

A rereading of the Majapahit royal palace architecture: Spatial patterns, orientation, and position

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ARTICLE INFO	ABSTRACT
<i>Article history:</i> Received May 05, 2026 Received in revised form June 11, 2026 Accepted August 09, 2026 Available online September 01, 2026 <i>Keywords:</i> Grid-Pattern Kedaton Village Majapahit Mount-Orientation Palace *Corresponding author: Rahadhian Prajudi Herwindo Department of Architecture, Universitas Katolik Parahyangan, Indonesia Email: dodo@unpar.ac.id ORCID: https://orcid.org/0000-0003-3756-3707	<i>The location of the Majapahit Palace, the royal seat of Majapahit, one of the most prominent kingdoms in Indonesia and a major political power in Asia, remains uncertain. To this day, diverse interpretations continue to emerge regarding its precise location. This study aims to investigate the spatial position and architectural form of the Majapahit Palace. Previous research, ranging from the pre-independence period to the present, provides the primary foundation for this investigation. The study employs an interpretative approach grounded in historical research, textual analysis, and archaeological evidence, utilizing overlay map analysis and comparative studies with Balinese palaces as well as early Islamic-period palaces in Java. The findings suggest that the principal palace of Majapahit was situated in the Kedaton Village area, with its orientation directed toward Mount Kelud to the south, Mount Penanggungan to the east, and the Java Sea to the north. Furthermore, the spatial organization of both the palace and the surrounding city is understood to follow a grid-based layout, integrating road networks and intersecting canal systems. The architectural form of the Majapahit Palace is believed to share strong affinities with Balinese palatial architecture and early Islamic palaces in Java, incorporating key features such as defensive fortifications and enclosing walls arranged in grid patterns, hierarchical layered gates, moats, royal and familial residential compounds, water gardens or pavilions, guest reception structures, and other significant architectural elements.</i>

Introduction

The Majapahit Kingdom represents one of the most significant historical milestones in Southeast Asia, as documented in the Nagarakretagama by Mpu Prapanca (Manggala 2013). For centuries, the kingdom encompassed a vast territory

extending across much of present-day Indonesia and the Malay Peninsula, serving as a major center of civilization, as evidenced by archaeological discoveries of temple ruins and palace structures, many of which now survive only in fragmented conditions (Akbar 2014). Scholarly interpretations concerning the



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Majapahit palace, including its location, orientation, and architectural configuration, have generally remained segmented and disconnected, with each aspect examined separately through extensive academic inquiry over time. This study therefore seeks to synthesize these diverse perspectives to establish a more comprehensive understanding. As one of the largest Hindu kingdoms in Indonesia during the 13th to 15th centuries CE, Majapahit gradually declined due to a complex interplay of factors, including internal political conflict, adverse climatic conditions, and the emergence of Islamic polities such as Demak Sultanate, which had previously formed part of Majapahit's territorial domain (Mahamid 2023). Archaeological remains associated with the palace have predominantly been identified in the Trowulan area, a region that has attracted scholarly attention since the early nineteenth century (UNESCO 2009; Wijaya 2023). Nevertheless, despite extensive investigation, the precise location of the palace remains unresolved due to the substantial loss and degradation of its material evidence.

Early investigations into the Majapahit palace were documented by Wardenaar (1815) (Gomperts, Haag, and Carey 2014), followed by later studies conducted by Verbeek (1890), Kern (1919), Maclaine Pont (1924;1926), Stutterheim (1948), Pigeaud (1960), and Slametmulyana (1966–1983). Subsequent research includes the excavations undertaken by Vistarini (1930) (Gomperts, Haag, and Carey (2014), as well as geospatial investigations utilizing aerial photography and infrared satellite imagery conducted by Bakosurtanal (Darmoyuwono, 1981). These datasets were later examined by Mundardjito, Hermanislamet (1999), Gomperts et al. (2014), Kubontubuh (2021), and Permana (2024). Bakosurtanal currently known as the Geospatial Information Agency produced maps revealing linear grid-like features, some of which have been interpreted as canal systems supported by archaeological evidence (Permana 2024). However, textual sources such as the Nagarakretagama (Robson 1995) and the account of Ma Huan (Van Der Linde 2024) do not explicitly mention such canals, instead referring to a *catuspatha*. Consequently, differing interpretations concerning whether these linear features represent canals, roads, or hybrid infrastructure have generated scholarly debate, with some researchers identifying them as canals and others interpreting them as road networks or

mixed infrastructural systems (Munandar 2013; Gomperts, Haag, and Carey 2010; Gomperts et al. 2014).

Previous research may broadly be categorized into three major groups. Study I, represented by Wardenaar, Stutterheim, Vistarini, and Gomperts, applies overlay analysis without incorporating Bakosurtanal data and identifies the palace location at Sumur Upas. Study II, represented by Mundardjito and Hermanislamet, correlates Bakosurtanal data with archaeological discoveries, demonstrating the presence of grid patterns and revealing a significant concentration of artifacts within the area. Study III, represented by Maclaine Pont, offers a distinct interpretation by locating the palace center at Candi Menakjinggo through architectural analysis without employing spatial overlay. The present research is closely aligned with Studies I and II, both of which integrate spatial and empirical evidence. Accordingly, this study seeks to determine the location of the Majapahit palace as described in the Nagarakretagama and other scholarly references through a combined analysis of textual sources, cartographic evidence, and archaeological data. The novelty of this research lies in its integration of earlier cartographic interpretations, such as those proposed by Stutterheim and Gomperts, with geospatial datasets from Bakosurtanal, while also proposing an interpretation of several architectural patterns of the palace. It is expected that this integrated approach will facilitate further reconstructions, including virtual simulations of the Majapahit palace complex.

Methods

This study establishes a unified analytical framework for identifying the palace site by utilizing textual sources, historical maps, and archaeological surface data, while incorporating both earlier and contemporary interpretations. A comparative approach is employed to reconstruct the architectural layout and internal spatial organization of the palace, drawing upon visual evidence from temple reliefs, Balinese puri, and historical Javanese palaces. This comparison considers essential architectural components, including gateways, enclosure walls, water gardens, and related spatial features. The research methodology is qualitative in nature and

integrates historical, interpretative, and comparative approaches. Textual accounts from the *Negarakretagama* and *Ma Huan*, along with perspectives offered by scholars such as Kern, Pigeaud, and Stutterheim, are supported by both textual and non-textual data, including geospatial datasets from Bakosurtanal and archaeological findings. A central analytical technique employed in this study is overlay (superposition), through which multiple maps are aligned using shared coordinates to produce a single spatial representation (Tjahyono 2007). This composite map is subsequently interpreted to identify spatial patterns and reconstruct the organization of the Majapahit palace.

In conducting the overlay analysis, several base maps previously utilized in earlier studies were employed, namely:

1. This study examines the position of the Majapahit royal palace using the following cartographic datasets: the reconstructed Majapahit royal palace on the 1941 topographic map of Modjoagoeng (Topografische Dienst in Nederlandsch-Indië, no. 53/XLI-D, original scale 1:50,000), with added WGS84, UTM zone 49M grids at 1000-meter intervals (georeferencing accuracy: 50 m), and the reconstructed palace on a QuickBird satellite image (scene: 101001000738F301, 2 October 2007, spatial resolution: 0.6 m), with added WGS84, UTM zone 49M grids at 500-meter intervals (georeferencing accuracy: 1.7 m) (Gomperts, Haag, and Carey 2014). This study evaluates the position of the Majapahit royal palace on the Trowulan map (Map 1). Several objects suitable as Ground Control Points (GCPs) include the main north–south road and Sumur Upas (Kedaton site). Map 1 serves as the primary reference.
2. Stutterheim’s plan of the royal palace and capital of Majapahit was reprojected onto the third edition of the topographic map of the Topografische Dienst in Nederlandsch-Indië, sheet Modjoagoeng, number 53/XLI-D, original scale 1:50,000 (1941). The contours of this plan correspond to roads, pathways, ditches, and enclosures shown on the topographic map, with deviations of 32 meters or less. The added gridlines appear at 1000-meter intervals and represent geographical coordinates in UTM zone 49M, WGS84 (Gomperts, Haag, and Carey 2008). The mapping accuracy of Stutterheim’s plan is

approximately 60 meters relative to UTM coordinates (Gomperts, Haag, and Carey 2008). Maps 1 and 2 are overlaid using identical coordinate points, with the main north–south road and Sumur Upas (Kedaton site) serving as key GCPs.

3. The Plan of Majapahit is based on a copy of Wardenaar’s original 1815 plan. Added gridlines appear at intervals of 1,000 meters and represent UTM coordinates (zone 49M, WGS84). Courtesy of the Trustees of the British Museum (Gomperts, Haag, and Carey 2012). Based on this map, several significant reference points can be identified, particularly Segaran tank. By using Kolam Segaran as a reference point, overlay analysis with contemporary maps can be conducted. The coordinates are as follows: Segaran tank, northeastern corner (652684 9164507 +7m); Segaran tank, southeastern corner (652620 9164135 +7m); Segaran tank, southwestern corner (652449 9164167 +7m); and Segaran tank, northwestern corner (652518 9164536 +7m). These coordinates serve as references for overlaying the map with the Trowulan map. As the oldest available map, the Wardenaar map was later georeferenced using coordinate projections, enabling the clear identification of Kolam Segaran.
4. The Bakosurtanal map, redrawn by Karina at a scale of 1:8,800 and illustrated by Hadi Sunaryo (Yusmaini Eriawati 2007), was further developed in Hermanislamet’s doctoral dissertation (1999), which examines the urban pattern of Majapahit by illustrating a chessboard-like layout and the inclination of the city axis relative to the north. The coordinates of Kolam Segaran, as identified in both the Wardenaar map and contemporary maps, can be used as reference points for overlaying the Bakosurtanal map with current cartographic datasets. Important objects serving as GCPs include Kolam Segaran, the main highway, the principal north–south road, Sumur Upas, and Candi Menakjinggo.

Using maps analyzed by Gomperts, Haag, and Carey (2008; 2012), this study integrates these datasets through overlay with Bakosurtanal and contemporary maps while reevaluating the proposed location of the Majapahit palace. The approach employs key Ground Control Points (GCPs), including Sumur Upas, Segaran, and major road intersections, to establish spatial

references and identify zones of convergence. Earlier maps by Wardenaar and Stutterheim were produced prior to the development of aerial photography, while Gomperts' studies did not incorporate Bakosurtanal data. Therefore, this research brings these datasets together to assess whether their spatial correspondences are mutually complementary. The resulting convergence zones are then compared with archaeological evidence from both early excavations and later studies (e.g., Vistarini, 1931). Maps developed by Gomperts and Bakosurtanal serve as the primary analytical tools, although future studies may achieve greater precision through technologies such as geo-radar and LiDAR.

Several prominent landmarks serve as Ground Control Points (GCPs) for spatial referencing. Features with clearly defined boundaries, such as Sumur Upas, the north-south road corridor, Segaran, and Menakjinggo Temple, were selected due to their proximity to the principal archaeological area and their relatively high positional certainty across both historical and contemporary cartographic sources. The relative positions of Segaran and Sumur Upas-Kedaton appear to have remained largely stable over time, as illustrated in Wardenaar's map, thereby increasing their reliability as georeferencing control points.

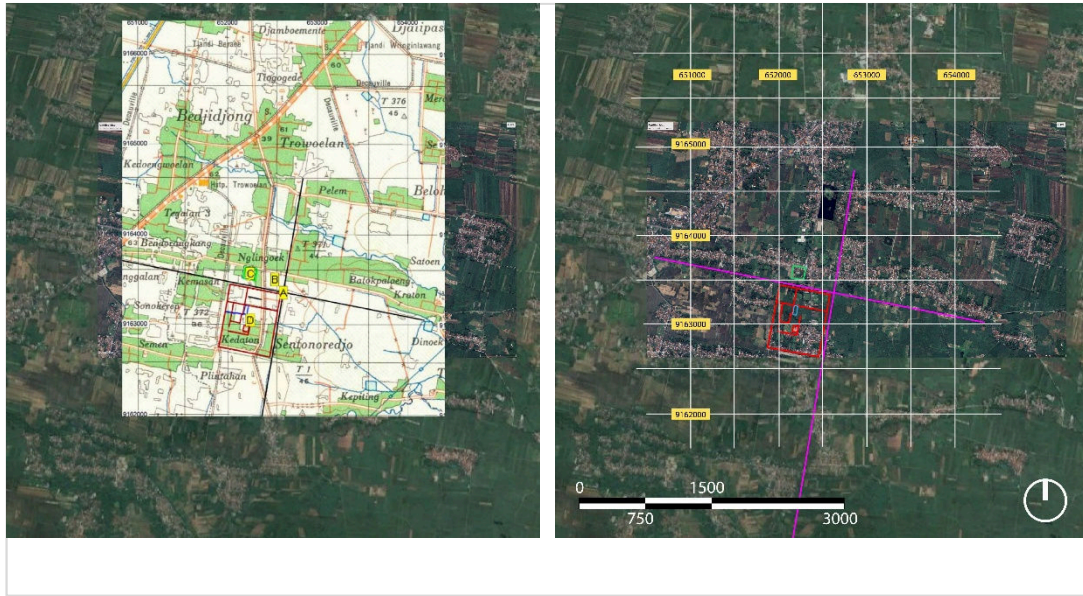
A comparative method is further employed to examine architectural characteristics by analyzing Balinese *puri*, Islamic-era Javanese palace-keraton complexes, and temple reliefs to interpret architectural features (Adrisijanti 2000; Munandar 2005; Wijaya Made 2014; Herwindo 2019; Iqbal 2023; Galestin 1936). Comparable features include hierarchical spatial organization, gateways (split gate and paduraksa), enclosure

walls, water elements, and bale kambang. These architectural similarities provide an interpretative framework for understanding Majapahit remains, including Wringin Lawang and Bajang Ratu, as well as architectural representations depicted in temple reliefs.

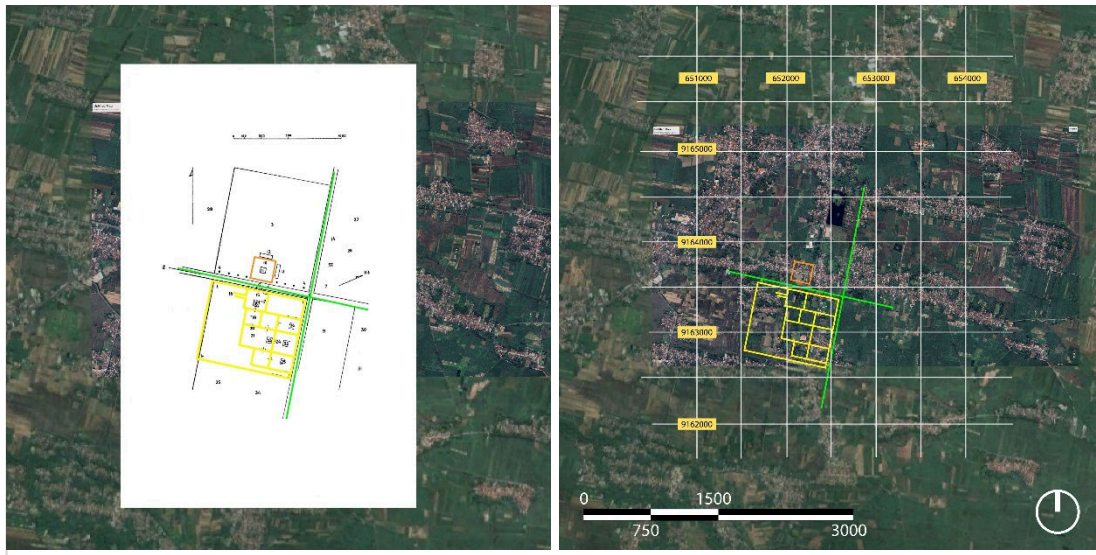
Results and discussion

The location of the *Majapahit* royal palace

The present study integrates historical cartographic interpretations proposed by Stutterheim (1948) and Gomperts et al. (2014) with geospatial datasets produced by Bakosurtanal, which had previously been examined independently. Through overlap and overlay analysis, these sources provide consistent indications regarding the location of the Majapahit palace. Building upon Gomperts et al. (2014) synthesis of earlier literature, this research further incorporates Bakosurtanal data alongside archaeological analyses conducted by Mundardjito (Permana 2024) and Hermanislamet (1999). In the Trowulan area, infrared imagery reveals a grid-like pattern that suggests a highly ordered urban layout. Archaeological evidence further indicates that the intersecting linear features may represent canals or other infrastructural components. Based on the combined evidence, the palace is most plausibly situated within the Kedaton-Sumur Upas-Kubur Panggung zone. This core area extends from Sumur Upas or Sentono Redjo in the south to Kubur Panggung in the north and is supported by artifact distributions across the area (green area, see figure 4).



Map 1. (Left) Overlay study by Gomperts. A: Central crossroads (*catuspatha*); B: Temple complex (*brahmasthāna*); C: Durbar (*sabhā*); D: Royal palace. The Majapahit royal palace reconstructed on the 1941 topographic map Modjoagoeng (Topografische Dienst in Nederlandsch-Indië, no. 53/XLI-D, original scale 1:50,000) with added WGS84, UTM, zone 49M grids appearing at intervals of 1000 m (georeferencing accuracy: 50 m), and the Majapahit royal palace reconstructed on a QuickBird satellite image (scene: 101001000738F301, 2 October 2007, spatial resolution: 0.6 m) with added WGS84, UTM, zone 49M grids appearing at intervals of 500 m (georeferencing accuracy: 1.7 m) (Gomperts et al. 2014); (Right) displayed on the present-day map using coordinate references (The initial drawing scale is 1:1,237.5. For map representation, a scale bar is used so that when the image is enlarged or reduced, the scale adjusts automatically, Herwindo 2025).



Map 2. (Left) Interpretation by Stutterheim (1948), showing the Majapahit royal palace reconstructed on the 1941 topographic map and overlaid onto the Trowulan site based on Gomperts, then (Right) displayed on the present-day map using coordinate references (The initial drawing scale is 1:1,237.5. For map representation, a scale bar is used so that when the image is enlarged or reduced, the scale adjusts automatically, Herwindo 2025).

Figure 1. Map Overlay form Gomperts (Map 1) dan Stutterheim (Map 2) (Gomperts et al. 2014; Herwindo 2025)

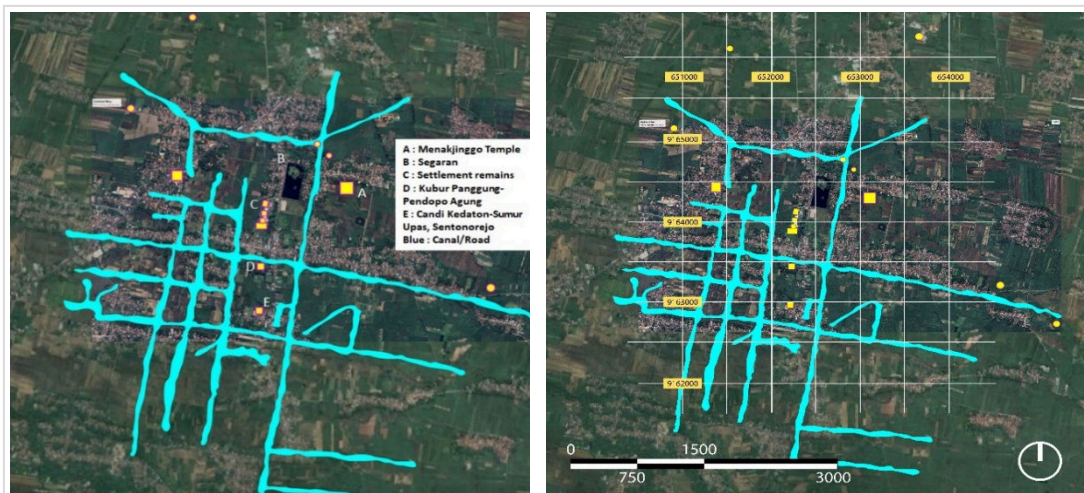


Figure 2. Overlay map from Bakorsurtanal (Hermanislamet 1999) and site-canal interpretation, displayed on the present-day map using coordinate references (The initial drawing scale is 1:1,237.5. For map representation, a scale bar is used so that when the image is enlarged or reduced, the scale adjusts automatically, Herwindo 2025)

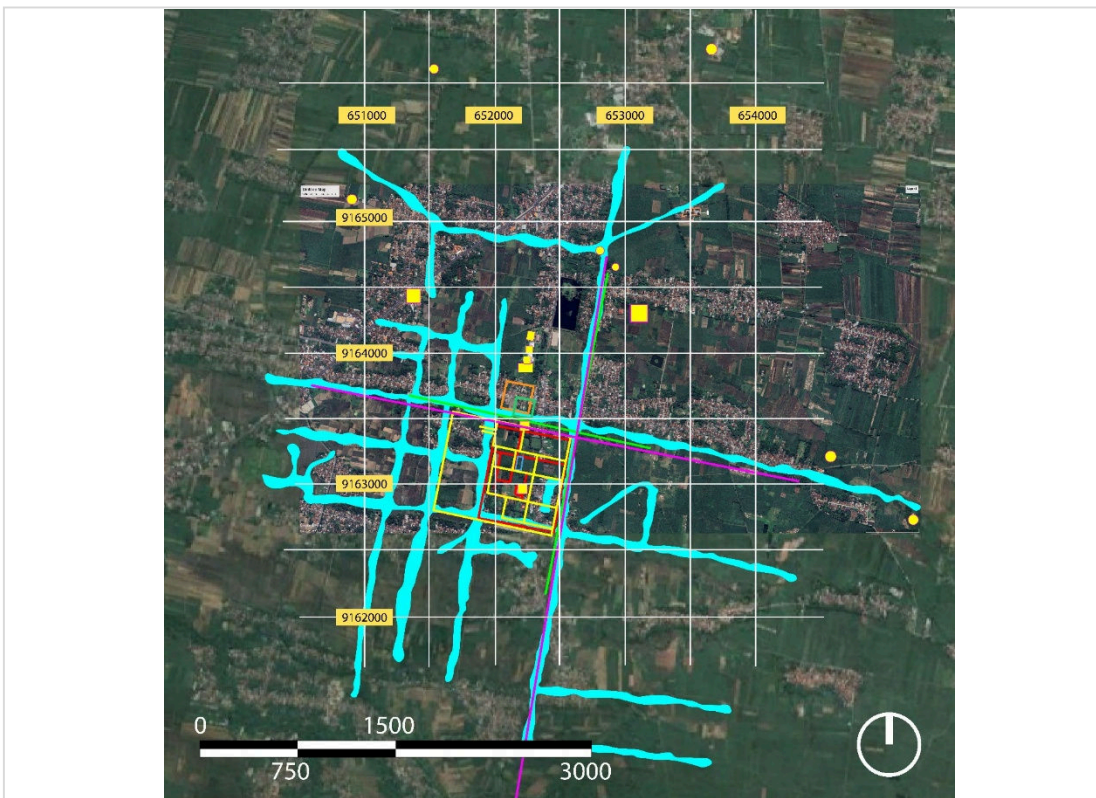


Figure 3. Overlay from Stutterheim, Gomperts, and Bakorsurtanal (The initial drawing scale is 1:1,237.5. For map representation, a scale bar is used so that when the image is enlarged or reduced, the scale adjusts automatically, Herwindo 2025). The convergence zone identified from the various maps is highlighted in green, indicating the area in which the center of the Majapahit palace described in the Negarakretagama is likely located

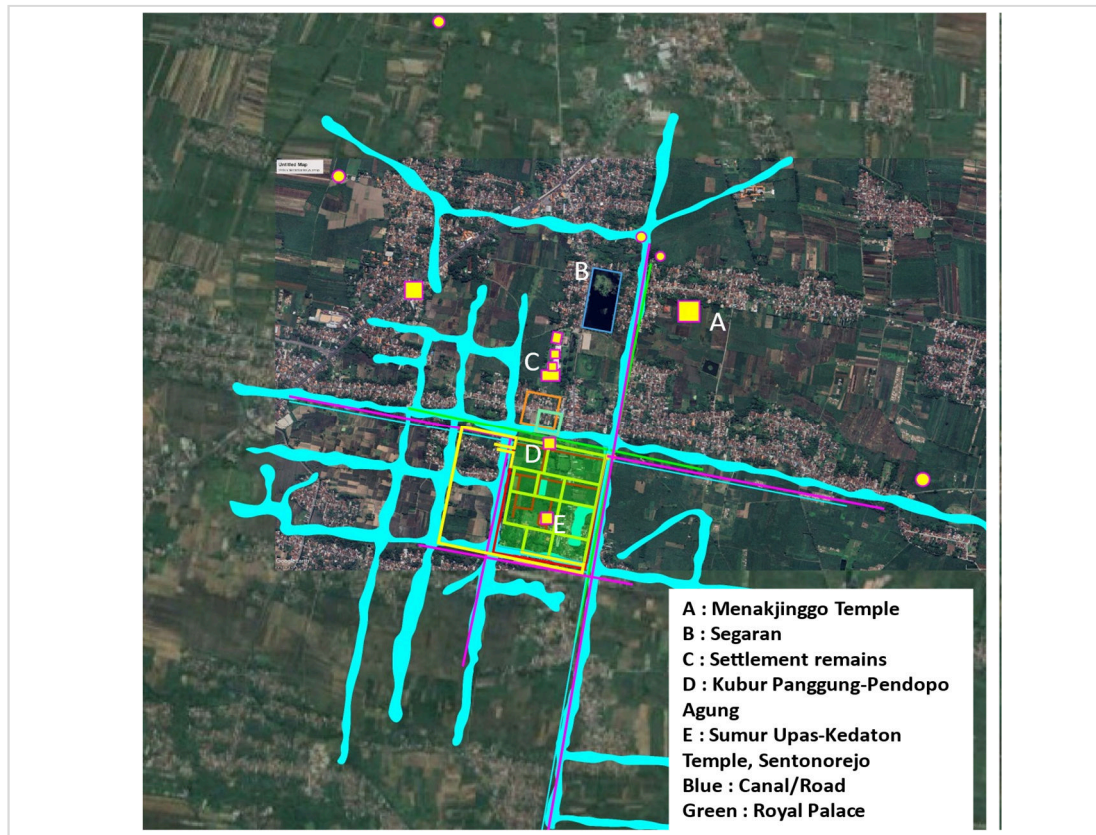


Figure 4. Overlay from Stutterheim, Gomperts, *Bakorsurtanal* Map and Location *Majapahit* of Royal Palace (green area) (Herwindo 2025)

The investigated area lies within a rectangular zone highlighted in green, bounded approximately by the following coordinates: upper-left corner, 7°33'56.12"S and 112°22'41.38"E; upper-right corner, 7°33'59.65"S and 112°22'59.64"E; lower-left corner, 7°34'18.27"S and 112°22'37.71"E; and lower-right corner, 7°34'22.23"S and 112°22'54.79"E. The identification of this area is further supported by the presence of elite ceramic findings, toponymic indicators, and various archaeological remains, including wall foundation remnants, ponds particularly from the excavation by Vistarini (1931) and other architectural structures. Collectively, this evidence indicates the presence of a significant built environment within the area (green area, see figure 4).

The canals depicted in the *Bakorsurtanal* maps are not explicitly mentioned in either the *Negarakretagama* or Ma Huan's account. Nevertheless, archaeological excavations have confirmed the existence of such canals. Their interpretation is based on excavation findings showing soil stratification on both sides of the

canal, formed by the relocation of earth from lower to higher elevations. This indicates past excavation activities undertaken to create canal embankments or retaining walls. Interpretations of the *Bakorsurtanal* maps vary considerably. Mundardjito (Permana 2024) interpreted these features as canals, whereas Kubontubuh (2021) proposed that they may represent roads, trenches, or a combination of both. These linear features may therefore reflect a hybrid system of roads and canals, potentially running alongside major urban structures such as the *catuspatha* (central crossroads). If interpreted solely as canals exceeding 20 meters in width, these features open compelling possibilities for comparative analysis with canal-based cities beyond Indonesia, including examples in Europe, China, and Angkor. The existence of canals would also correspond with practical urban functions, particularly water management. For example, Kolam Segaran, located north of the Kedaton area, is absent from the *Negarakretagama*. Archaeological evidence suggests the presence of settlements west of Segaran, corresponding to

areas described in the *Negarakretagama* as lying north of the palace. This discrepancy raises the possibility that Segaran may have been constructed after the composition of the *Negarakretagama*. Consequently, multiple interpretations remain regarding these perpendicular linear features, namely that they represent canals, roads, or a combination of both. In traditional urban morphology, roads generally function as primary circulation routes and are often accompanied by canals along their edges to facilitate rainwater drainage.

Accordingly, the urban morphology of Trowulan may be understood as integrating both canal-based and road-based circulation systems. This interpretation is supported by historical accounts describing the movement of elephants, ceremonial parades, and ritual processions, all of which would have required the existence of established road networks. The canals were likely positioned along both sides of these thoroughfares. Furthermore, geological evidence indicates the probable existence of a large canal in the southern sector of the city, further reinforcing the hypothesis that Trowulan's urban structure consisted of an integrated network of waterways and roads.

Archaeological findings and toponymic investigations indicate that Majapahit may have possessed more than a single palace complex. Additional royal compounds were likely established by subsequent rulers or members of the royal lineage. For instance, the Bajang Ratu Gate precinct, commonly identified as Keraton Village, together with the Kunitir complex, is widely believed to have functioned as royal residential compounds (*puri*). The presence of multiple palace compounds finds parallels in Bali, particularly in Karangasem, where more than one principal *puri* continues to exist. Comparable patterns are also evident in Islamic-period Java, where Sultan Agung commissioned Keraton Kerta as a successor to Kotagede, while his successor later developed Keraton Plered alongside Keraton Kerta (Adrisijanti 2000). Such continuity likely reflects the enduring spatial legacy of Majapahit. Nevertheless, the Kedaton–Sumur Upas area remains the most convincing candidate for representing the principal Majapahit palace described in the *Negarakretagama*, especially when corroborated through overlay analysis of the aforementioned cartographic reconstructions.

Analysis of spatial organisation suggests that open spaces were arranged according to a layout strongly reminiscent of the Majapahit period, particularly through the application of a grid-based spatial order. This grid morphology has been identified through field investigations and aerial photographic surveys of the Trowulan archaeological site, as well as through temple relief depictions from the Majapahit era illustrating clusters of houses enclosed by walls and bordered by riverine landscapes on one side (Eriawati 2023). Comparable spatial arrangements are also observable in Bali (Suwitha 2019). The grid framework remains discernible within the Pakungwati complex and the Sitihiinggil zones of the Kasepuhan and Kanoman Palaces in Cirebon, both representing some of the oldest surviving Javanese courts. This spatial model underwent further refinement during the Islamic Mataram era in Kotagede, Plered, and Kartasura, and subsequently continued to shape the younger palace complexes of Yogyakarta and Surakarta.

This grid configuration is widely associated with the mandala concept, particularly the *Astadikpala* cosmology, which recognises eight cardinal and intercardinal directions guarded by deities and aligned with major natural features such as mountains and seas. The placement of Hindu deities within the mandala framework was later transformed into local ancestral or spiritual entities. Consequently, even in later palace complexes such as Surakarta, cosmological transformations remain evident through a four-directional symbolic orientation: north (Krendhawahono forest and Bathari Kayuwati), south (the Southern Sea and Ratu Kidul), west (Mount Merapi), and east (Mount Lawu, Sunan Lawu, and Majapahit heritage).

In subsequent developments, this cosmological framework became integrated with Islamic urban morphology through the incorporation of mosques as central spatial elements. Beyond political or dynastic symbolism, this inherited spatial order particularly its axial organisation demonstrates both linear and concentric square-grid systems deeply rooted in the ecological and cosmological worldview of the Nusantara. Spatial hierarchy and dualistic ordering constitute defining characteristics of regional urbanism, grounded in indigenous traditions and environmental relationships such as the mountain–sea dichotomy. This enduring pattern reflects a

sustained cultural consciousness aimed at harmonising human settlement with the natural environment while preserving ancestral continuity.

Orientation

Hermanislamet (1999) observes that the Majapahit grid system does not align strictly along a north–south axis but instead exhibits a slight deviation toward the northeast, owing to uncertainty regarding the exact orientation of the grid. Comparative examination of later Javanese *keraton* and Balinese *puri*, both of which were strongly shaped by Majapahit traditions, indicates that spatial orientation generally follows cosmological principles, particularly the mountain–sea axis. These Austronesian spatial axioms can be traced back to periods preceding Hindu-Buddhist influence and persisted

throughout the Majapahit era. Within this framework, the Majapahit palace likely adhered to a similar orientation system and organisational structure. The southern axis appears to correspond with Mount Kelud, a prominent volcanic peak referenced in Majapahit historical sources and associated with important temple complexes such as Penataran. The eastern orientation relates to Mount Penanggungan (Pawitra), a sacred mountain of major significance during the final phase of the Majapahit kingdom, while the northern axis aligns with the Java Sea, which served as the kingdom’s principal maritime gateway. This orientation pattern closely parallels later Javanese cosmological planning, particularly the alignment of Mount Merapi with the southern coastline in Islamic-period courts, demonstrating continuity in spatial ideology.

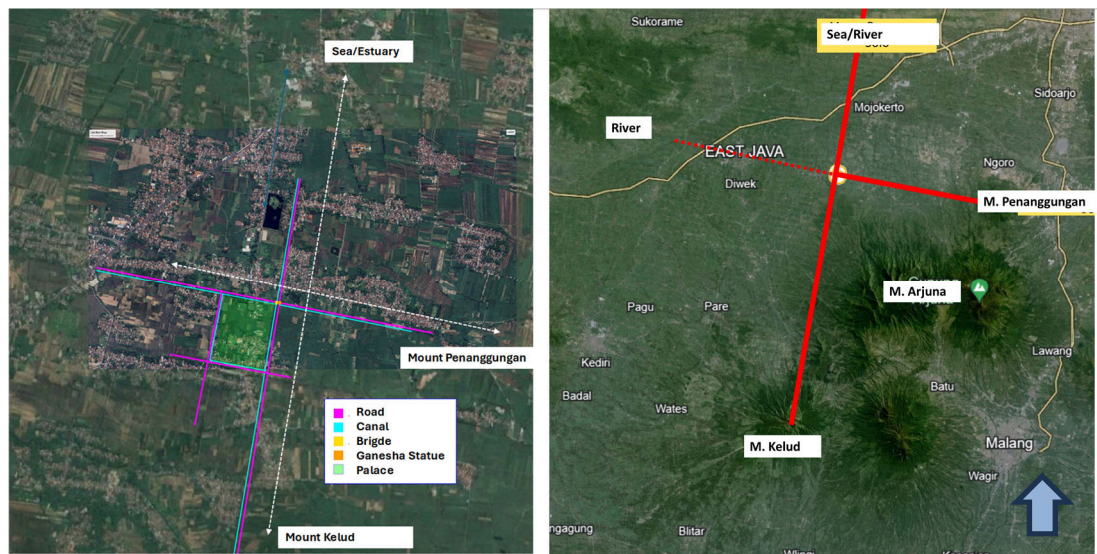


Figure 5. Orientation and Location of Majapahit Royal Palace (Shaded in green), (Herwindo 2025)

Architectural planning in the Majapahit realm was profoundly shaped by ancient Austronesian cosmological principles, which established direct relationships between built form and the mountain–sea axis. This conceptual framework continued into later historical periods, as Javanese *keraton* and Balinese *puri* preserved spatial and cultural continuities inherited from Majapahit traditions. Based on Bakosurtanal cartographic data and reconstructions by Gomperts, the Majapahit urban grid does not follow a strict cardinal north–south alignment but instead tilts slightly east of north (azimuth $\sim 011^\circ$), with a

perpendicular axis of approximately $\sim 101^\circ$. This deviation suggests that the layout was not determined purely by geometric logic but was instead influenced by cultural symbolism and environmental conditions. When projected onto the broader volcanic landscape, the principal axis extends approximately toward Mount Penanggungan in the southeast (azimuth $\sim 115^\circ$) and Mount Kelud in the southwest (azimuth $\sim 215^\circ$). Such alignment suggests that the spatial grid functioned as a symbolic axis connecting major sacred mountains within the Majapahit cosmological landscape. Using Sumur Upas

(Candi Kedaton) as a principal reference point ($7^{\circ}34' 13.1''$ S; $112^{\circ}22' 47.1''$ E / $-7.5703, 112.3798$), the azimuth toward Mount Penanggungan is approximately 109° , whereas the azimuth toward Mount Kelud reaches roughly 192° , producing an angular relationship of around 83° . Although this does not constitute a mathematically exact right angle, the angular variation ($\pm 5-10^{\circ}$) should be understood as symbolic spatial alignment rather than strict geometric precision. Such deviations likely reflect practical considerations, including topography, traditional measurement methods, solar orientation, and pre-existing infrastructural conditions, reinforcing the interpretation that Majapahit spatial planning fused cosmological symbolism with environmental pragmatism.

In addition to the mandala concept, Majapahit spatial ideology also emphasised symbolic representations of mountains and oceans, both central components of Jambudvīpa cosmology. This symbolism remained influential in later coastal courts and Islamic palace complexes in Java, where architectural elements such as *bale kambang* and water gardens (*taman air*) evoke sacred landscapes surrounded by symbolic seas (Stein, Prajudi Herwindo, and Nirwan 2025). These features indicate continuity with Majapahit architectural principles, despite significant changes in spatial configuration during the Islamic era. One major transformation involved the replacement of the Majapahit *catuspatha* (central crossroads) with the palace–mosque–*alun-alun* arrangement. Despite this shift, macro-spatial analysis reveals continuity in orientation principles, particularly concerning the mountain–sea axis and the qibla direction. Linear planning strategies and functional zoning in later courts correspond closely with reconstructions of Trowulan, suggesting adaptation rather than rupture. With the rise of Islamic sultanates, urban spatial organisation became increasingly complex through the incorporation of qibla-oriented components. Consequently, building orientation and circulation patterns evolved in accordance with sacred Islamic direction while simultaneously preserving and reinterpreting inherited Majapahit spatial traditions.

The position of *Catuspatha* Layout – Hypothetical

Based on the *Negarakretagama*, the existence of a *catuspatha*, or grand crossroads, is identified

at the corners of the *keraton* complex (see fig. 6). This *catuspatha* is likewise represented in reliefs discovered at Trowulan (see fig. 6). According to Van Der Linde (2024), Ma Huan recorded the presence of a *catuspatha* within the Majapahit capital, marked by a Ganesha statue at its centre. The concept was also illustrated in cartographic interpretations by Stutterheim (1948) and Gomperts et al. (2014). In Bali, the *catuspatha* remains observable as the central node of a settlement, typically surrounded by a *puri*, temple (*pura*), pavilion (*wantilan* or *bale banjar*), marketplace, or public open space (Budihardjo 1986). The *catuspatha* constitutes a traditional spatial concept in Hindu culture (Munandar 2011), with roots traceable to India (Hermanislamet 1999). It refers to the intersection of four roads (*simpang empat*) and carries philosophical, spiritual, and social meanings. Etymologically, the term derives from Sanskrit, where *catus* denotes four and *patha* signifies road or direction.

Within traditional Balinese settlements (*desa adat*), the *catuspatha* occupies the central spatial position, forming the principal core (*utama mandala*) of settlement organisation (Yudiantini and Jones 2015). This area typically accommodates essential communal structures, including the *bale agung* (assembly pavilion), *pura desa* or *pura puseh* (community temples), and open spaces used for ritual and performance. Functionally, the *catuspatha* serves as the primary orientational anchor, organising settlement patterns according to the mountain–sea axis (*kaja–kelod*), which forms the foundation of Balinese cosmology.

In urban settings, the *catuspatha* likewise functions as both geometric and symbolic centre, embodying mandala principles through concentric and axial spatial organisation. Roads extend from this centre toward the four cardinal directions, generating a grid-like pattern associated with the *lokapala* (guardian deities). The palace (*puri*) is typically positioned near the *catuspatha*, often within the *kaja–kangin* (northeast) sector, alongside temples and civic buildings. This arrangement establishes the *catuspatha* as a cosmopolitical node where sacred, civic, and royal domains intersect.

During the Majapahit period, the *catuspatha* or Grand Crossroads served as a critical element of urban centrality, as described by Ma Huan. During the Islamic era, this concept likely persisted, although it became less visually

dominant than in Balinese and Majapahit contexts. Nonetheless, traces remain visible in Kota Gede, where the *catuspatha* continues to integrate with the marketplace, while in other *keraton* environments its presence became increasingly diffused due to urban transformation. Despite these changes, reverence for crossroads remains deeply embedded in post-Majapahit

Javanese culture. Crossroads are commonly perceived as spaces of concentrated spiritual energy where multiple metaphysical forces converge, both benevolent and malevolent. Consequently, such spaces are often associated with rituals, meditation, offerings, and other spiritual practices intended to connect with nature and divine forces.

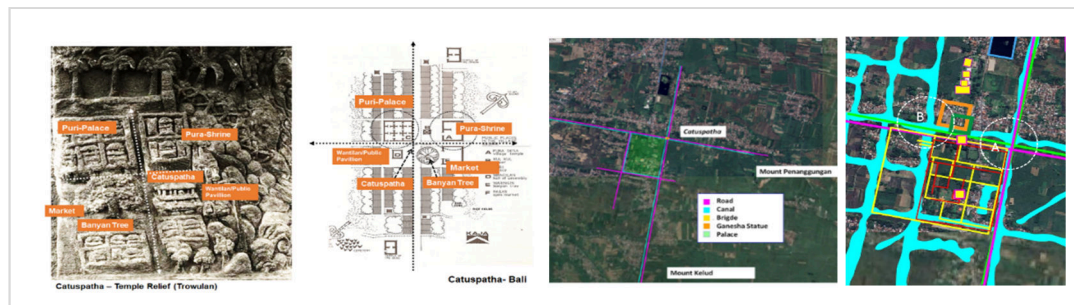


Figure 6. Catuspatha Depiction on Temple Majapahit Relief and Balinese Cities (left); Location of Catuspatha at Majapahit – Trowulan, A and B – Hypothetical (right) (Herwindo 2025)

Referring to the studies of Stutterheim and Gomperts discussed earlier, the *catuspatha* is interpreted as being located at the upper-right corner (Point A). This interpretation is further supported by the Bakosurtanal map, which identifies this position as the intersection of the site's longest east–west and north–south axes. However, comparative studies of Balinese *puri* complexes suggest an alternative possibility, namely that the *catuspatha* may have occupied the upper-left corner (Point B). This interpretation emerges from Stutterheim's findings, which identified remnants of a gateway structure together with the Panggung Tinggi–Lebuh Ageng within that zone. This interpretation gains additional support from the Nagarakretagama, which records the existence of two gates to the west and north, as well as open fields in those same directions. In Balinese *puri* spatial organisation, the *catuspatha* is commonly positioned near the principal gate and central open space, thereby strengthening the possibility that the crossroads may have been situated in that area (see fig. 6).

When compared with traditional Balinese *puri* compounds, the interpretation placing the *catuspatha* at Point B (near the main gateway) appears highly persuasive. However, evidence from other historic *puri*, such as the ancient royal complex of Klungkung (Kertagosa Area) which maintains strong historical and cultural ties with Majapahit suggests a different spatial

arrangement. In Klungkung, the *catuspatha* is not positioned near the principal gateway, a condition more comparable to Point A in the proposed Majapahit reconstruction. Furthermore, when considering the intersection of the site's principal longitudinal axes, Point A also emerges as a compelling candidate. Therefore, both interpretations remain plausible, each supported by distinct spatial and historical evidence.

The architectural depiction of royal palace

Descriptions of the Majapahit *keraton* in the *Nagarakretagama* indicate that the royal palace was enclosed by fortified perimeter walls. This characteristic closely parallels the architectural configuration of Balinese *puri* and Islamic-era Javanese *keraton*. Although detailed visual descriptions of internal buildings remain limited, architectural insights may be inferred through comparative analysis with Balinese *puri*. Relief representations likewise require careful interpretation when correlated with palace architecture. Additional evidence is provided by foreign accounts from visitors to the Majapahit court, including Ma Huan in the fifteenth century and the European missionary Odorico Mattiuzzi in the thirteenth century. Ma Huan (Kustiono and Wulan 2023) described the Majapahit royal palace, or Kotaraja, as enclosed by walls measuring three *chang* or three spears in height, equivalent to approximately 9.4 metres. The perimeter reportedly extended beyond 200 paces,

or over 310 metres. According to Ma Huan, the palace was protected by two layers of gates: the outer gate serving as the entrance to the *keraton* complex, and the inner gate functioning as a restricted entrance reserved for the king and his immediate relatives. Security within the palace was highly controlled and multilayered, while the environment was described as clean and orderly. The king's residence itself was enclosed by brick walls approximately 9 metres high and protected by double-layered gates. The city accommodated around 200–300 families. Residential structures within the palace complex were elevated 30–40 feet above ground level, featuring timber floors covered with finely woven rattan mats made from grass. Roofs were constructed from split timber resembling roof tiles (Groeneveldt 2009).

Reliefs from the Majapahit era portray timber architectural forms closely resembling later structures found in Balinese *puri* and post-Majapahit Javanese *keraton*, such as Sitihiunggil Kasepuhan (Tjahjono 1998; Rahadhian Prajudi Herwindo 2022). When combined with descriptions from the *Nagarakretagama*, these sources indicate a sophisticated spatial organisation consisting of royal residences, reception spaces, worship areas, *bale kambang* (water gardens), courtyards (*natah*), and layered gateway systems. Comparable functional elements also appear in Islamic-era *keraton*, suggesting continuity in spatial hierarchy and palace organisation across historical periods (Herwindo 2025).

Two principal gateway typologies define Majapahit architecture: the split gate (*gapura belah*), which marks outer zones, and the roofed gate (*paduraksa*), which defines inner and more restricted spaces. Both gateway types remain visible at Trowulan and continued to influence later Javanese and Balinese architectural traditions. The *gapura belah*, which became particularly prominent during the Majapahit period and is absent in earlier temple architecture, evolved into a defining architectural form widely adopted in Islamic-era sites and known in Bali as *candi bentar* (Mayangsari 2025). Meanwhile, *paduraksa* gates whose origins lie in earlier architectural traditions underwent further development during the Majapahit period and remained integral to later religious and royal compounds (Ramadhan and Handayani 2021). Together, these gateway forms illustrate architectural continuity and transformation from Majapahit into subsequent cultural periods. Both

gate types appear in Majapahit temple reliefs and continued to be utilised in Islamic-era architecture throughout Java, including royal tombs and mosques such as Astana Gunung Jati, Kasepuhan Palace, Kanoman Palace, Surosowan, and Kaibon (see figure 7).

A distinctive architectural feature strongly associated with Majapahit is the *bale kambang*, a pavilion constructed above or adjacent to water. Its presence is indicated in Majapahit temple reliefs and further supported by archaeological evidence from the Kedaton Temple complex, where pools and coral-like decorative features suggest the existence of water gardens. Such evidence strengthens the interpretation that *bale kambang* formed part of the Majapahit palace environment. Similar coral-like decorative motifs appear in later Cirebon sites, including Taman Sari Pakungwati, Kasepuhan, Kanoman, and Sunyaragi (Andayani and Saliya 2019), as well as within the Banten royal complex (Gilbert and Rahadhian 2024). This continuity indicates the persistence of water-garden traditions from Majapahit into Islamic-era architecture in coastal Java. The survival of *taman air* as sacred landscape elements also visible in later courts such as Yogyakarta and Surakarta demonstrates the ongoing adaptation of Hindu-Buddhist symbolic concepts within Islamic architectural contexts (Osiri 2023) (see fig. 7). A distinctive architectural feature strongly associated with Majapahit is the *bale kambang*, a pavilion constructed above or adjacent to water. Its presence is indicated in Majapahit temple reliefs and further supported by archaeological evidence from the Kedaton Temple complex, where pools and coral-like decorative features suggest the existence of water gardens. Such evidence strengthens the interpretation that *bale kambang* formed part of the Majapahit palace environment. Similar coral-like decorative motifs appear in later Cirebon sites, including Taman Sari Pakungwati, Kasepuhan, Kanoman, and Sunyaragi (Andayani and Saliya 2019), as well as within the Banten royal complex (Gilbert and Rahadhian 2024). This continuity indicates the persistence of water-garden traditions from Majapahit into Islamic-era architecture in coastal Java. The survival of *taman air* as sacred landscape elements also visible in later courts such as Yogyakarta and Surakarta demonstrates the ongoing adaptation of Hindu-Buddhist symbolic concepts within Islamic architectural contexts (Osiri 2023) (see figure 7).



Figure 7. Interpretive Overview of Building Types within the Majapahit Royal Palace and the continuity of its application in subsequent periods, (upper) *Majapahit Relief Depiction (Grid Pattern –Limasan Building, Settlement)* and *Reconstruction of Majapahit Settlement*, Source : Research Report (KILTV , [Herwinda 2025](#)); (below): *Majapahit Gate (Majapahit Relief, Majapahit remains : Wringin Lawang, Bajangratu)*, *Water Garden (Majapahit Relief – Kedaton Temple-Trowulan)*; Right: *Islamic era : Gate (Kasepuhan-Giri)*, *Water Garden Yogyakarta and Sunyaragi* Source; Research Report (KILTV, [Herwinda 2025](#))

Thus, the major architectural elements of Majapahit buildings as represented in temple reliefs, particularly within residential compounds such as palace complexes, depict structures elevated on stilts or platforms, featuring *limasan* roofs and *umpak* stone foundations. Buildings may have enclosed walls or semi-open configurations that allow structural columns to remain visible. These compounds were typically enclosed by high perimeter walls and accessed through *paduraksa* or split gates (*gapura belah*). In Majapahit-period Ramayana reliefs, water features such as *bale kambang* and palace water gardens with fountains are also depicted, particularly in representations of Ravana's palace

at Candi Penataran. These reliefs further portray elevated pavilion-like structures with *limasan* roofs, semi-open layouts, carved columns, and ornamental curtains. Architectural features of this type continued to influence later palace architecture, particularly Balinese *puri* and Islamic-era Javanese *keraton*.

Conclusions

The Majapahit Palace (*Keraton*) was most likely situated in the Kedaton/Sumur Upas/Sentono Rejo zone, extending northward toward Kubur Panggung, corresponding to the location and

perspective described in the *Negarakretagama*. The *Catuspatha* or Grand Crossroads was likely located at the northeastern corner of the palace complex. The palace and urban settlement were oriented toward Mount Kelud to the south, Mount Penanggungan to the east, and the sea to the north. The city exhibited a structured grid-based layout reinforced by layered networks of roads and canals. Architectural evidence suggests that buildings during the Majapahit era resembled forms represented in reliefs, incorporating split gateways (*gapura belah*), *paduraksa* gateways, and elevated pavilion structures with elongated limasan roofs. These structures may have featured enclosed walls or open-sided layouts exposing structural columns. Comparative studies and evidence from the *Negarakretagama* indicate that several palace functions were comparable to post-Majapahit *keraton* in Java and *puri* in Bali. The Majapahit royal palace and its spatial organisation remain among the most significant references for understanding the evolution of Javanese palace architecture. However, existing interpretations have often prioritised symbolic narratives over spatial-logical analysis. The findings of this study demonstrate clear continuity between Majapahit spatial principles and those later adopted in Balinese *puri* and early Islamic palaces in Java.

Regarding the location and architectural form of the Majapahit palace, this study seeks to complement previous scholarship, particularly the works of Gomperts and studies employing Bakosurtanal maps, including those by Mundardjito, Hermanislamet, and others. By integrating alternative data sources with archaeological evidence gathered in the field, this analysis aligns multiple lines of evidence into a more coherent interpretation. This research may serve as a foundation for future studies, particularly through the application of LiDAR and Geo-Radar technologies within the Green Zone identified as the most probable location of the Majapahit Royal Palace. Furthermore, archaeological excavations and field investigations concentrated within this zone may enable the recovery of evidence capable of providing more detailed and comprehensive insights into the spatial organisation and architectural characteristics of the Majapahit Palace. The interpretations presented in this study remain open to further refinement and reinterpretation as research methodologies advance, new datasets become available, and future archaeological discoveries emerge.

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- Enrico Nirwan Histanto** contribute to the research concepts preparation and literature reviews, data analysis, of article drafts preparation and validation.
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