYARD B



Figure 27: I,J Perspective Views of Entrance



Figure 28: K,L Perspective Views of Interactive Gathering Zone



Figure 29: M,N Perspective Views of Sitting Area

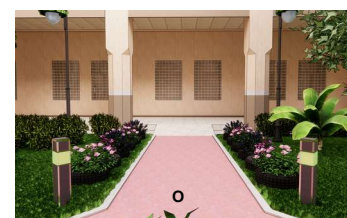


Figure 30:O,P Perspective Views Planters Area

THE PROPOSAL

The proposed of Courtyard A illustrates the spatial arrangement and design elements through floor plan, sectional, and elevation views. Figure 31 presents the floor plan layout, showing the overall organization of circulation paths, vegetation, and built structures within the courtyard. Figure 32, Section A-A, provides a vertical cut that highlights the relationship between courtyard features such as trees, seating, and architectural structures against the multi-storey building backdrop, while Figure 33, Section B-B, emphasizes spatial depth and elevation differences, showing how vegetation and built elements interact with the surrounding façade.

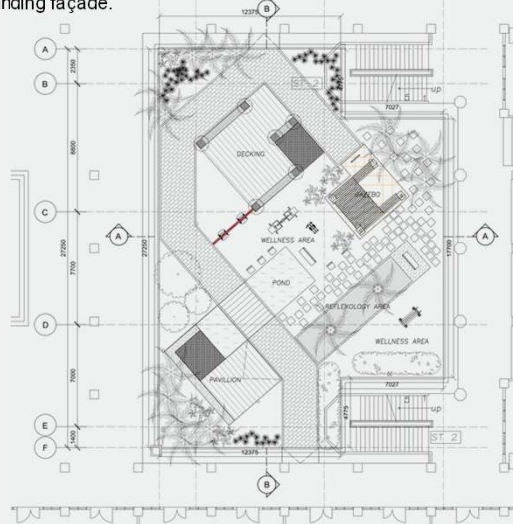


Figure 31: courtyard A floor plan design



Figure 32: courtyard A Section A - A



Figure 33: Courtyard A Section B - B

The four elevations further demonstrate the courtyard's character from different viewpoints: Figure 34 (North Elevation) depicts the arrangement of palm trees and structures with the building as a backdrop; Figure 35 (South Elevation) shows the clustering of greenery that frames the central courtyard; Figure 36 (East Elevation) illustrates the linear alignment of palms and built interventions along pedestrian pathways; and Figure 37 (West Elevation) presents a balanced view of vegetation and structures, reinforcing the courtyard as a focal space within the architectural setting.



Figure 34: North Elevation



Figure 35: South Elevation



Figure 36: East Elevation

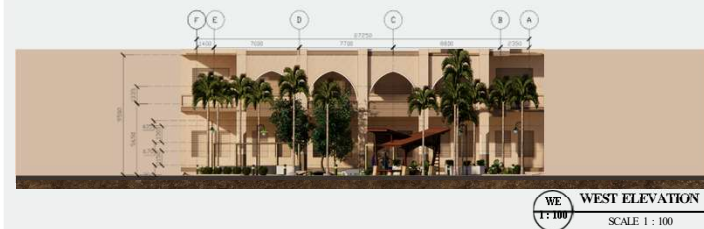


Figure 37: West Elevation

The proposed of Courtyard B provide a comprehensive representation of the courtyard design through floor plan, sectional, and elevation views. Figure 36 presents the floor plan layout, illustrating the spatial organisation of circulation paths, greenery, and seating areas within the courtyard. Figure 37, Section A-A, shows a vertical cut through the courtyard, highlighting the arrangement of vegetation, pathways, and built elements in relation to the adjacent architectural structures, while Figure 38, Section B-B, emphasises the scale and depth of the courtyard, showing how trees and landscaping integrate with the arched façade of the building.

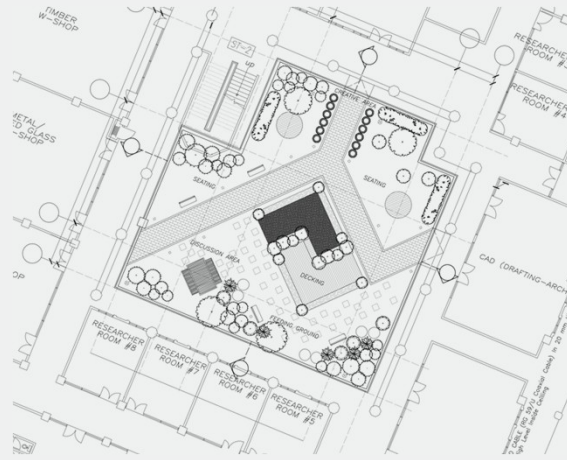


Figure 36 courtyard B floor plan design



Figure 37 courtyard B Section A - A

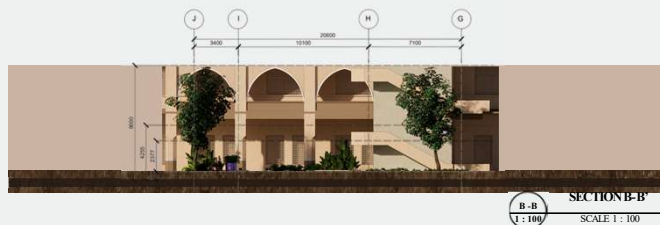


Figure 38 Courtyard B Section B - B

The elevation drawings further depict the courtyard from four perspectives: Figure 39 (North Elevation) illustrates the positioning of trees and greenery with the building as a backdrop; Figure 40 (South Elevation) highlights the central arched openings framed by vegetation; Figure 41 (East Elevation) shows the placement of trees and landscape features along the courtyard edge; and Figure 42 (West Elevation) presents a balanced composition of vegetation and arched architectural features, reinforcing the courtyard's role as a harmonious and inviting space within the building context.



Figure 39 North-East Elevation



Figure 40 South-East Elevation



Figure 41 East-West Elevation



Figure 42 North-West Elevation

COST PROPOSAL

1) COURTYARD A & B

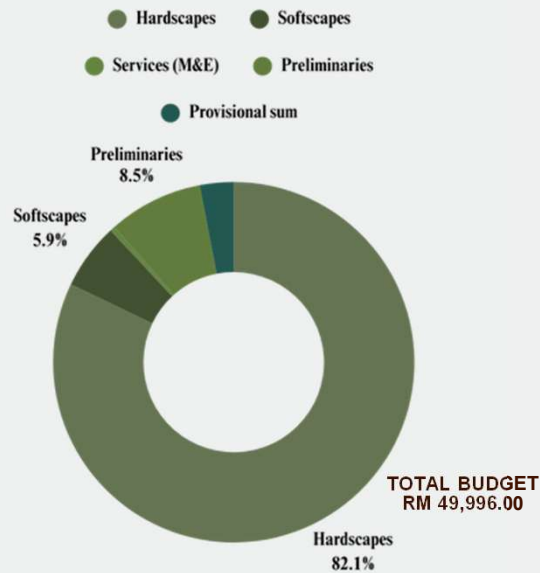


Figure 38: Budgeting for Courtyard A & B

NO	COMPONENT	AMOUNT (RM)	PERCENTAGE (%)
A	Preliminaries	4,215.00	8.50
B	Hardscapes	40,768.00	82.10
C	Softscapes	2,946.00	5.90
D	M&E Services	217.00	0.40
TOTAL		48,146.00	97
E	Provisional Sum	1,500.00	3
GRAND TOTAL		49,646.00	100

2) TOTAL ELEMENTAL COST

The project is designed to stay within a budget of RM50,000, striking a balance between creativity and practicality. Courtyard A focuses on interactive gathering and activity areas, while Courtyard B offers a serene setting for comfort and reflection. By using locally sourced materials, sturdy furniture, and native plants, the design minimises costs and long-term maintenance, ensuring both sustainability and feasibility.

COURTYARD A : RM 31,952.00

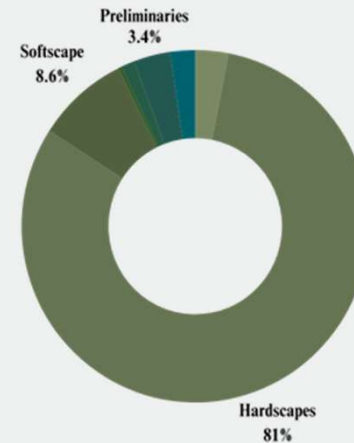


Figure 39: Budgeting for Courtyard A

COURTYARD B : RM 17,694.00

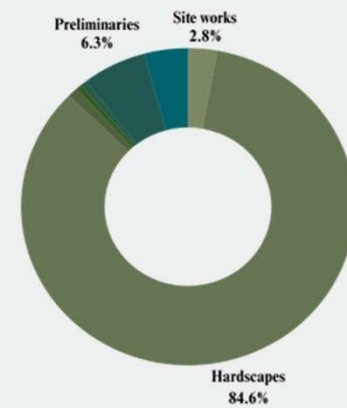


Figure 40: Budgeting for Courtyard B

CONCLUSION

This paper presents the findings of a study conducted at the Kulliyyah of Architecture and Environmental Design (KAED) on the transformation of IIUM courtyards. A collaborative effort involving students from multiple programmes explored innovative strategies to address challenges such as inadequate circulation, underutilised space, and an uninviting atmosphere. The project aims to develop a modern, sustainable courtyard system, enhance lighting and thermal comfort, and incorporate ergonomic design elements to create a more functional, welcoming, and engaging environment. This renovation is envisioned to strengthen the KAED courtyards' role as a central hub for research, teaching, and learning within the IIUM community, providing vibrant spaces that respond to the diverse needs of its users. In conclusion, the project demonstrates a significant impact on the KAED community by fostering collaborative engagement, promoting sustainable design practices, and enhancing the quality of shared spaces. It contributes to the broader knowledge of sustainable courtyard design while offering recommendations for future research, including further exploration of user experience, adaptive design strategies, and the integration of innovative technologies to optimise functionality and comfort.

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8. Nur Ulfah Awatif Umairah Alias
9. Julaila Abdul Rahman

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16	Nurul Syafiza Binti Wan Shariman	AAD (ID)
17	Nor Atiqah Syaquirah Binti Amri Shah	AAD (ID)
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