The Urban Design Guidelines of Sungai Pinyuh Street Corridor

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Abstract. Sungai Pinyuh is the largest market in Mempawah Regency, West Kalimantan. This area placed between 3 main roads (Pontianak-Mempawah-Bengkayang). It is very strategic as trade and service transit line. From these benefits, there were several negative influences that could reduce the quality of urban environment from lacking of road planning. The purpose of this study is to provide concepts and guidelines for solving various degradation in physical and environmental quality problems, due to uncontrolled development. The research method is qualitative approach with descriptive research reviewing the literature relating to the concept of urban elements to apply to the case. The method focuses on problem-solving by elaborating with the Street Design Guidelines and urban elements. The result are 2 principles, namely integrated corridor and urban green corridor. Both of these concepts are elaborated with the Street Design Guidelines and urban elements by Hamid Shirvani. This principles direct to: 1) composing the rules and spatial planning details, 2) as an operational form to control spatial use, 3) formulating recommendations for building mass and environment system along with main road corridor as the basis for development control guidelines and a sustainable development framework.

1. Introduction

City growth and it development need to be direct for creating harmony and balance of functions and intensity of land use. Wismarani [1], stated that the trend of regional growth prioritizing vehicle users has made inequality with non-vehicle road users neglected. Structuring that does not pay attention to the correlation to the surrounding area that functions as a residential area and the arrangement of street corridors that are carrying out on some of the road boundaries causes an imbalance of activities.

Darmawan in Wardhana stated that the corridor is a road that along the left and right sides bounding by a wall and forms a facade. The street is considered as a corridor if it can connect from one place to another and can combine parts of that place. In line with Darmawan [2], Verbeek, Bossauw and Pisman argued that the pattern of development commonly found in street corridors is the ribbons development pattern in which this development pattern is found to spread a variety of activities along the road corridor which are sometimes unplanned in its growth and usually depend on existing traffic flow [2]. There are two types of Urban corridors according to Bishop in Asha [3], including the following:

- Commercial corridor
Commercial corridors are corridors that have solid activity and start from commercial parts to the urban center such as office building complexes, and trade in services located along the corridor. Commercial corridors have pedestrian pathways and transport drivers who pass through a city.

- **Scenic corridor**
  The scenic corridor is a corridor that has natural and unique natural scenery to provide an entertaining experience for pedestrians and transportation riders.

  The street corridor as a public open space includes the following aspects: 1) mixed land use, 2) transportation mode choices, 3) pedestrian comfort, and 4) have social activities taking place on it [4]. In addition, streets corridor for vehicles has a large contribution to the movement and traffic form in an area [5]. Corridor physical form can lead to a good role if it contains comfort, relaxation, passive engagement, active engagement, and discovery elements. Each area has a fragment that connects each other. According to Shirvani [6] in The Urban Design Process, there are 8 elements to form an urban area, namely: Land Use, Building Form and Mass, Open Space, Parking and Circulation, Signs, Pedestrian Ways, Activity Support and Preservation. Corridors are strongly influencing by the larger surrounding area and their background. Thus, road corridors formed by two important factors, namely physical factors related to the shape and mass of buildings that are around the public space and psychological factors that represented in physical factors [7].

Sungai Pinyuh is one of 9 sub-districts in Mempawah Regency, West Kalimantan, Indonesia. It is a transit point between three main roads with area 121.12 km², the distance of Sungai Pinyuh with Mempawah Regency is ± 15 km to the north, and with Pontianak ± 67 km to the south. The development of the region increasing highly and has made Sungai Pinyuh expansion growth rapidly. The 2-floor shop houses arise a lot, as far as the construction of swallow nests building in almost every corner of the city. This has an impact on the economy of the society and also makes the city layout chaos. The infrastructure of it has several problems. First of all, poorly urban drainage plan makes some road in Sungai Pinyuh area inundated because of clogged drains. Then, waste disposal locations are very rare, it affects people to throw away the garbage to river. The housing zone changing into commercial zone occurs in almost corridors. The urgency of development always happen in strategic locations like in the downtown area or on road segments with a high level of accessibility this causes the need of land capability along the left and right of the road segment increases. The impact on land use tends to concentrate along main street lanes. As a result, land use development in the main road environment will be faster, and service burden for utilizing land functions becomes increasingly heterogeneous. In turn, these problems can adversely affect regional and city transportation flows. In the other hand, there will be a gap in land use intensity growth, between the downtown area and the rear area of the city.

For anticipating these conditions, it is important that Sungai Pinyuh street corridor should have the right guidelines for determining the direction of regional development in the future. This guideline is an operational form to control the spatial utilization, therefore, a recommendation for structuring the building and environment mass along the corridor, it used as the basis for development control guidelines and sustainable development frameworks, especially which related with building mass arranging and public space utilization along the corridor.

2. **Research method**

The method used is descriptive qualitative method [8] that is by reviewing the literature relating to the concept of urban elements to apply to the case. The purpose of this method is to describe a situation that existed at the time while the study was conducted and examine cause and effect through the identification of symptoms from existing problems. Data collection gathered by field observation, and study of literature. This data used as the basis for analyzing the problems to discuss. The method used applied research which focuses on problem-solving. Applied research conducted in urban space means identifying and finding solutions to problems that occur in urban space.
### Table 1. Primary and secondary data

| Data                                      | Collecting Technique | Results                                                                 |
|-------------------------------------------|----------------------|--------------------------------------------------------------------------|
| Existing condition of Sungai Pinyuh street| Field observation    | • For knowing the truth of existing condition                             |
|                                           |                      | • For knowing the problem in the field                                   |
|                                           |                      | • Documentation of existing condition                                    |
| Land use                                  | Satellite image data | • Figure ground map                                                       |
|                                           | Field observation    |                                                                         |
| Intensity of land utilization             | Field observation    | Land use map                                                              |
| Circulation and pathway                   | Field observation    | Documentation of existing condition                                       |
| Building Form                             | Field observation    | Documentation of existing condition                                       |
| Open space and green spatial layout       | Field observation    | Open space and greenery map                                              |
| Landscape                                 | Field observation    | Documentation of existing condition                                       |
| Water resources                           | Field observation    | Documentation of existing condition                                       |
| Conservation area                         | Field observation    | Senagai Pinyuh administration map, description of Sungai Pinyuh, topography, climate, facilities and infrastructure, city planning map of Sungai Pinyuh |
| Condition of Sungai Pinyuh                | BPS, Spatial plan of Mempawah Regency |                                                                          |

Variables used to view the corridor of the Sungai Pinyuh street use 8 elements forming by Shirvani, namely: Land Use, Building form and mass, Open Space, Parking and Circulation, Signs, Pedestrian Paths, Supporting Activities, and Preservation.

### Table 2. Research variables based on shirvani urban elements

| Concept                                      | Variables                  | Indicator                                                                 |
|----------------------------------------------|----------------------------|--------------------------------------------------------------------------|
| Urban design guidelines of Sungai Pinyuh street corridor | Land use                  | Type of land use                                                          |
|                                              | Building mass arranging    | Skyline and local building characteristics                               |
|                                              | Open space                | Intensity of land utilization                                            |
|                                              | Parking and circulation   | Accessibility and circulation path                                        |
|                                              | signage                   | Landmark and differentiating with other regions                          |
|                                              | Pedestrians way           | Continuity of pedestrians                                                |
|                                              | Supporting activities     | Events that take place routinely, monthly or annually                   |
|                                              | Preservation              | Visibility of the area as a conservation area                            |

The geographical delineation area located between 00° 16'17" to 00° 16'55" North Latitude, and 109° 04'10" to 109° 04'45" East Longitude. Administratively, the research area is part of the Kelurahan Sungai Pinyuh consisting of 5 citizens Association and 31 neighbourhoods Association. The delineation of the study area shown in figure 1.
3. Analysis and results

3.1. Physical and visual condition analysis
The observations result indicate that most of the land and building use along the Sungai Pinyuh corridor was dominated of formal activities kind of commercial functions in the area consists of shopping complexes, morning markets, banyan markets, and fish markets. In addition, there are also stalls and shop houses as businesses of the local community, other financial facilities. The impact of the development of commercial activities and its growth has several negative impact, especially in residential areas in the rear area. Strategies for limiting the types of activities and building structuring patterns need to be done to minimize the occurrence of disruption surrounding community’s activities. The strategy also includes the form of regulation of informal activities throughout the region. The existing conditions of the corridor from Mempawah city street shows in figure 2 below.

![Figure 1](image1.png)

**Figure 1.** Sungai Pinyuh street corridor, research location

![Figure 2](image2.png)

**Figure 2.** Existing street corridor section from Mempawah Regency, segment 1 and 2 (from left)

The growth of the city structure leads to sprawl cause incompatibility of road networks, pedestrians, utilities, and other infrastructure. When it gets poor maintenance, the degradation in the physical quality and ecological environment area deteriorate. This conditions could see in table 3 below.
### Table 3. Environment and ecological quality and functional and visual quality

| Environment and ecological quality | Functional and visual quality |
|------------------------------------|--------------------------------|
| Noise                             | Land use and intensity         |
| Noise increasing due traffic volume| • Growth of commercial functions along the main corridor |
|                                   | • Domination of retails and trades comparing services |
| Air pollution                     | Building and mass arrangement  |
| Increasing of air polution due to increasing vehicles volume | • Infraction of building boundary line |
|                                   | • Lack of public transport stops along corridor |
| Water pollution                   | Circulation and parking        |
| • Pollution due to household waste which is directly discharging into the canal | • Increasing of circulation load because vehicle volume increase either |
| • Pollution from commercial activities such as workshops and laundry | • Careless parking because lack of parking space |
|                                   | • The public transport terminal is not functioning properly |
| Waste pollution                   | Open space and green system    |
| • Trash was dumped into the ditch and scattered on the road | • Less trees |
| • Lack of waste disposal          | • Lack of tree rejuvenation    |
| Water infiltration                | Pedestrian                     |
| Decreasing of water infiltration because hardening of border area | • There is no pedestrian lane |
|                                   | • Street body as parking area  |
|                                   | • Pedestrian path was tight because it is blocking by hawker |
|                                   | • There is no slow lane and bycycle path |
|                                   | • The conditions of road are not possible for people with disabilities |
| Vegetation                        | Supporting activities          |
| Reducing of vegetation due to tree rejuvenation absence for providing parking space | • There is no supporting activities rather than commercial |
|                                   | Signages                       |
|                                   | • Placement unplanning of trash bins |
|                                   | • Irregular of installation signs |
|                                   | • Lack of street furniture     |
|                                   | • There is no clear landmark and signage for the region |
|                                   | Preservation                   |
|                                   | • There is no heritage building or conservation area |

According to Indonesia Government Regulation Number 34 of 2006, the road width for primary roads needed 11 m minimum. In fact, in the field less than 11 m. The road uses for trading activities such as street vendors and on-street parking. It can explain that unbuilt land function on the Sungai Pinyuh corridor covers empty land, yard, and bush. The area of built land stands at 38.30 ha (64.37%) and the unbuilt land reaches 21.20 Ha (35.63%). In general, all planning areas have high building densities. From the analysis above it could conclude that;
• It is necessary to stipulate spatial control devices so that existing developments will limit and will anticipating with local government.
• Changes in land use to be commercial require and will increase the capacity and quality of infrastructure and public/social facilities.
• There needs a regional vision arrangement integrally so that good environment quality can create.

3.2. Development concept
The deliberation of corridor character based on these following factors generally: 1) The percentage of change level from occupancy to non-occupancy in the main street corridor; 2) Traffic load and parking impact on existing road conditions; 3) The change of physical and visual character changing of the existing environment; 4) The type of functions supporting urban activities. The vision guidelines in the conceptualization of the Sungai Pinyuh street corridor is to create an urban corridor that are attractive, dynamic and having character accordance to its potential. It described as follows:
• Corridor as a place where people can live comfortably, safely and supported by service facilities for daily activities.
• To become a commercial corridor that has strong character and lives by preserving the green environment character.

At the same time, the corridor arrangement mission is to prevent the Sungai Pinyuh corridor character by maintaining vegetation on the left and right side. In addition, developing activities as a typical non-residential corridor referring to Mobility, Safety, and Comfort, and Ecology principles. Based on description above there are 2 visions that will develop for this corridor are integrated street and urban green corridor.

3.3. The urban guidelines strategy
In accordance with its potential, the Sungai Pinyuh street corridor development which prioritizes ease of access, comfort, corridor secure. The aims of the urban guidelines strategy are: 1) Public spaces that are responsive to activities that occur along the Sungai Pinyuh street corridor for creating attractive and active corridors for the pedestrian; 2) Buildings and street furniture that have good design can simultaneously raise the quality of the environment and open space in front of it; 3) Active public spaces by promoting mixed use along the corridor and maintaining residential character by structuring space and residential functions in buildings; 4) Convenience and comfort, by understanding movement character along the corridor and arrangement according to the differences in the use of functions between residential and commercial; 5) The area that is capable of being a region that has distinctive features so that it becomes one of the repertoires of the attractive Sungai Pinyuh street corridor.

The emphasize of this arrangement strategy are land use planning due to changes in residential functions to commercial, and transportation systems due to the need for capacity building. And also improving the quality of public spaces along the corridor so that could create an attractive area and the application of integrated street development concept can be applying. These strategies form can be seen in table 2 below.

| Table 4. Sungai Pinyuh street corridor arrangement strategy |
|------------------------------------------------------------|
| Existing condition | Strategy arrangement                                      |
| 1. Land use |  |
| Change of residential function to commercial | Collecting data and giving sanctions on existing buildings |
| • Land use delinquency | • Controlling the commercial activities |
| • BCR and FCR infraction | • Development control by setting the appropriate BCR and FCR |
| • Utilization of public space for the extension of commercial activities | |
### Existing condition

| Strategy arrangement |
|-----------------------|
| 2. Transportation |
| Improve infrastructure of region |
| • Corridor as a primary road |
| • Street width that does not adequately service the flow of vehicles |
| • Pedestrian ways and parking lot does not enough |
| • Inadequate drainage system |
| 3. Visual quality |
| Open space quality improvement |
| • The pedestrian ways are damaged and disturbed by hawker activities |
| • Unorganized green line |
| • Unorganized street furniture and signages |

3.3.1. Integrated corridor. Pedestrian zones in the integrated corridor concept based on Pedestrian Design Guidelines [9]. It is not only to ensure vehicles flow, comfortable free movement, pedestrian areas and users of public transportation, but provide social interaction, security, and people quality of life in the urban. There are 2 principles that might be considered based on the integrated corridor concept, namely: 1) Mobility, which emphasizes the people in maximum numbers must be able to move quickly, safely and comfortably along the corridor; 2) Safety & Comfort, which is to create clean and safe road design, and comfortable for pedestrians adapted to the environment climate.

Mobility principle is to determine public transportation use by adjusting the street with similar or higher priority for public vehicles and pedestrians. It is also to provide the vehicle's transit orientation line that accessible in a 10-minute walk and providing a special lane for vehicles during rush hour.

Safety and Comfort principle [9] made to ascertain pedestrians safety by:

- Removing obstacles and boundary walls towards the street side. This will allow people from building inside to see on the sidewalk by reducing the shade. This principle also provides a vehicle transit orientation path that accessible with a 10-minute walk.
- Make a transparent level of up to 30% for commercial building facade.
- Providing street lighting for pedestrians and bicycle users adequately.
- Trees are the main component in pedestrians’ way.
- Reducing the use of reflective materials for decreasing heat effects.
- Build building boundaries against sidewalks with overhangs or arcades to protect pedestrians
- Provide the crossing areas with it distance more than 70-250 m.
- Provide public amenities at street corners such as signage etc.
- Provide public toilets if needed at a distance of 500-800 m, preferably located at bus stops so that pedestrian and public transportation users can easily reach them.
- Following international design standards for accessibility for disabilities people.
Overall, the integrated corridor concept was illustrated in the figure 3. The illustration shows 2 part of overall concept design. The example are pedestrian bridge (a) function to connect people from right to left side without worrying about traffic. In (b) illustration, the 3-way junction revitalized as new landmark of area by adding bycicle path and crossing line.

![Figure 3](image)

**Figure 3.** Existing condition in 3-way junction (a), illustration of pedestrian bridge (b), and crossing area on 3-way junction (c)

### 3.3.2. Green corridor
The ecological and green principle used to reduce urban heat, degradation of land surface through permeable paving, planning tree zones, and for increasing groundwater recharge & prevent seasonal flooding. The green principle also integrates water filtration and absorption into the design path through bio-filtration beds, swales and detention ponds. Green corridor planning introduced with the preserve and sustainable urban space aim. Landscapes and green corridors will improve the environment quality and they are the best places to spend leisure time.

The direction of the green corridor principle arrangement, at first is the trees should not place in the pedestrian area, on the hook area, or street corner, and left side. Second, designing for trees space. Furthermore, making the pedestrian safety zone to 1.8 m and the placement of utility systems must placed separately from trees zone. Trees must not place where it can interfere with the street lighting because it will be disturbing the vision of traffic signs. Trees trimmed for signage safety, street lights and ease of sight for street users. Finally, before planting trees, all of the existing plants must be identified, numbered, marked in the survey plan and maintained as much as possible. The green corridor concept applied in the figure 4 below.

![Figure 4](image)

**Figure 4.** Existing corridor to Pontianak (a), Green corridor concept for Pontianak direction (b), green corridor concept for Bengkayang direction (c)

### 3.4. The corridor design concept and guidelines
The urban design concepts and guidelines formula based on urban design principles. This guidelines concept derived from elaboration result of data with the theory of urban elements from Hamid Shirvani. The preservation element is not included in the design of this area because the place does not have preservation areas nor buildings. The urban design elements concept of Sungai Pinyuh street corridor includes:

#### 3.4.1. Land use and intensity
The land use of the Sungai Pinyuh street corridor directed for commercial functions street corridors on the ground floor and residential on the upper floors. This based on consideration of the land use changes to be commercial up to 60%, the regional context which is the primary collector line and the Mempawah Regency road, the effort to control changes in urban functions as commercially limited only on the ground floor so that urban character can maintain, for developing this area as an area that integrated with its surrounding and limited street infrastructure so that expected not to be the source of traffic jam in the future. The recommendation shows in the table 3 below.
Table 5. Recommendation of land use and intensity of Sungai Pinyuh Corridor

| Land use for housing with it facilities | Intensity |
|----------------------------------------|-----------|
| BCR to 80%, BFR to 2 and building height is 1-4 storeys for commercial |
| BCR to 60%, BFR to 0.8, and building height is 1-2 storeys for housing |
| Allowment for commercial functions are only on the ground floor, and residential at second floor |

3.4.2. **Building and mass system.** The building mass system attempt to encourage walking and commercial activities that are located along the Sungai Pinyuh corridor, till the concept of ‘Perimeter Block’ can apply for giving priority to comfortable walking corridors and provide a friendly scale for observers that do activities on the ground floor. The application of this concept will create a continuous and friendly corridor space. It applies to both blocks plots and single plots.

![Figure 5. Existing building layout (a), commercial plan concept (b), residential plan concept (c)](image)

3.4.3. **Open space and green system.** In the Sungai Pinyuh street corridor, the trees lane is also the main elements to form the road character. For this reason, the existence of existing tree lanes needs to maintain and turn to the main concept of this guidelines design. The trees lane planting on the right side along corridor between pedestrian path and the main street. The distance of each trees are 8-10 m. The green area have 1.5 width. On the left side of the green lane is slow line that use by bicycle or vehicle who want to stop at buildings in a moment. It described in the figure 9 below.

![Figure 6. Existing corridor that has no greenery (a), Green system concept (b), illustration of green path, pedestrian and bicycle lane (c)](image)

3.4.4. **Supporting activities.** Supporting activities in this area utilize existing road corridors and existing terminal areas. The location of inter-city public transport terminal in this corridor for the future use to as one-stop shopping area, it means that the use of public transport terminals is steady but adding new functions, like shop houses, and shopping centres so that terminal utilization function maximally. The second supporting activity is utilizing the Anjungan-Bengkayang corridor as Chinatown. Chinese New Year events such as lion dance, dragon dances, and Chinese New Year attributes can places in this corridor till people can find out that this area is one of the supporting activities of the Sungai Pinyuh corridor.
3.4.5. Circulation and parking. Circulation is direct for boulevard corridor formation by providing a slow lane that functions as access and vehicles lane of lower speeds till it expects to give a character to the area and preventing jam on the main lane. The size of the row adapts with the existing condition and planning for widening the road corridor. The row is direct for future development, which is 13 m wide on the Chinatown (Anjungan-Bengkayang lane) corridor (see in figure 8), 21 m for the corridor leading to Mempawah (see in figure 9), and 16-18 m for the corridor to Pontianak (figure 8). Sharing access applied to this corridor with the use of clear and easy to read traffic signs. Direct access to single lots allows as long as the distance does not interfere with smooth traffic circulation. The circulation guidelines concept in 3 way junction designed to connect each corridor by making a new path that connecting each slow lane from each corridor to another. Its is ilustrated from figure 8.

![Figure 8](image)

**Figure 8.** No bicycle path in exsisting corridor (left), bicycles path and corridor concept from Bengkayang regency (center), corridor concept from Pontianak city (right)

There is 3 concept for parking in this corridor, namely: 1) to place vehicles in the parking area (off-street parking) that provide by with sharing access so that the road corridor does not dominate by parking spaces; 2) on street parking only allows on the area that provides on-street parking; 3) Providing parking in the slow lane so that the vehicle does not accumulate on the main corridor segments, and reduces the vehicle speed.

3.4.6. Pedestrians path. The pedestrian path was designing continuously along the corridor with good and comfortable landscape arrangement. The placement of utilities and street furniture does not interfere in pedestrian movements. Openings to the direction of building facade especially on the ground floor develop, so it provides attraction and experience for street users. The landscape material encourages comfort and safety factors and is able to absorb water. The pedestrian area also equipped with pathways for people with disabilities and visually impaired people, making it easier for them accessing this route.
3.4.7. Signages. The signage are important in structuring the Sungai Pinyuh corridor. It’s made to provide instructions for the existence of certain facilities placement in an area that could access visually, especially by pedestrians. The principles of signage along the Sungai Pinyuh corridor are:

- Signage in the form of traffic signs and street names must be clear and placed in a position that does not interfere with movement, especially in the pedestrian corridor.
- The form and design of information systems must be in accordance with applicable standards so that they are easily understanding and familiar.
- Installation of ads space and building name in the space of on electric poles or pedestrian path lighting.
- Buildings name or business board places to the buildings facade or that does not disturb the visual of the city.

4. Conclusions
From this study, it concluded that the Sungai Pinyuh street corridor has experience land function, physical and visual quality degradation. From this problem, an urban design concept emerges which aims to organize the built-up area and open space so it could creates a proportional environmental system, besides, it provides guidance on the structural form of regional space utilization in a three-dimensional form that could be implemented by related parties. As well as recommendations for structuring the building mass and environment, the corridor design concept also as the basis for the preparation of development control guidelines and a sustainable development framework in the future.

There are 2 concepts that will developing in this study namely integrated corridor and urban green corridor. These concept implemented by using 8 variables of urban elements. As the results, street corridor design guidelines do by looking at whole aspects and carry out in an integrated manner by arranging the road space, arrange the side of the street space and providing guidelines for the building system and land use. Urban design elements adding in this guidelines to get good performance with arranging the visual aspects so that the Sungai Pinyuh street corridor well organized.

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