

ALIANYANG HOSPITAL IN PONTIANAK, WEST BORNEO, INDONESIA

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ABSTRACT

The provision of adequate healthcare facilities is an important component in improving public health services. Type D hospitals serve as primary healthcare referral facilities, providing basic medical services at the regional level. The planning and design of hospital facilities must comply with technical and functional standards set by national healthcare regulations. This study aims to develop the planning and architectural design of a Type D hospital in Pontianak in accordance with Indonesian Ministry of Health regulations. The design applies spatial standards, medical service zoning, circulation requirements, and supporting facility standards in accordance with national hospital planning guidelines. The expected result is a hospital design that meets regulatory requirements while supporting effective and efficient healthcare services.

Keywords: Type D Hospital; Hospital Planning; Ministry of Health Regulation

INTRODUCTION

Hospitals are essential components of healthcare systems and play a significant role in supporting public health services. Hospitals provide continuous healthcare services for acute and complex medical conditions and act as central facilities in referral healthcare networks. The availability of adequate hospital infrastructure is also an important element in achieving universal health coverage and strengthening national health systems (World Health Organization [WHO], n.d.). Hospitals also serve as centers of coordination for medical services, health data management, and the distribution of healthcare resources within a region (WHO, n.d.).

The development of healthcare facilities must be supported by proper planning and architectural design to ensure service quality and operational effectiveness. The design of healthcare buildings directly influences patient experience, staff performance, and clinical outcomes (Ulrich et al., 2008). In addition, hospital facility design is closely related to organizational productivity, economic performance, and patient satisfaction. Therefore, healthcare facility planning requires careful consideration of functional, environmental, and operational factors (Ulrich et al., 2008).

Hospital architecture is recognized as one of the most complex building typologies due to the integration of medical technology, functional zoning, patient circulation, and service efficiency. Hospital buildings must be designed to accommodate current medical needs while remaining adaptable to future healthcare service developments, particularly technological advancements, regulatory updates, and evolving patient care standards. In the context of Type D hospitals in Indonesia, spatial planning must align with Ministry of Health regulations to ensure appropriate service capacity, functional zoning, and operational efficiency, while remaining flexible to support future healthcare service developments. Proper architectural strategies enable hospitals to adapt to changes in medical services and technological developments over time (Rashid & Zimring, 2008).

In many countries, hospital planning and development must follow national healthcare facility standards and regulations to ensure patient safety, service quality, and operational sustainability (WHO, n.d.). In Indonesia, hospital planning must follow technical standards and healthcare facility regulations established by the Ministry of Health. These regulations regulate hospital classification, spatial standards, service zoning, circulation systems, and supporting medical facilities to ensure that healthcare services can operate effectively and safely (Kementerian Kesehatan Republik Indonesia, 2019). As one of the developing cities in West Kalimantan, Pontianak requires adequate development of healthcare infrastructure to support population growth and rising demand for healthcare services. In addition, the tropical climate of West Kalimantan, characterized by high humidity, intense rainfall, and elevated temperatures, requires architectural responses that address thermal comfort, natural ventilation, shading systems, and adequate drainage planning.

Therefore, hospital design must not only comply with regulatory standards but also respond to local environmental conditions to ensure long-term building performance and user comfort. The development of Type D hospital facilities is expected to improve access to healthcare and service coverage for the surrounding community (Kementerian Kesehatan Republik Indonesia, 2019). Accordingly, hospital planning must refer to applicable healthcare facility regulations to ensure that building functions, medical services, and supporting facilities meet national standards (Kementerian Kesehatan Republik Indonesia, 2019).

This study aims to develop the planning and architectural design concept for a Type D hospital in Pontianak, in accordance with Indonesian Ministry of Health regulations. The planning approach focuses on spatial standards, medical service zoning, circulation systems, and supporting facility requirements in accordance with national hospital planning guidelines (Kementerian Kesehatan Republik Indonesia, 2019). The expected result is a hospital design that meets regulatory standards while supporting effective, safe, and efficient healthcare services.

LOCATION DESCRIPTION

Based on the site location analysis, the selected site is on Jalan Pangeran Natakusuma, a strategic location for planning a Type D hospital. The selected site is considered strategic due to its accessibility, surrounding land use, and proximity to existing healthcare facilities.

The site is located directly in front of Puskesmas Alianyang, which supports the integration of primary and referral healthcare services. This proximity is expected to strengthen the healthcare service network and improve access to healthcare for the surrounding community. Administratively, the site is located in Pontianak, one of the developing urban areas that requires additional healthcare facility capacity to support population growth and healthcare service demand. Therefore, the selected site is considered suitable for the development of Type D hospital facilities, given service coverage and accessibility considerations (Fig. 1 – Fig. 3).



Figure 1. Map of West Kalimantan

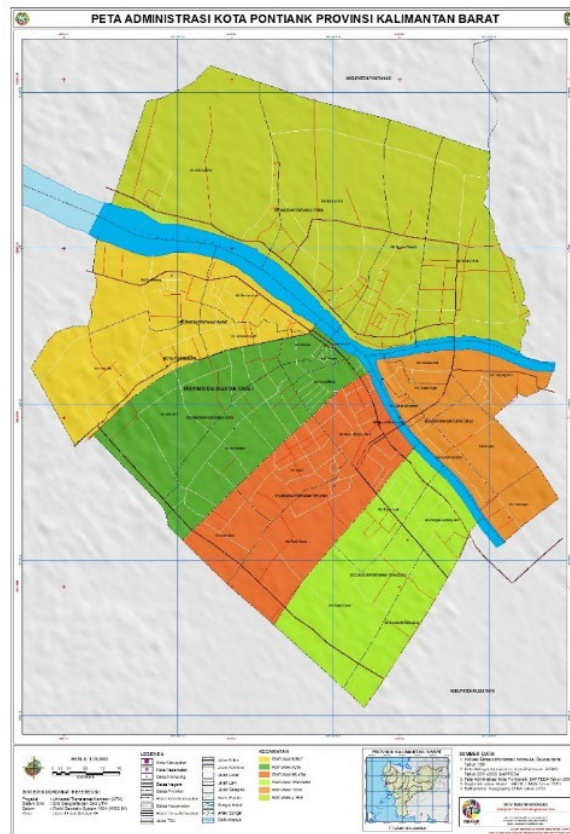


Figure 2. Pontianak Map



Figure 3. Site Location

THE SITE ANALYSIS



Figure 4: Conclusion of Site Analysis

Based on the site's potential analysis, several design strategies were developed to respond to environmental conditions, accessibility factors, and surrounding site characteristics. The building design incorporates sun-shading elements on the east and west facades to reduce solar heat gain and improve indoor thermal comfort. In addition, vegetation is planted around the site to help reduce ambient temperatures and improve microclimate conditions (Fig. 4).

The use of relatively bright exterior colors is applied to minimize heat absorption on building surfaces. Vegetation is also used as a noise buffer to reduce traffic noise from surrounding roads. Furthermore, building spaces that require higher levels of privacy and quiet are located in the rear area of the site, further from Jalan Pangeran Natakusuma, which has relatively high traffic noise levels.

The building facade is designed to enhance visual quality and urban aesthetics, particularly given its direct visibility from the main road corridor. From an environmental perspective, site drainage

systems are designed to cover the entire site to prevent flooding and support rainwater runoff management. In terms of circulation planning, the site access system is divided into two different circulation routes to improve traffic flow efficiency. The main entrance to the site is on Jalan Pangeran Natakusuma, the primary access road. Meanwhile, the side exit is located on Gang Karang Anyar and is specifically designed for service circulation and operational support activities.

CONCEPTUAL APPROACH AND WARFARE THEME

The architectural design of the Type D hospital applies a modern architectural approach supported by environmental response strategies, functional efficiency, and contextual adaptation. In addition to regulatory compliance and site analysis, the building form development was also informed by a precedent study analysis of several healthcare facilities to ensure architectural relevance and functional performance.

The concept ties a contemporary healthcare aesthetic to environmental responsiveness and local identity, emphasizing legibility, simplicity, and climate adaptation. This integrated approach reflects established guidelines for tropical hospital design that balance modern expression with local climatic and cultural considerations (Nawawi et al, 2013). Design intent: Modern, functional clarity, and contextual integration are core aims supported by studies that recommend grounding hospital form and program in local climate and culture to achieve replicable, high-quality regional healthcare facilities. Contextual harmony Research on tropical hospital planning highlights the need to relate new facilities visually and functionally to existing healthcare networks and community facilities to strengthen system coherence (Nawawi et al, 2013).

Meanwhile, Puskesmas Alianyang was analyzed to maintain contextual continuity within the surrounding healthcare environment. The use of color accents and proportional massing was adapted to create visual harmony between the proposed hospital and the existing healthcare facility. This approach strengthens the healthcare network identity within the area while maintaining a modern architectural language.

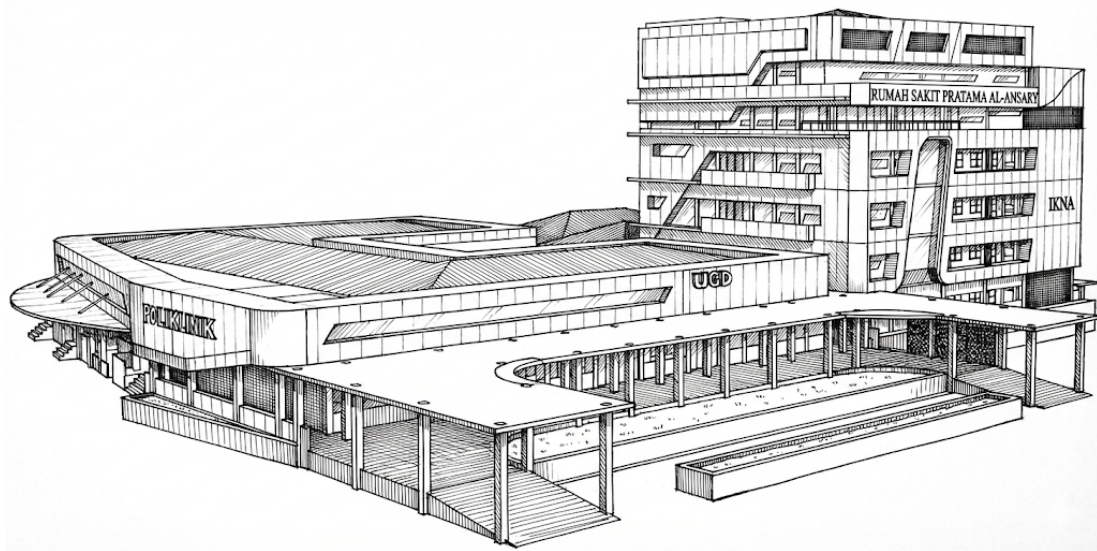


Figure 5. Building Sketch

By integrating these prior studies, the final building form reflects a balanced combination of modern architectural principles, contextual responsiveness, and functional healthcare requirements. The massing strategy emphasizes simplicity, clarity, and efficiency, while façade articulation and material selection enhance the building's institutional identity. The result is a

hospital design that aligns with modern healthcare architecture standards while remaining responsive to its local context in Pontianak (Fig. 5).

DESIGN THEME

The architectural character features clean geometric volumes, horizontal massing, and contemporary façade systems, with a neutral color palette and targeted accents to convey professionalism and identity. Analyses of tropical and sustainable hospital designs emphasize precise volumetric composition and consider façade treatments as key to performance and perception in healthcare buildings (Nawawi et al, 2013; Harshalata et al, 2024)—that is, geometric clarity. Clean, rectilinear forms and horizontal composition improve wayfinding and functional clarity in hospitals while supporting shading and daylight control strategies (Nawawi et al, 2013). Façade performance: Upgrading the building skin with modern materials and sun-control devices is recommended to reduce solar gains and improve energy performance in warm, humid contexts (Harshalata et al., 2024; Ismail et al., 2024). Color and identity. Using neutral base colors for perceptions of cleanliness and selective accent colors for institutional identity aligns with guidance to craft hospital façades that balance clinical appearance with contextual recognition (Nawawi et al, 2013)

The modern architectural character is expressed through clean geometric building forms, horizontal mass composition, and the use of contemporary façade materials such as Aluminum Composite Panel (ACP). The application of neutral façade colors, such as white and grey, conveys cleanliness, sterility, and professionalism, which are essential visual characteristics in healthcare architecture. Accent colors are applied to strengthen visual identity and maintain contextual harmony with surrounding healthcare facilities, particularly the visual character of Puskesmas Alianyang.

From an environmental design perspective, the theme integrates passive climate response strategies. The use of secondary skin elements serves as solar shading, reducing direct solar heat gain while maintaining airflow around the building envelope. The secondary skin design features geometric and local ornamental patterns that also serve as architectural identity elements while maintaining modern design principles.

Passive measures such as secondary skins, solar shading, and ventilation-oriented layouts are central to reducing cooling loads and maintaining hygienic indoor conditions in humid tropical hospitals. Multiple studies of humid tropical hospitals and envelope upgrades document the effectiveness of shading, double-skin façades, and layout optimization for thermal comfort and energy saving (Ignjatovic et al, 2018). Secondary skin shading. Incorporation of a ventilated or perforated secondary skin reduces direct solar heat gain while allowing airflow across the primary envelope, improving thermal control without compromising ventilation (Harshalata et al., 2024; Ignjatovic et al, 2018)—layout and orientation. Courtyard configurations, careful orientation, and planning of openings are shown to lower heat gain and enable natural ventilation strategies appropriate for warm, humid climates (Harshalata et al., 2024). Hybrid ventilation options. Where full natural ventilation is constrained by clinical requirements, hybrid or targeted mechanical systems paired with passive measures can extend low-energy operation across much of a small-to-medium hospital footprint (Ignjatovic et al, 2018).

Vegetated balconies, therapeutic landscape elements, and a sloped roof are proposed to moderate the microclimate, support rainwater handling, and enhance patient well-being while creating a substantial urban frontage. Evidence links biophilic elements, therapeutic gardens, and green roofs or balcony planting to improved environmental quality and patient outcomes in healthcare settings (Harshalata et al., 2024; Olaiya & Yusuf, 2025). Green balconies. Vegetation on terraces

and balconies functions as microclimate modifiers and visual therapy, supporting cooling, shading, and restorative views for patients and visitors as recommended in biophilic healthcare literature (Olaiya & Yusuf, 2025). Site vegetation and noise reduction. Integrating planting across the site contributes to ambient cooling and can attenuate urban noise, improving the clinic's environmental quality (Olaiya & Yusuf, 2025)—sloped roof and drainage. Sloped roof profiles suit high-rainfall tropical conditions by improving rainwater drainage performance and, when combined with green roof or insulation strategies, can also help reduce external noise and heat gain (Harshalata et al., 2024).

Overall, the building design theme aims to create a healthcare facility that reflects modern architectural values while remaining environmentally responsive and contextually integrated with the urban healthcare network in Pontianak.

IMPLEMENTATION OF CONCEPT IN DESIGN

The design concept is implemented through the integration of regulatory standards, modern architectural principles, environmental response strategies, and contextual adaptation. The planning process translates the conceptual framework into spatial organization, mass composition, façade treatment, and circulation systems that support healthcare functionality and operational efficiency (Fig. 6).

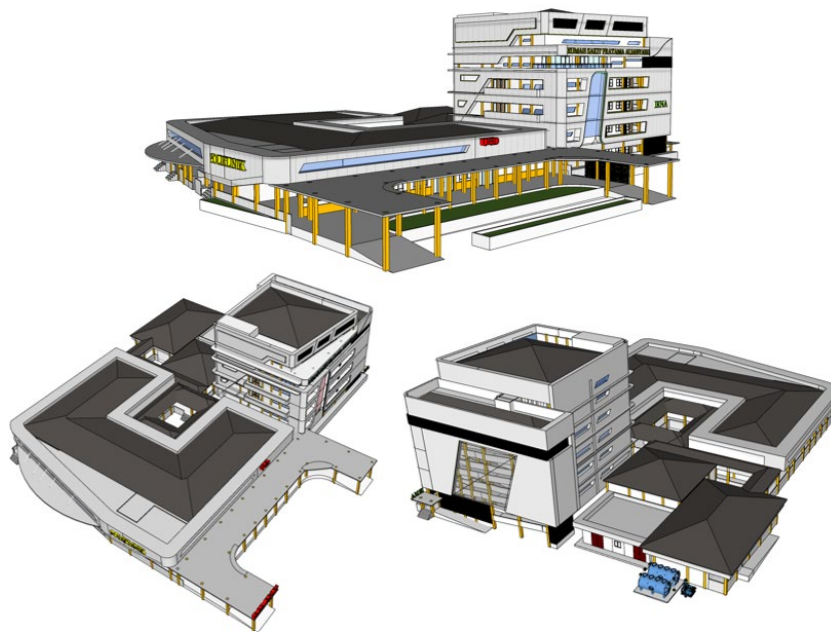


Figure 6. Building Perspective

The application of green balcony elements on each floor level is part of the environmental comfort strategy. These green elements function as microclimate regulators, heat-reduction components, and visual therapy elements, providing calming exterior views for patients and visitors. Vegetation elements are also integrated into the site design to improve environmental quality and reduce surrounding noise levels.

The roof design uses a sloped roof system suitable for tropical climates with high rainfall intensity. This strategy supports rainwater drainage performance while also helping reduce external noise levels. In addition, the building façade is designed to create a strong visual presence when viewed from the main urban corridor, particularly from Jalan Pangeran Natakusuma. The application of Ministry of Health regulations is reflected in the zoning arrangement, circulation separation, and

spatial standards to ensure compliance with healthcare facility requirements. Functional zoning is organized to separate public, semi-public, private, and service areas in order to maintain operational clarity and patient safety. The circulation system is designed with distinct access points for main visitors and service functions to improve traffic flow efficiency and minimize operational conflicts.



Figure 7. Building Perspective

The modern architectural concept is implemented through simple geometric massing, clean façade articulation, and the use of contemporary materials such as Aluminum Composite Panel (ACP). Neutral color schemes are applied to represent cleanliness and professionalism, while accent colors are integrated to strengthen contextual identity and visual continuity with nearby healthcare facilities, particularly Puskesmas Alianyang (Fig. 7).

Environmental response strategies are implemented through the use of secondary skin elements functioning as sun shading devices to reduce direct solar heat gain while maintaining airflow. Green balcony elements and vegetation are incorporated to improve microclimate conditions, reduce heat exposure, and enhance visual comfort for patients. The sloped roof system is applied to address high rainfall intensity and ensure adequate water drainage. The building facade and overall massing are oriented to create a strong visual presence from Jalan Pangeran Natakusuma while maintaining spatial organization that prioritizes quieter zones at the rear of the site. Drainage systems and site planning strategies are implemented to prevent flooding and improve environmental sustainability.

Through this integrated implementation approach, the conceptual framework is translated into a functional, responsive, and contextually appropriate healthcare facility design. The result is a Type D hospital design in Pontianak that balances regulatory compliance, architectural identity, environmental responsiveness, and operational efficiency.

The design concept is reflected in the treatment room's interior layout, which prioritizes functionality, comfort, and cleanliness. The layout is organized to support efficient interaction between medical staff and patients, ensuring smooth movement and clear circulation within the space. Natural light is maximized through large window openings to create a bright and comfortable atmosphere, reducing the sense of confinement often associated with medical spaces. The use of neutral colors, combined with green accents, reinforces the impression of cleanliness and creates a calming environment for patients (Fig. 8).



Figure 8. Dentist Interior

Material selection focuses on hygiene, durability, and ease of maintenance, supporting healthcare operational standards. Overall, the design translates modern architectural principles into a practical and patient-friendly treatment space that supports both medical efficiency and psychological comfort (Fig. 9).



Figure 9. the inpatient room

The implementation of the design concept in the inpatient room (IRNA) emphasizes comfort, functionality, and a healing-oriented environment within a modern architectural framework. The spatial layout is arranged to provide sufficient circulation space for medical staff while maintaining patient privacy and ease of monitoring. Natural lighting is maximized through window openings to create a bright and open atmosphere, reducing the feeling of confinement. The use of neutral tones, combined with warm lighting, creates a calm, welcoming environment for patients during their recovery.

Material selection prioritizes hygiene, durability, and ease of maintenance in accordance with healthcare facility standards. The arrangement of beds, medical equipment, and supporting furniture is designed to support efficient medical service while ensuring patient comfort (Fig. 10). Overall, the inpatient room integrates modern design principles and healthcare functional requirements, creating a space that supports both medical performance and patient well-being.



Figure 10. The Corridor in The Inpatient

The corridor in the inpatient unit is designed based on modern architectural principles that emphasize clarity, efficiency, and comfort. The spatial organization allows smooth circulation for medical staff, patients, and visitors without creating congestion. The nurse station is positioned strategically at the center of the corridor to ensure optimal visibility and quick response to patient needs. This placement strengthens supervision while maintaining openness.

The use of warm wood panels paired with neutral wall colors creates a calm, professional atmosphere. Indirect lighting along the ceiling and walls enhances visual comfort while guiding movement through the space. Clean lines and simple forms reflect the modern concept, ensuring the corridor is not only functional but also supportive of a healing environment. Overall, the corridor design integrates circulation efficiency, visual comfort, and modern aesthetics to support effective inpatient care services.



Figure 11. Surgery Room

The operating room is designed with a strong emphasis on sterility, efficiency, and precision, in line with modern architectural principles. The spatial organization ensures clear zoning between sterile and non-sterile areas, allowing medical teams to move efficiently without disrupting procedural flow. The layout centers on the operating table as the focal point, supported by strategically positioned medical equipment to ensure optimal accessibility. Overhead surgical lighting is designed to provide focused, shadow-free illumination, supporting accuracy during procedures (Fig. 11).

The selection of smooth, seamless materials enhances hygiene and simplifies maintenance, while the cool-toned color palette reinforces a clean and controlled atmosphere. Integrated lighting and concealed mechanical systems reflect a modern approach that prioritizes both performance and

visual clarity. Overall, the operating room integrates functional medical standards with modern design elements to create a safe, efficient, and highly controlled surgical environment.

CONCLUSION AND SUGGESTIONS

The planning and architectural design of the Type D hospital has been developed based on site analysis, regulatory standards, environmental response strategies, and modern architectural design principles. The selected site location is considered strategic in terms of accessibility, integration with surrounding healthcare facilities, and infrastructure readiness. The application of modern architectural concepts combined with climate-responsive design strategies is expected to support functional healthcare services, environmental comfort, and building performance. Overall, the proposed design is expected to contribute to the development of healthcare infrastructure and improve the accessibility of healthcare services in Pontianak.

1. Future hospital development should continue to prioritize compliance with healthcare facility regulations and functional service standards to ensure operational effectiveness and service quality.
2. Environmental design strategies such as passive shading systems, vegetation integration, and climate-adaptive materials should be further optimized to improve building sustainability and long-term performance.
3. Future research is recommended to evaluate building performance, patient comfort, and operational efficiency through post-occupancy evaluation after the hospital becomes operational.

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