



A Study of Urban Design Elements in Garden City Bertam Perdana 2 of Seberang Perai Utara in Penang

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Abstract

This paper analyses the mental mapping of Bertam, Seberang Perai Utara, Penang on five urban architecture elements: paths, districts, edges, nodes, and landmarks. These five components usually occur and interweave in urbanization. Taman Bertam Perdana 2 is known as Garden City in Bertam. Seberang Perai Utara has a master plan with a circular architectural design that makes the site appear cooperatively organized. For successful urbanization, the urban layout will compete with all urban planning elements to create a city identity with its style and character. In this analysis, the path is the most dominant factor. This study reveals that Garden City in Bertam has an urban design with a circular gridiron street model. The circle style pattern is distorted in the Taman Bertam Perdana region due to the site's flat land typology. In creating a garden city, all these elements need to blend to achieve the best urbanization environment. It will help set up urbanization and aim for more practical urban areas.

Disciplinary: Architecture, Urban and Town Planning.

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1 Introduction

This examination targets behaviors to investigations and recognizes the five significant urban structure components and standards for paths, edges, districts, landmarks, and nodes

executed for the situation study territory, Garden City at Bertam. Fundamentally, every one of these components is ordinarily existing and coordinates with one another in an urbanization setting. It will assist the game plan with achieving as a nursery city (Jenks and Burton, 2000). Seberang Perai Utara, dependent on comprehension of urban structure components inside the nearby customary manufactured condition in Malaysia (Figure 1), alludes to the hypotheses of Kevin Lynch (1960). Ways are the channels alongside the eyewitness possibly or sometimes move - the person on the footway and the vehicular way - a prevalent component in city style and character. Locale requests that appear in this paper can help urbanization to look at greater reasonableness and well plan of urban territory of Penang as one of the states in Peninsular Malaysia. It is arranged on the northwest coast, involving Mainland and Seberang Perai. The land use in Bertam Perdana 2 was changed from farming use to palm oil plantation.

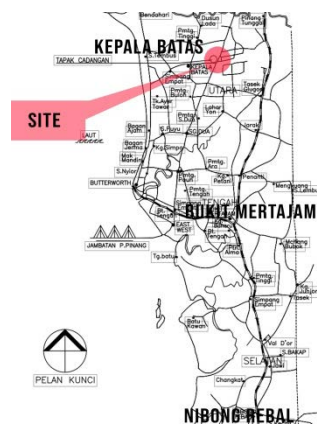


Figure 1: Key plan of the study site, Penang, Malaysia.

The urban study region is a garden city at Bertam Perdana 2, 5.3 km from Kepala Batas, connected by Jalan Tun Hamdan Sheik Tahir from Kepala Batas Town to Bertam Perdana 2. It comprises some blend of strict and instructive zones. It has 42 sections with five land sections of government land, situated close to the Penang Bridge, which is Penang's passage. The investigation likewise covers 5.5 sections of land of significant expense landed private neighborhood of Bertam Perdana 1 with a garden city idea from England.

2 Literature Review

In some parts, Bertam Perdana 2 is framed by the nursery city concept. The urban structure depends on an idea of high-thickness low-ascent type private advancement. It is an arranged town that centers around giving financial work and advantage of the occupant in the urban zone, outfitted with fundamental foundations and administrations as one of the OK models (Jacobs, 2011; Rahim et al., 2021).

2.1 Irregular Gridiron Urban Layout

The most noteworthy trademark is the urban format of the region. The structure squares are perfectly in matrix development (Zakaria and Aziz, 2018). This urban format configuration is a whole arranging masterplan grasped by the British pioneer organization (Hassan, 2005). During the British's provincial period, the gap and rule ideas were actualized into the urban example to assign

diverse ethnic gatherings into isolated settlements (Hassan, 2017; Hall, 2014). This idea has influenced the urban course and town picture of the examination zone in a roundabout way. The urban field format structured in a sporadic example because of the arrangement with the geography of the investigation region (Glatron and Granchamp, 2018; Ni et al., 2020)

2.2 Urban Design Elements

Urban plan components talk about urban structure by watching the city's visual and physical type at an urban scale. The rule creates five urban structure components: the way, edge, districts, node, and landmarks. With this methodology, the urban structure components are to examine the effect of the urban plan of a city on its capacity, history, name, or significance (Larice and Macdonald, 2013).

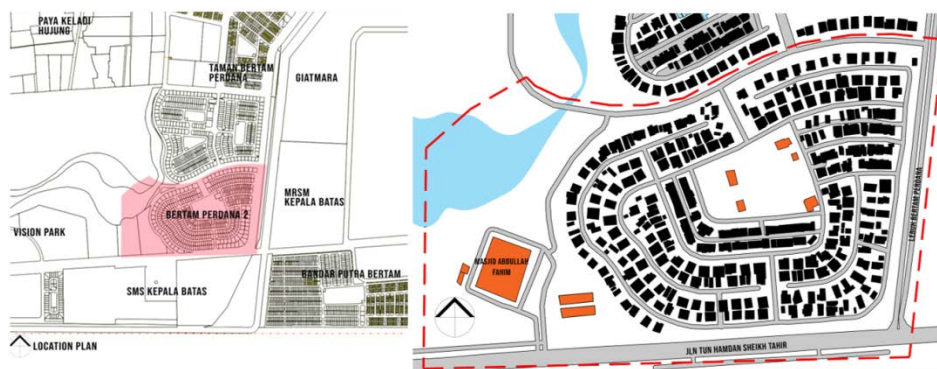


Figure 2: Location and Layout Plan of the study area (geolocation 5.520969, 100.469502).

2.3 Background of the Case Study

This investigation site (Figure 2) comprises two neighborhood zones, Bandar Putra Perdana and Taman Bertam Perdana. The completion of 65.5 sections of land of site bargains the components of the nursery city. There are numerous open offices and establishments in the site, including the new city Bandar Baru Bertam, Sekolah Menengah Sains Kepala Batas, Maktab Redah Sains Mara Kepala Batas and, Abdullah Fahim Mosque. From 42 Kampung Sungai Gelugor, five land sections are government land, while Malay residents initially claim 47 sections. At present, the land is populated by right around 2145 families, for the most part, Malay individuals. In 2016, an elementary school of Sekolah Rendah Bertam Perdana was worked in Bertam Perdana. Taman Bertam Perdana is a minimal effort lodging neighborhood plot created by the Bertam Properties Sdn Bhd to settle the lodging reasonableness issues by the Medium individuals. T20 situated at Lot 9673 in Seberang Perai Utara The Lot 9673 land was possessed by palm oil Orchard holders yet offered to the Bertam Properties Sdn Bhd engineer. This improvement began in mid-2011 and finished in the year 2015. The site remembers for the examination comprises the landed lodging improvement, which 550 units of contrast private houses based on the 5.5 sections of land from a RM 650 million expense. From the neighborhood occupant meeting in 2018, as of now, most inhabitants had redesigned their homes.

3 Methodology

This exploration configuration approach recognizes the chosen site's psychological planning by using five urban structure components as per the hypothesis of Kevin Lynch. The urban plan components are nodes, path, edge, district, and landmark. Figure-ground plan of the territory is used to increase an underlying comprehension of the contextual analysis. Starter concentrate on history and foundation of the site is directed to get important data of the site. A site study was completed to increase a progressively exact comprehension of the site. Point by point data is then gotten through a visit to Majlis Bandaraya Seberang Perai (MBSP) and Bertam Properties Sdn Bhd Planning Office. The nature of the key urban structure components is recognized during the site overview. The data collected from the site is analyzed based on Kevin Lynch's urban mapping theory. The scale of measurement of the urban design elements are

- Paths - Width, and length of the paths are under study to analyze their relation to the function, importance, accessibility of the paths at the site.
- Edges - The edges are determined based on the edges' physical features and function that could become boundaries at the site.
- Districts - The background and history, age, size, land use, and dominance are analyzed for the district elements.
- Nodes - The nodes' function, attraction, and placemaking are studied to analyze the nodes' importance at the site.
- Landmark - the landmarks' popularity, scale, and attraction are observed to study their effects.

4 Analysis and Results

4.1 Path

4.1.1 Vehicular paths

Vehicular paths include Jalan Tun Hamdan Sheik Tahir 40 m width as an arterial road from Expressway, and in Bertam Perdana, (Persiaran Bertam Perdana) 12 m width as nearby street alludes to (Lebuh Bertam Perdana) 20 m width as an authority street. There is one fundamental passageway on the site. Traffic lights are spotted at the passageway connecting to Lebuh Bertam Perdana, which go about as a traffic stream guide and occupy the traffic load for the vehicles entering or leaving the site. There is just a single blood vessel street on the site, Jalan Tun Hamdan Sheik Tahir. It is a 40 m twofold-way vehicular way comprised of three paths on each side, interfacing the site to Kepala Batas from the north and Kubang Menerong from the south. The street is adjusted in the middle of the Government region, isolated from the local location by the authority streets. Lebuh Bertam Perdana connected to gatherer street, for example, Persiaran Bertam Perdana. Lebuh Bertam Perdana is considered a decent blood vessel pathway (Figure 3); it serves no road-turned parking lot even at the pinnacle time of 7.00 pm as the traffic stream is smooth. Tow gatherer streets are seen in the examination zone, primarily 6 m long, with a twofold-way traffic stream, one path on each side. In Bertam Perdana 2, a gatherer of (Lebuh Bertam Perdana) width 20 m is connected to another nearby street, (Persiaran Bertam Perdana) width 12 m.



Figure 3: vehicular path plan of the case study area (photo courtesy of Google Street View)

The neighborhood streets are the 12-m vehicular way that serves the private network. There are 13 nearby streets on the site that provide for impasse secured by private units, making a circular drive, while another neighborhood street goes about as a back path of the business shophouse units. The neighborhood street-connected from (Persiaran Bertam Perdana) width 12 m represents a little circle dissemination of a circular drive alongside the private unit doorways connected to Lorong Limonia while the other three connected to Bertam Perdana. All the doorways are twofold way passageways tolerating the progression of traffic from both bay and outlet.

4.1.2 Pedestrian Walk

The pedestrian pathways are just found along both sides of (Lebu Bertam Perdana) width 20 m, for the most part, interlocking pathway, Figure 4. There is no person on foot pathways seen in the neighborhood, prompting fewer walkers in the local locations. Figure 5, the pathways along with Persiaran Bertam Perdana Shah interface two passersby serving over the street while another walker connect to the site



Figure 4: Pedestrian Pathway Plan of the case study area (courtesy of Google Street View)

A two-way can be found on our site—the vehicular way and the person on the footway. First, two fundamental streets can be characterized, first Arterial Roads (Jalan Tun Hamdan Sheikh Tahir) width 40 m with 51.3% and length 1718 m with 10.36%. Next, authority streets (Lebu Bertam

Perdana) width 20 m with 25.6% and length street is 740m with 4.46% proceed by nearby roads (Persiaran Bertam Perdana) width 12 m with 15.38% and length street is 6110 m with 36.86% (Table 1). Essentially, this information can contrast, and the quantity of the unit street will influence the traffic stream in our urban zone. By taking a gander at the table, Local street (1 unit) higher rate contrast and two streets which are authority roads(1 unit) and nearby streets(1 unit) it is because this street will serve to the private as it were. This rate can be demonstrated that our urban site dissemination is structured appropriately, smooth, and well arranged. All the passageways are twofold way doorways tolerating the progression of traffic from both gulf and outlet.



Figure 5: Pathway along with Persiaran Perdana Shah (left) and another link to the site (right) (courtesy of Google Street View).

Table 1. List of Bath in the study area

Path	Number	Width	Percentage	Length	Ratio
Arterial Roads Jalan Tun Hamdan Sheikh Tahir	1	40m	51.3	1718m	1.00
Collector Roads Lebuh Bertam Perdana	1	20m	25.6	740m	9.52
Local Roads Persiaran Bertam Perdana	1	12m	15.38	6110m	15.63
End Roads or Cul-de-sacs	5	15m	19.2	175m	2.36
Pedestrian Walks	2	3m	3.8	7828m	47.23

4.2 Edges

Table 2 shows the edges of the selected area, The prevailing edge is the significant road edge by the Arterial Roads (Jalan Tun Hamdan Sheik Tahir) width 40 m with 51.3% and length 1718 m with 10.36% it set a boundary in the middle of two principle private regions of Bertam Perdana 2 and Bertam Perdana which is in the distinctive never-ending suburbia, Figure 6.

Table 2. Types of edges in the selected area

Edge	Number	Width	Percentage	Length	Ratio
Main Edge	1	40m	11.52	1718m	1.45
Secondary Edge	1	20m	5.76	740m	1.00
Tertiary Edge	2	12m	3.45	1685m	1.35
Minor 1 Edge	1	275m	79.2	446m	2.36

Bertam Perdana 2 is a sporadic field game plan that uses the Garden City idea. Another upheld street edge by nearby streets (Persiaran Bertam Perdana) width 12 m with 15.38% and length street is 6110 m with 36.86%. It is isolating the private region of Bertam Perdana 2 to future improvement Taman Bertam Lake Home. The private edges are being isolated from the local

location by the authority street of Persiaran Bertam Perdana; it is characterized as an edge on account of its façade style, which is unique concerning the private units.



Figure 6: Edges of Study Area (photo courtesy of Google Street View)

4.3 District

The most prevailing locale of the site is garden city region (368,044m²) with 45.98% (percentage all-out land size) which is comprise neighborhoods , instructive region (259,306m²) with 32.39% (percentage complete land size), religion district (138,640m²) with 17.32% (percentage all-out land size) and in conclusion the recreational region 34,397m²) with 4.29% (percentage all-out land size) and all-out region will be (800,347 m²) with 100% (percentage all-out land size) (Table 3 and Figure 7).



Figure 7: Districts in the Study Area (photo courtesy of Google Street View).

Local location all has a place with the landed property including porch house, semi-withdrew house, home with the various chain of importance from the single-story until three stories private units. Bertam Perdana 2 has a place with Garden City's private region as the lodging format is naturally orchestrated by an unpredictable field course of action. The greater part is migrated under the lodging program for the medium expense and significant expense lodging. Quarters of single-

story patio units are based on this locale for the inhabitants. Instructive regions are distinguished in the site of study. Sekolah Menengah Sains Kepala Batas is arranged at the south area of Bertam Perdana 2, serving additional training and pre-grade school instruction. Vision Park Recreational zone incorporates void land for multipurpose utilize, such as any games exercises or meeting points. As a religious local, Masjid Abdullah Fahim is distinguished in this site, serving every Muslim individual to have their supplication and a few exercises.

Table 3: List of districts in the selected case study.

Districts	District 1 GARDEN CITY	District 2 EDUCATIONAL	District 3 RELIGION	District 4 RECREATIONAL	Total
Building typology	Terraces, Semi-detached bungalow, Semi-detached Villa	Sekolah Menengah Sains Kepala Batas , Maktab Rendah Sains Mara .	Majid Abdullah Fahim	Vision park	-
Height	2-3	5-8	1	-	
Area m ²	368,044	259,306	138,640	34,397	800,37
Area Ratio	11.03	9.50	2.35	1.42	
Percentage (%) to the total land size	45.98	32.39	17.32	4.29	100

4.4 Nodes

The nodes (Figure 8) that can be found on the site are principally action regions, or enhancements gave in the area because there are two local locations at the site, which are Bertam Perdana and Bertam Perdana 2. Besides, these nodes are contemplative as they give minimal directional sense. The rule of the heading is just toward or away from the hub itself because of muddled associations and general bearings. Vision Park as a recreational park is a portion of the open comforts found at the site.



Figure 8: Nodes of Case Study Area (photo courtesy of Google Street View).

The nodes that are resolved are useful hubs that serve the network of the site. Tanah Lapang in Bertam Perdana 2 is considered the predominant node at the site because of its biggest land size among the distinguished nodes. The Recreational Park community is the second predominant node because of its significant capacity, a piece of the need for local people's day-by-day life. These nodes are transient because the exercises that make hubs occur at a specific period.

4.5 Landmark

Landmarks are normally distinguished because of their particular personality, structure, tallness, or use at the site. The milestones (Figure 9) distinguished are portions of the civilities around that territory for the most part. They go about as purposes of references and can be utilized to recognize one's area. The tourist spots perceived are a mosque (Masjid Abdullah Fahim), and Educational zone (Sekolah Menengah Sains Kepala Batas). The mosque becomes far off landmark because of the uniqueness and particular design styles that are not the same as different structures. The structural styles make the landmarks simple to be spotted from afar, making it guests simple to distinguish their area when they see these structures. The mosque(Masjid Abdullah Fahim) are the prevailing landmarks because of their stature and size that could be perceived from far. These landmarks additionally speak to the part of the way of life of the site (Table 40).



Figure 9: Landmarks of the study area (photo courtesy of Google Street Map)

Table 4. Landmarks in the study area

Landmark	Length(m)	Width(m)	Height(m)	Area ^{m²}	Volume(m ³)	Level of Dominance
Landmark 1 Masjid Abdullah Fahim	99.6	124.8	20	11848	236,960	Very Good
Landmark 2 Maktab Rendah Sains Mara Kepala Batas	237	310	15	73340	1,102,050	Good
Landmark 3 Sekolah Menengah Sains Kepala Batas	500	300	15	150,000	2,250,000	Satisfactory

5 Discussion

5.1 Path

The most dominant urban design feature on our site is the path. Paths in the site interconnect with each other according to the hierarchy, dividing the site's zoning by their purpose and privacy (Ewing & Handy, 2009). Vehicle pathway provides high accessibility as the arterial road is interconnected with the local roads by the collector roads, slowing down and reducing the traffic load at the residential area. By providing a few entrances to each residential area, the interaction between the roads smoothes the traffic flow and decreases the traffic load at the main road. Traffic

lights are installed correctly to monitor the major arterial road traffic flow. Several cul-de-sacs are found in the suburban neighborhood, supplying the local roads with loop circulation or dead-end to improve the protection of the connected housing units. As far as the pedestrian path is concerned, there is low accessibility. The paths are only provided along the main arterial road, linked to the residential area. The bus stops are on both sides of the arterial road. The weakest path is the local road back lane in Persiaran Bertam Perdana because it is not often used.

5.2 Edge

Lebuh Bertam Perdana, which connects the two main residential districts of Bertam Perdana 2 and Bertam Lakeside is the main edge of the entire site. Another edge is Bertam Lakeside's boundary, separating it from the east with another residential district, and provides privacy among all the residential units. While another residential district is aligned with Lebuh Bertam Perdana's main arterial road, dividing the road from residential areas, creating a buffer to the private area from the road's sound traffic pollution. The weakest edge of this site is the Persiaran Perdana Road, as it separates the residential zone in a very low end. Thus the edge is not well portrait.

5.3 District

A further dominant urban element is the district. There are mainly residential districts, one at Bertam Perdana 2, that are each segregated by another residential district from the main arterial road of Persiaran Bertam Perdana. The school or government districts are located across our site, setting up in the core region where most pedestrians and traffic will pass through it to attract user flow. The recreational district (vision park) is set on the open ground next to the mosque (Masjid Abdullah Fahim) for assembly and some recreational activities. The weakest district is the religious district as it shows a minor zone that gives low impact to the site surrounding.

5.4 Node

Node is one of the less common elements, large open spaces that are shaped by thematic concentration and public transport breakpoints. The nodes located mostly on-site are housing zone services. Compared to the surrounding residential lots, the land's size as activity areas is larger. These nodes that the amenities formed encourage social interaction among the locals. According to the events, the nodes form only at certain periods, e.g., the nodes of faith may not form at prayer time. The platform needs permanent nodes. The junction of roads is now without nodes. This situation is due to fast traffic at the site and insufficient infrastructure for road users.

5.5 Landmark

Landmarks are decided based on the site's features and experiences, beauty, value, and visibility. Plus, the landmark is one of the study area's less dominant elements. Due to its location in the housing area, the landmarks found are mainly nearby facilities. The site is lacking spatial landmarks, which could support location identification or spotting. Major landmarks will have very good intensity and popularity to be known by the locals and outsiders. They will be seen as both

religious landmarks are visual landmarks that are spotted at the site. Because of the architectural styles affected by religious popularity, the mosque may stand out from the surrounding building. The designs contrast greatly with the neighboring house. This landmark will enable the city at every event and provide their events. The mosque is the most important landmark in the study area because of its unique architectural style and strategic location. The weakest landmark of the site is MRSM Kepala Batas, as it is located quite far from the site; thus, it will not independently depend on the landmark itself if people want to come to the site.

6 Conclusion

The case study site is a housing area comprising Bertam Perdana 2 and a garden city Bertam garden. A path that forms the urban pattern is the most important factor in the study area, followed by district and edge. The landmark and node contribute less to designing the study area's town image. The site's urban planning and architecture is a simplified gridiron structure. A style of urban architecture design allows for the residential environment with a formal arrangement. The layout ensures the efficient circulation of vehicular routes, which are great for finding ways. The gridiron layout of the traffic forms an efficient arrangement of the hierarchical roads. The edges built around the site by the highway also formed a distinct boundary. The site's dominant district is a residential district supported by the commercial district, part of the housing area's facilities. Due to the limited potential space and place that could become landmark and node, the site is less community-friendly. These two main elements act as a meeting point or public gathering point. More nodes should be implemented to strengthen the sense of community at the location. It has been transformed to meet current needs. The Malay culture and identity can be easily observed with its background as a residential district through the architectural styles and facilities.

7 Data Availability Statement

All information is included in this study.

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