Public Version

Road Layout Design Blueprint
for Iskandar Malaysia
Series of Public Version Blueprint

Urban Planning

- Planning & Design Guidelines for Housing, Neighbourhood and Facilities for Iskandar Malaysia
- Area Character Statement Blueprint for Iskandar Malaysia
- Integrated Land Use Blueprint for Iskandar Malaysia
- Housing Management Blueprint for Iskandar Malaysia
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- Investment and Marketing Strategic Roadmap for Iskandar Malaysia
- Human Capital Blueprint for Iskandar Malaysia
- Tanjung Puteri – Tourism Development Strategy Framework for Iskandar Malaysia
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List of agencies/departments involved in developing RLD blueprint

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Department of Road Safety (JKJR)

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Pontian Land Office
Johor Bahru City Council (MBJB)
Central JB Municipal Council (MPJBT)
Kulai Municipal Council (MPKu)
Pasir Gudang Municipal Council (MPPG)
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Others

Malaysia Institute of Road Safety Research (MIROS)
Foreword

Iskandar Malaysia is a National Project to develop a vibrant new region at the southern gateway of Peninsular Malaysia. A regional authority body Iskandar Regional Development Authority (IRDA) was formed with specific roles to plan, promote and facilitate in which to coordinate the economic, environmental and social planning, development and management of Iskandar Malaysia. IRDA refers to The Comprehensive Development Plan (CDP) as the guiding document in developing Iskandar Malaysia, and subsequent to that, blueprints are prepared as a subset and supplementary document to CDP, which outlines detail findings, strategies, implementation and action plans.

The Road Layout Design (RLD) blueprint for Iskandar Malaysia has been prepared to assist the public and private sector and the community to work together in managing the concerns of road layout within the Iskandar Malaysia region so that all can benefit in making the region a place to invest, work, live and play.

The Road Layout Design Blueprint for Iskandar Malaysia was documented because of following reasons: to prepare the design road layout especially for urban context area; to consider safety of citizens and sustainable ecology; to create economically vibrant commercial areas and liveable neighbourhoods; to consider land use context within Iskandar Malaysia area; and to provide high quality urban road environment within Iskandar Malaysia area, they are: Land Use Context and Road Hierarchy.

Furthermore, the road layout design process will respond to the land use context and accommodate the needs of individual places and neighbourhoods, safety, efficiency, sustainability, Public Health and Public Enjoyment.

This blueprint has incorporated a set of Fifteen Road layout Development Programmes that can mapped out to each strategy and to each of the pathways. In fact, each Development Programme addresses a specific Road layout’s design standards, recaps international good practice, and outlines ways ahead for Iskandar Malaysia.

To facilitate the implementation, the blueprint outlines a set of new coordinating structure to manage new partnerships expected come from public agencies and private organisations working together on more complex programmes of Safety & Security enhancement and sustainability in Iskandar Malaysia. Consequently, the region will be a safe and secure place to invest, live, work and play under a Metropolis environment of an International Standard.

Ismail bin Ibrahim
Chief Executive
Background of IM and IRDA

Launched by the Government in November 2006, Iskandar Malaysia is envisaged to become a “Strong and Sustainable Metropolis of International Standing” set to spur economic developments that actuate Malaysia’s global potential.

Iskandar Malaysia is centrally located within South East Asia’s new economic zone and a short eight-hour flight radius from Asia’s burgeoning growth centres such as Bangalore, Hong Kong, Seoul, Shanghai, Singapore, Taipei and Tokyo.

Besides the strategic location and space for business expansion and quality living, Iskandar Malaysia has a package of good fundamentals and strengths such as existing infrastructure, cultural familiarity, friendly policies and an ease-of-doing business environment based on global best practices.

Driven by nine economic clusters – Electrical and Electronics, Petro and Oleo-chemicals, Food and Agro Processing, Logistics, Tourism, Health Services, Education Services, Financial Services and Creative Industries; Iskandar Malaysia aims to develop a strong, diversified, dynamic and global economy based on the foundations of nation-building; growth and value creation, as well as equitable and fair distribution amongst stakeholders.

There are five key economic zones within Iskandar Malaysia: Zone A – JB City Centre, Zone B – Greenfield of Nusajaya, Zone C – Western Gate Development, Zone D – Eastern Gate Development, and Zone E – Senai-Skudai. In Zone A, the development activities will be focused on: New Financial District, Danga Bay Integrated Waterfront City, Upgrading of Central Business District, Tebrau Plentong mixed development and enhancement of causeway infrastructure connecting Johor Bahru and Singapore. In Zone B, development is centred on the Johor New Administration Centre (JNAC) at Kota Iskandar, University Park in Edu-city, International Destination resort comprised of outdoor and indoor theme parks, and clean and green factories & warehouses at the Southern Industrial Logistics Clusters area. While in Zone C, the development is focused on the development of Free Trade Zone at Port of Tanjung Pelepas, Petrochemical and Maritime Industrial hub at Tanjung Bin, and Tanjung Bin Power Plants. Zone C also has the three Ramsar sites (Pulau Kukup, Tanjung Piai and Sungai Pulai). With Tanjung Piai being the conservation of RAMSAR called as the Southern-most tip of mainland of Asia, and the good land linkages through Second Link Access to Singapore. Zone D there is a mixed development with City of knowledge in Seri Alam, a Regional Distribution Centre in Kim-Kim, Pasir Gudang Industrial park, Tanjung Langsat Industrial Park, Pasir Gudang Port and Tanjung Langsat Port. The most northern part is Zone E – which included Universiti Teknologi Malaysia at Skudai, Senai International Airport, Senai Cargo Hub and Senai High Technology park and Senai Industrial Parks. Upon completion, the region will boast state-of-the-art facilities, infrastructure that is comprehensive, and toward becoming a one-stop business centre where living, environment, and business will converge within a sustainable metropolis of international standing.

Iskandar Malaysia is already attracting an influx of foreign and high level corporate investments without forgetting the domestic investments, through its strategic location and accessibility by land, sea and air. In fact, the Ninth Malaysia Plan (2006–2010), the Federal government has allocated RM 6.83 billion for infrastructural development for the key success of the vision. The funding has been channelled to develop 30 projects comprising 8 road packages, 12 drainage packages, 6 river cleaning packages, and 4 public housing packages.

The government commissioned a feasibility study on the development of Iskandar Malaysia in July 2005. Then on 30 June 2006 the economic corridor, Iskandar Malaysia (formerly known as South Johor Economic Region – S杰R) was established. And a year after the establishment, the Iskandar Regional Development Authority (IRDA) was formed as a statutory Federal government body to execute the Comprehensive Development Plan (CDP) for Iskandar Malaysia, the regional development blueprint.
Iskandar Regional Development Authority (IRDA) is the single authority or single point of reference for coordinating the implementation and approval of development programmes within Iskandar Malaysia. Established by Federal Act of Parliament – IRDA Act 2007 (Act 664), it is a Federal statutory body empowered to plan, promote and facilitate the development implementation of Iskandar Malaysia benchmarking against world standards. IRDA shall put emphasize on the planning for sustainable development, through conservation and equitable distribution of growth while promoting the region to become the preferred place to live, invest, work, and play. IRDA is empowered to:

- Establish national policy directions and strategies that have a direct impact on the development with Iskandar Malaysia.
- Coordinate the performance of development activities carried out by government departments and agencies in Iskandar Malaysia.
- Plan, promote, and facilitate to stimulate and undertake the development in Iskandar Malaysia.
- Act as the principal coordinating agent on behalf of government agencies in relation to receiving, processing and expediting the required approvals.

Three development principles have been the foundation of Iskandar Malaysia: nation building, growth and value creation, and fair distribution among its stakeholders. These principles will blend nicely with IRDA’s main role – Planning, Promotion and Facilitation.

Planning

- To integrate and recommend policies of Federal Government, State Government of Johor and relevant Local Authorities to enhance the well-being of Iskandar Malaysia.
- To identify and develop strategies to enhance infrastructure, skills, science and technology research in the development of Iskandar Malaysia.
- To develop blueprints in order to enhance the current Comprehensive Development Plan (CDP).

Promotion

- To undertake broad based promotion of Iskandar Malaysia to the general public and potential investors – both local and overseas.
- To drive, coordinate and monitor development of economic sectors, required enablers and social infrastructure.
- To use blueprints as points reference for policies, guidelines, legislations and design instructions for promotional tools.

Facilitation

- To provide consultation and information on investing in Iskandar Malaysia.
- To act as the principal coordinating agents on behalf of relevant government agencies in relation to receiving, processing and expediting the requisite approvals for investors in Iskandar Malaysia.
- To implement compliance of blueprints in order to fulfil investors’ needs and requirement.

IRDA refers to The Comprehensive Development Plan (CDP) as the guiding document in developing Iskandar Malaysia, and subsequent to that, blueprints are prepared as a subset and supplementary document to CDP, which outlines detail findings, strategies, implementation and action plans. IRDA has formulated blueprints to both guide and benchmark the implementation of policies, guidelines, legislations and design instructions as well as strategies on specific subjects such as land use, safety & security, environment and infrastructure to develop Iskandar Malaysia into a strong and sustainable metropolis of international standing.
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1 INTRODUCTION

1.1 Study Purpose and Background

The Road Layout Design Blueprint for Iskandar Malaysia (IM) has been commissioned by Iskandar Regional Development Authority (IRDA) for following reasons:

• To address the needs of the growing population.
• To improve road design, motorcycle lane, pedestrian and cyclist.
• To increase safety city for entire Iskandar Malaysia.
• To steer the development of Iskandar Malaysia into a sustainable metropolis of international standing.
• To identify issues related to the safety and smooth flow of traffic.
• To recommend the implementation of road layout design to the international standard.

Besides, this blueprint has been developed to address the following needs:

• To collect and analyse data, guidelines and standards from related agencies such as JKR, JKJR and local authorities.
• To provide path for pedestrian and cyclist to increase the safety within the centre, residential area, business and institutional area.
• To provide motorcyclist route at the strategic location.
• To offer practical solution to smoothen the traffic.
• To review the development approval criteria especially 'Kebenaran Merancang' and local plan in order to ensure the application of guidelines and requirements.

1.2 Profile of Study Area

1.2.1 Study Area

The Road Layout Design (RLD) blueprint has been prepared for the Iskandar Malaysia area that covers 221,634.10 hectares (2,216.30 sq. km) of land area within the southernmost part of Johor. It covers the entire district of Johor Bahru, Mukim Jeram Batu, Mukim Sungai Karang, Mukim Serkat and Pulau Kukup in Mukim Ayer Masin and all within the district of Pontian.

1.2.2 Existing Land Use

The existing land use within Iskandar Malaysia is clearly shown in the table 1.2-1 below:

<table>
<thead>
<tr>
<th>No.</th>
<th>Land Uses</th>
<th>Area (Hectares)</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Housing</td>
<td>10,829.37</td>
<td>4.89</td>
</tr>
<tr>
<td>2.</td>
<td>Commercial</td>
<td>1,252.88</td>
<td>0.57</td>
</tr>
<tr>
<td>3.</td>
<td>Industrial</td>
<td>4,179.10</td>
<td>1.89</td>
</tr>
<tr>
<td>4.</td>
<td>Institution and Facilities</td>
<td>3,769.34</td>
<td>1.70</td>
</tr>
<tr>
<td>5.</td>
<td>Open Space and Recreation</td>
<td>4,640.76</td>
<td>2.09</td>
</tr>
<tr>
<td>6.</td>
<td>Agriculture</td>
<td>112,202.10</td>
<td>50.62</td>
</tr>
<tr>
<td>7.</td>
<td>Forest</td>
<td>21,339.55</td>
<td>9.63</td>
</tr>
<tr>
<td>8.</td>
<td>Vacant Land</td>
<td>8,233.35</td>
<td>3.71</td>
</tr>
<tr>
<td>9.</td>
<td>Transportation</td>
<td>21,255.85</td>
<td>9.63</td>
</tr>
<tr>
<td>10.</td>
<td>Infrastructure and Utilities</td>
<td>2,130.29</td>
<td>0.71</td>
</tr>
<tr>
<td>11.</td>
<td>Water Bodies</td>
<td>21,935.09</td>
<td>9.90</td>
</tr>
<tr>
<td>12.</td>
<td>Development Status</td>
<td>9,866.42</td>
<td>4.45</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>221,634.10</td>
<td>100.00</td>
</tr>
</tbody>
</table>

Source: Integrated Land Use Blueprint, 2009
1.2.3 Local Authority
The study areas fall under the jurisdiction of five local planning authorities, namely:
   b. Majlis Perbandaran Johor Bahru Tengah (MPJBT).
   c. Majlis Perbandaran Pasir Gudang (MPPG).
   d. Majlis Perbandaran Kulai (MPKu).
   e. Majlis Daerah Pontian (MDP).

1.2.4 Accessibility
Iskandar Malaysia had a good accessibility for connectivity to other districts or states such as Plus Highway, Second Link and others. Based on CDP 2006-2025, there are 25 projects were identify as road infrastructure that cover 423.96 km length of road. The total cost was estimate around RM4,772.80 million and the projects implementation will be divided into 2 phases by 2004-2010 and 2016-2020.

1.2.5 Population
Existing population of Iskandar Malaysia is estimated at 1,624,453 people or approximately 49% of the Johor state population which stood at 3,317,381 in 2008.

1.2.6 Flagship Zones in Iskandar Malaysia
There are Five Flagship Zones are proposed as key focal points for developments in the Iskandar Malaysia as shown in Table 1.2-2 below:

Table 1.2-2: Flagship Zone and Key Function

<table>
<thead>
<tr>
<th>Flagship Zone</th>
<th>Key Function and Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Johor Bahru City Centre</td>
<td>• Service and business district</td>
</tr>
<tr>
<td></td>
<td>• Free Access Zone</td>
</tr>
<tr>
<td>B Nusajaya</td>
<td>• Johor State Administrative Centre</td>
</tr>
<tr>
<td></td>
<td>• New financial and business district</td>
</tr>
<tr>
<td></td>
<td>• MSC Cyber city and Nusajaya Cyberpark</td>
</tr>
<tr>
<td></td>
<td>• Education Hub</td>
</tr>
<tr>
<td>C Western Gate Development</td>
<td>• Port of Tanjung Pelepas (PTP)</td>
</tr>
<tr>
<td></td>
<td>• RAMSAR Sites</td>
</tr>
<tr>
<td></td>
<td>• 2nd Link Free Access Zone</td>
</tr>
<tr>
<td>D Eastern Gate</td>
<td>• Pasir Gudang Port and Industrial zone</td>
</tr>
<tr>
<td></td>
<td>• Tanjung Langsat Technopolis</td>
</tr>
<tr>
<td></td>
<td>• Kim-Kim Regional park</td>
</tr>
<tr>
<td>E Senai Skudai</td>
<td>• Senai International Airport</td>
</tr>
<tr>
<td></td>
<td>• Integrated logistic hub</td>
</tr>
<tr>
<td></td>
<td>• Skudai Knowledge Centre</td>
</tr>
<tr>
<td></td>
<td>• Senai Multimodal Terminal Hub</td>
</tr>
</tbody>
</table>

1.3 Manual Goals
Overall manual goals are:
   1. Land Use Context
      The road layout design process will respond to the land use context and accommodate the needs of individual places and neighbourhoods, such as the modes of transport and different activities among the users.
   2. Safety
      Iskandar Malaysia roads will be safe for all users with a particular emphasis on children, older adults and disabled people. Safety will be achieved by targeting speed, network design and prioritization of users, promoting educational campaigns, monitoring enforcement of existing laws and introducing the strengthened laws and regulations.
3. Efficiency
Iskandar Malaysia roads will be designed for the efficient movement of all modes of transport. Efficiency can be achieved through investment in the capacity of transport networks and the connectivity between superblocks.

4. Sustainability
Iskandar Malaysia will be designed to achieve thriving natural/environmental, economic and social system.

5. Public Health
Iskandar Malaysia will be designed to accommodate walking and bicycling for the residents and to decrease obesity, heart disease and diabetes.

6. Public Enjoyment
Iskandar Malaysia will be a pleasure for all users especially pedestrians by providing good road design for it will increase tourism and rates of non-utilitarian walking.

2 ISSUES OF ROAD LAYOUT DESIGN

Issues of road layout design in Iskandar Malaysia is summarised into 6 main aspects as shown in Figure 2-1 below:

![Figure 2-1: Issues of Road Layout Design](image)

2.1 Carriageway Issue

- Motorcyclist had to share lane with other vehicle.
- Motorcycle land and bicycle lane were not provided at almost development in Iskandar Malaysia.
- High numbers of accidents involving motorcycles as have been recorded in the years 2005 to 2009 amounted to 10,974 cases.
- Carriageway width was exceeding then 'Arahan Teknik Jalan' requirement.
- No detail carriageway measurement guidelines based on type of land use.
2.2  Road Edge Issue

- Pedestrian walkway was not provided.
- Illegal parking (no facilities provided).
- No specific measurement for landscape corridor and drainage.
- Some development has wider road edge but not fully functioning.

2.3  Adjacent Land Use Issue

- Most of the industrial zone does not have setback, vehicle parking at road edge.
- For commercial zone, pedestrian walk only provided along five-foot way at the building frontage.
- Residential and commercial area shares the same access road.

2.4  Road Safety Issue

- Most of the survey development did not have clear zone/emergency area which is stated in Road Safety Audit Guideline.
- Oversize tree at median and roadside shoulder.
- Not enough parking area especially at commercial/industrial area.
- Misjudge on applying location of guardrail.
- Bus may byes dimensions.

2.5  Junction Spacing Issue

- Certain junction does not have sufficient setback reserved. Example: nearest junction spacing: Taman Rinting – Jalan Keruing 2 (95 m). Requirement nearest junction spacing: 100 m.

2.6  Turning Radius Issue

- Most of existing turning radius does not comply with the requirement guideline especially at Industrial Zone.

3  BLUEPRINT APPROACH

3.1  Introduction

Road design guideline in Malaysia that prepared by JKR as known as 'Arahan Teknik Jalan' was influenced by documents of US Association of State Highway Transportation Officials 'A Policy on Geometric Design of Highways and Streets'. Thus, Road Layout Design Blueprint for Iskandar Malaysia was documented because of following reasons:
- To prepare the design road layout especially for urban context area.
- To consider safety of citizens and sustainable ecology.
- To create economically vibrant commercial areas and liveable neighbourhoods.
- To consider land use context within Iskandar Malaysia area.

3.2  Iskandar Malaysia Road Layout

There are two factors performed as a basic for the design concept which need to be considered to provide high quality urban road environment within Iskandar Malaysia area, they are:
  a. Land Use Context.
  b. Road Hierarchy.
3.2.1 Land Use Context

Due to the frequent changes in the land use context, it needs to be reflected in the design of the road as it adapts to meet the needs of its surroundings. More intensive land uses may require greater provisions for transit, wider sidewalks, and greater network connectivity and in some cases, more efficiency travel lanes. Land use context in Iskandar Malaysia is shown in the following Figure 3.2-1.

![Image of Land Use Context in Iskandar Malaysia](image)

Figure 3.2-1: Land Use Context in Iskandar Malaysia

3.2.2 Road Hierarchy

Road hierarchy context is defined refers to the transport capacity and the function of the road. It can be categorised as following:

i. Expressway: It is a divided highway for through traffic with full control of access, always with grade separations at all intersections and serves long trips and smooth traffic flow. Normally, design speed for expressway is about 110km/hr. E.g: Lebuhraya Utara Selatan (PLUS).

ii. Arterial: It is a continuous road with partial access control for through traffic within urban areas. Smooth traffic flow is essential since it carries large traffic volume, e.g.: Jalan Skudai, Lebuhraya Pasir Gudang, Jalan Tebrau.

iii. Major Collector: It forms the basic network of the road transportation system within a District or Regional Development Area. They serve intermediate trip lengths with partial access control and link up the arterial road to town, e.g.: Jalan Molek Utama, Jalan Tun Aminah, Jalan Masjid.

iv. Minor Collector: It is a road with partial access control designed to serve on a collector or distributor or traffic between major collector and the local road system. It penetrates and serves identifiable neighbourhoods, commercial areas and industrial areas, e.g.: Jalan Persiaran Molek, Jalan Mawar Biru.
v. Local Road: It is the basic road network within a neighbourhood and a local slow movement that provides frontages for higher density buildings. It has only one lane in each direction and could be the only one lane shared road, e.g.: Jalan Dhoby, road within the residential area, service road at commercial area.

3.3 Promoting Pedestrian, Cyclist and Motorcyclist

3.3.1 Promote Pedestrian and Cyclist

Pedestrian and cyclist can share the same route in the limited ROW, therefore, the blueprint promotes build on-site vehicle and pedestrian and cyclist circulation systems that are safe, convenient, attractive and comfortable for pedestrians.

The pedestrian and cyclist connectivity strategies are:

i. Enhance pedestrian and cyclist spaces and develop comprehensive networks of facilities by improving existing spaces and introducing new one to connect key locations in the City.

ii. Create a city centre that safe for pedestrian and cyclist and easy to navigate with coordinated signage.

3.3.2 Promote Motorcyclist

The blueprint aims to provide comfortable and safety environment to motorcycle riders with provision of their own lane without sharing with other auto vehicles to avoid any accident.

3.4 Applying the Blueprint

This blueprint guides the transition of the Iskandar Malaysia’s roads toward a more multi-modal, walkable, low carbon future by enforcing laws, promoting public education campaign and providing encouragement of walking, bicycling and transit use. As the Iskandar Malaysia areas continue to develop and change, these and other considerations should be revisited continually.

4 DESIGN PRIORITIES AND PARAMETERS

4.1 Design Considerations

The establishment of standard design criteria for all users is important to produce a successful, attractive and safe road to all modes of transport. The following design dimensions and parameters shall be considered and used where appropriate for road design.

4.1.1 Public Transport

Public transport passengers are among the most efficient users of road space. Safety, security and comfort are needed at waiting areas, as well as efficient cross streets and convenient access to transit stops. Design parameters for transit are covered by various documents available from the Ministry of Transport. Figure 4.1-1 provides simple spatial dimensions for buses and trams.
4.1.2 Bicycle and Pedestrian

The safety of bicyclists must be considered during design by providing bicycle facilities in the pedestrian realm in the form of cycle tracks or within the travelled way as bicycle lanes or yield lanes. Besides, all roads must be safe and pleasant for pedestrians of all ages and abilities.

4.1.3 Motorcycle

Due to high risk of accident and limited lane for motorcyclist, motorcycle lane should be provided to improve traffic flow, motorcycle security and to encourage more responsible riding. Figure 4.1-2 shows motorcycle design dimension for motorcyclists.
4.1.4 Auto Vehicles

The accommodation of auto vehicle traffic is important to the continuing growth of Iskandar Malaysia. The following design factors contribute to speed management and should be incorporated into the road design process as suitable in urban areas:

- Lanes of appropriate width without excess.
- On-street parking.
- Tight curb return radii at junctions and elimination or reconfiguration of high-speed channelised right turns.
- Spacing of signalised junctions and synchronisation of signals.
- Vertical shifts, such as raised pedestrian crossings and junctions.
- ‘Gateway’ elements and other appropriate devices.
- Curb extensions.
- Bicycle facilities.
- Paving materials with texture (crosswalks, junctions) detectable by drivers as a notification of the possible presence of pedestrians.

4.2 Design Methods

4.2.1 Universal Design

Universal Design accommodates all potential users in the design process by promoting approaches and solutions that can benefit everyone. Among examples from the universal design are the provision of urban Braille for impaired users and understandable signage for all users, local and international.

4.2.2 Vertical Separation

Pedestrian and vehicle dominant spaces across the road right-of-way will be separated vertically. Both road users; pedestrians and vehicle drivers should give and take as well as alert with the spaces such as the traveled way. Similar treatment applies to transit and bicycle facilities depending on their location within the road right-of-way. The discrepancy in vertical elevation is illustrated in Figure 4.2-1 below:

![Figure 4.2-1: Pedestrian and Vehicle Vertical Separation](image)

4.2.3 Vehicle Speed

Vehicle speeds need to be maintained through safe street design, education and the enforcement of policy concerning other road users. A network speed approach can be adopted in urban areas with suitable traffic control devices such as signal control junctions. Table 4.2-1 below shows the recommended operating speeds of vehicle:
Table 4.2-1: Recommended Operating Speeds

<table>
<thead>
<tr>
<th>Land Use Context</th>
<th>Road Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Arterial</td>
</tr>
<tr>
<td>National Regional Centre</td>
<td>70 km/h</td>
</tr>
<tr>
<td>Sub Regional Centre</td>
<td>70 km/h</td>
</tr>
<tr>
<td>Industry (Service Centre)</td>
<td>NA</td>
</tr>
<tr>
<td>Commercial (Service Centre)</td>
<td>NA</td>
</tr>
<tr>
<td>Residential (Service Centre)</td>
<td>NA</td>
</tr>
</tbody>
</table>

5 ROAD PLANNING PROCEDURE

5.1 Application of Planning Permission

The development proposal process at local authority will be divided into 4 main application processes such as related on Land Matter, Planning Permission, Building Plan, and Earthwork Plan and Road and Drainage Plan (Figure 5.1-1). Based on normal procedure, requirement of road planning application is needed for approval process on stage of Kebenaran Merancang and Earthwork Plan and Road and Drainage Plan. This requirement should involve as follows:

i. Borang A (Akta 172).

ii. Borang ATJ 03/85 Pindaan06/2008 (03).

Figure 5.1-1: Procedure and Process of Development Proposal
The method of ‘Arahan Teknik Jalan’ (ATJ) Form was divided into 3 stages application. Every stage application has a different requirement especially on document submission and technical requirement.

5.2 Traffic Impact Assessment (TIA)

5.2.1 Introduction

This section describes the key elements required for preparing and reviewing traffic impact studies for land developments. It serves the following practices:

a. To provide guidance on suitable range planning of site access, off-site improvements needed to permit the street system to accommodate site and non-site traffic and on-site circulation.

b. To assist developers and property owners in making critical land use site planning decisions regarding traffic and transportation aspects.

5.2.2 Major Issues Addressed in Traffic Impact Studies

Traffic impact assessment can respond with variety issues; type of development, location of the proposed project, existing traffic and environmental conditions in the area, and local policies toward new development. However, the participation and development fees have been excluded from this assessment.

5.2.3 Warrant for Assessment

Baseline criteria for urban or suburban site traffic impact assessment shown in Table 5.2-1. These criteria can be used to help in deciding when and how such a study should be performed.

| Table 5.2-1: Suggested Baseline Criteria for Urban or Suburban Site Traffic Impact Assessment |
|-----------------------------------------------|-----------------------------------------------------------------------------------------------|
| Criteria                        | Suggested Threshold                                                                          |
| Need for Study                  | Established criterion based on trip generation, development size, other development or area characteristics, or localized conditions. In lieu of another preferred criterion, development generation of 100 added vehicle trips in the peak direction during the site’s peak traffic hour is suggested. |
| Study Area Limits              | All site access drives, adjacent roadways, and major intersections, plus the first signalized intersection in each direction from the site up to a distance determined locally. Additional areas may be added based on development size and specific site local issues and policy. |

5.2.4 TIA Requirement

TIA requirement for Iskandar Malaysia were divided into 9 categories. It is compulsory for all type development National Regional Centre (Johor Bahru and Nusajaya) area and Sub Regional Centre (Senai-Kulai, Skudai, Pasir Gudang and Tebrau-Ulu Tiram) area.

5.3 Road Safety Audit

The final blueprint is to recommend RSA Stage 1 (Feasibility and Planning Stage) and Stage 2 (Preliminary design Stage) compulsory to all road development in Iskandar Malaysia. Therefore, standard checklist for RSA Stage 1 and 2 has been developed.
6 ROAD DESIGN ELEMENTS

6.1 Introduction

This chapter provides a set of standards for road design element, including junctions, traffic calming, cross sections and dimension tables. All designs must be referred to ATJ guideline. This blueprint covers state priority and limit particular operations only under road operations. It also addresses operational signal design, pavement marking and regulatory signage in separate documents.

6.2 Road Composition

Dimensions of the road edge and the travelled way are provided for pedestrians, bicyclist, motorcycle riders, transit users, auto vehicle drivers and median.

The development of a cohesion design for the pedestrian realm is important because interaction occurs between its four zones, which are:
- Frontage Zone.
- Through Zone.
- Furnishing Zone.
- Edge Zone.

6.3 Standard Cross Section

The dimension tables and cross sections contain fixed values as have been organized according to the Iskandar Malaysia’s land use context categories: National Regional Centre (NRC), Sub Regional Centre (SRC), Industry Centre (IC), Commercial Centre (CC) and Residential Centre (RC). Each category has its own geometric design criteria for road design based on land use context.

6.3.1 National Regional Centre Context

- It is a central of mixed use activity especially for pedestrians.
- Buildings are typically three stories and above with 1:4.5 to 1:9 plot ratio.
- The design of the building gives high priority for the comfort and safety of pedestrians.
- It provides design of realm, shade and landscape for pedestrian and public, within the area of Johor Bahru City Centre and Nusajaya.

6.3.2 Sub Regional Centre Context

- It is mixed use areas with medium levels of pedestrian activity.
- Buildings are typically two or ten stories and have 1:3.5 to 1:4 plot ratios.
- Its designs are similar to the city context, but some lower pedestrian volumes and realms dimensions are slightly narrower, within the area Kulai-Senai, Skudai, Pasir Gudang, Tebrau-Ulu Tiram.

6.3.3 Industrial Context

- It is the areas for large business and factories.
- Its designs are focus on pedestrian, landscape, safety and considering too on heavy vehicles.
- Example: Taman Perindustrian Desa Cemerlang, Pasir Gudang, Senai.
6.3.4 Commercial Context
• It is the areas which provide a variety of working, shopping and service options and convenience.
• Buildings are typically one to ten stories and have 1:1 to 1:4 plot ratio.
• Its designs are focus on pedestrian, low speed for automobiles, safety and on-road parking.
• Examples: Taman Molek and Taman Universiti.

6.3.5 Residential Context
• It is the areas which provide a variety of housing opportunities.
• Its designs are focus on pedestrian, landscape, low speed travel lane.
• Examples: Taman Mawar and Taman Tun Aminah.

6.3.6 Transit Dedicated Lanes
Transit accommodation may be provided on a road in the centre median or side travel lane.

6.4 Additional Road Types
Variations from the preferred cross sections may be permitted, along with unique, custom designed roads, provided as below:

6.4.1 One-way Road
It accommodates traffic moving in only one direction, and may be designed using the sample cross section by removing the median and one direction of travel lanes.

6.4.2 Shared Access Lane
It is a variation of the access lane as it provides a single wide lane that accommodates both directions of travel. Its width is a maximum of 5.0 m and minimum of 2.7 m. It is only used on very low volume roads.

6.4.3 Service Road
It is a road that used to enter commercial area or building lot. The different of the service road type is the provision of parking lot.

6.5 Designing for Pedestrians
As the most vulnerable road users, pedestrians need special care and consideration to identify potential issues and to design facilities.

6.5.1 Pedestrian Walkway
It is most justified at the community development area that results in pedestrian concentrations near or along the highways. Sidewalks should be included as a part of the construction but should be separated from the shoulder and have different requirements in different areas:
  a. Sidewalk in residential areas: It may vary from 1.25 to 2.5 m. It should be provided along both sides of roads but need to be provided on at least one side of all local roads.
  b. Sidewalk in commercial areas: It has greater length and should be provided along both sides of roads.
6.5.2 Pedestrian Crossing

It is located at junctions and mid-block to provide a high-quality pedestrian environment and ensure their safety. It shall be provided on all roads to accommodate pedestrian desire lines and must follow the spacing standards below:

- 120 m for national, sub regional and commercial areas.
- 150 m for residential area.
- 200 m for industrial area.

6.5.3 Crossing Design

It ranges from raised speed table style crosswalks to informal crossings.

- Maximum uninterrupted crossing distance shall not exceed 14 m to reduce crossing distance:
  - Provide kerb extensions
  - Narrow width of travel lanes
  - Reduce the number of travel lanes
  - Install refuge islands located within clearly visible areas
- Provide kerb ramps to accommodate the change in grade at the ends of crossings.
- Place in line with and at the same width as the adjoining walkway or kerb ramp.
- Typical width: 3 m, 5 m on Arterial.
- Vehicle stop lines 30 ahead of the crosswalk, 10 m ahead at mid-block crosswalks.

<table>
<thead>
<tr>
<th>Pedestrian volume at peak hour</th>
<th>Traffic Volume (1 way) at peak hour</th>
<th>Type of Crossing</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50</td>
<td>&lt; 100</td>
<td>Ordinary level crossing</td>
</tr>
<tr>
<td>50 – 100</td>
<td>100 – 200</td>
<td>Signalised level crossing</td>
</tr>
<tr>
<td>&gt;100</td>
<td>&gt; 2000</td>
<td>Overhead crossing/underpass</td>
</tr>
</tbody>
</table>

Table 6.5-1: Guideline for Type of Crossing Required

Source: Arahan Teknik Jalan, JKR

Signalised crossings:
- Use fixed-time.
- Prioritise pedestrians over vehicle or provide exclusive phase.
- Provide dynamic timing (countdown) signals.
- Provide audible pedestrian signals.

Pedestrian Refuges
- Minimum width: 1.8 m (typically 2.5 m, 3 m on Arterials)
- Extend median tips / noses past crossings at junctions.
- Crossing area to be flush (cut-through)
- Crossing may be off-set or angled to orient pedestrians to oncoming traffic.

6.5.4 Driveway Design

Driveways shall be designed to ensure pedestrians have the right-of-way over motor vehicles. Other guidance for driveway design includes:
- Orient driveways at 90 degree (right angles) to roadway.
- Design driveways as ramps, not as minor junctions.
- Ramp driveways up to pedestrian realm level.
6.5.5 Slopes and Grade

A maximum 1:50 cross slope should be provided on all surfaces in the pedestrian realm and road crossings to facilitate travel by wheelchair users, minimize tripping hazards, and provide positive drainage for hard surface.

- Longitudinal grades shall not exceed a maximum of 1:20.
- Longitudinal ramps may not exceed a maximum ramp grade of 1:12.
- Provide edge protection for ramps steeper than 1:20 or landings more than 1.3 m above the adjacent grade.

6.6 Designing for Transit Users

Transit user is the user of public transport, but the priority of design is given to buses by providing road layout for bus lane, transit stop and bus lay-by.

6.6.1 Bus Lanes

Bus lane is dedicated at the side median. Lane width for bus minimum is 3.5 m.

6.6.2 Bus Lay-by

Bus stops may be placed at junctions or mid-block depending on the route, transfers, passenger generations and destinations.

6.7 Designing for Bicyclist

This section addresses bicycle facilities and provides guidance to the location and bicycle parking. Refer to ATJ for standards and details on any bicycle requirements within the road design area.

Important design points include the following:

- Highlight bicycle facilities with colour pavement, especially at junctions and other conflict zones.
- Create bicycle facilities that are wide enough for a bicycle.
- Design to reinforce that bicyclist is to yield to pedestrian at all intersection points.

6.7.1 Bicycle Facility Type and Selection

Various bicycle facilities will be provided along the road by providing cycle track to encourage the using of bicycle in Iskandar Malaysia. Cycle track is reserved only for bicyclist, combined with pedestrian walkway, separated by the marking and separator and shall not combine with motor vehicle lanes.

6.7.2 Bicycle Facility at Junctions

Specific provisions for bicyclists are necessary at junctions, both major and minor, including driveways, by providing mark and specific colour bicycle lanes and advanced stop line (ASL) or bicycle box. Cycle crossings through main junctions shall be separated from vehicle lanes and its design with sufficient spaces are needed to accommodate bicyclists mixing with pedestrians.
6.7.3 Bicycle Parking

General design criteria for bicycle parking facilities are as following:
- Locate parking in furnishings zone, out of the through zone or driveways, on kerb extensions within 15 m of the main entrance or between buildings.
- Provide longer term bicycle parking in convenient, shaded, well-lit, and secure locations.
- Provide directional signage if parking is not readily visible to visitors.
- Bicycle lockers should be provided to encourage bicycle commuting.
- Bicycle racks are to be durable and securely anchored.

6.8 Designing for Motor Vehicles

The design of motor vehicle facilities, including u-turn design, lane transitions, access management, and on-road parking will be discussed as it ensures safety for all types of motor vehicles.

6.8.1 Travel Lanes

Various widths of travel lanes are depending on the road family and the specific land use. These widths are stated and illustrated on the standard cross sections shown in section 6.3.

6.8.2 Lane Transitions

Lane transitions shall be minimized on urban roads to ensure a maximum pedestrian crossing distance of 14 m is maintained.
- Do not use lane transitions within junctions, but match entry and exit lanes and drop turn lanes.
- Maximum lane transition 1:10.
- Tapers to turn lanes 1:2.

6.8.3 U-Turns

U-turns enhance motor vehicle traffic flow, facilitate access management and reduce left turn pressure at junctions. They may be used on Arterial and Collector.
- Locate before crosswalks.
- Signalise where there are two or more receiving lanes.

6.8.4 Access Management

Access management techniques shall limit vehicle movement; manage driver behaviour and support pedestrian, transit and bicycle design.
- Limit the size, quantity and frequency of driveways to reduce conflict points in the pedestrian realm.
- Construct alternate routes to disperse traffic.
- Limit turns onto and off of main roads.
- Manage access to construction sites and other temporary conditions.
- Design driveways and minor road crossings.

6.8.5 Frontage Lanes

- Frontage lanes are used to act as a portion of the pedestrian realm and speeds shall be managed accordingly.
- It is required when there is a parking demand on Arterial and Major Collector.
- It is essential to keep frontage lanes narrow to ensure slow travel speeds.
- Diagonal and perpendicular parking should be avoided along frontage lanes.
6.8.6 Medians

Medians are used to separate traffic flows and control turning movements by providing a protected pedestrian refuge, as located in the middle and the side of the road. It is preferable to minimize median widths to reduce the overall width of the road and the length of the road crossing. Medians should be:

- Minimum width of 1.5 m, increasing to 3 m where there is heavy pedestrian activity. Left turn lanes shall be accommodated with an additional 3 m.
- No trees allowed at median.
- Cluster trees where shade is most valuable, such as at pedestrian crossings of the median, while also ensuring that pedestrians are clearly visible to oncoming traffic.

6.8.7 Sight Distance

Sight distance is the length of road ahead visible to others in ensuring the safety and efficient operation of a road. Its requirements include the following:

- Provide kerb extensions and restrict parking near crossings to improve visibility between motorists and pedestrians.
- Lower vehicle speeds.
- Restrict turning movements.
- Clear visual obstacles from the pedestrian realm.

Thus, sight distance includes the following:

a. Stopping Sight Distance: It is the length required to enable a vehicle travelling at or near the design speed to stop before reaching an object in its path.

b. Passing Sight Distance: It is the length needed to safely complete a normal passing movement.

6.8.8 Provision of Parking Lot

Parking lot is a planning space provided for motor vehicles park especially at the areas full with activities. Types of planned parking are:

i. Off-Street parking:
   - Parking lot field (open area).
   - Storey parking lot.
   - Roof parking lot.
   - Basement parking lot.
   - Mechanical parking.

ii. On-Street Parking:
   - Perpendicular parking (90 degree).
   - Parallel parking (180 degree).
   - Angle and diagonal parking (40, 45 and 60 degree).

6.9 Designing for Motorcycle Riders

Provision of motorcycle lane is needed for Arterial road and several in Major Collector within Iskandar Malaysia for high number of motorcycle users. The design of motorcycle lanes and facilities need to consider as follow:

- Lane width minimum is 2.5m.
- Motorcycle lane separated from other auto vehicles lane.
- Motorcycle parking width about 1.5 m each space.

6.10 Junction Design

Junctions are intersections of roads where all road users share the space. Junction types shall be selected to address user interactions during the design process.
6.10.1 Junction Types

Various junction types have basic characteristics of each.

6.10.2 Junction Layout and Design

Important objectives to be achieved in junction layout and design are as following:
- Pedestrian and cycles must be routed through the intersection with minimum deviation from their direct path.
- Provide shade at and near junctions.
- Design junctions with the understanding that turning vehicles may turn into any lane of the receiving road and larger vehicles may cross the centreline.
- Circle tracks shall be brought into the junction at the pedestrian level.

6.10.3 Corner Cutting

It is one of the important aspects in the design of junction especially for the safety reason. Two aspects that influenced in determination of corner cutting are:
- Radius of pavement.
- Junction spacing.

6.10.4 Junction Spacing

It is important to maintain the suitable spacing between road and junctions because it will determine the efficiency and avoid vehicle delay. Table 6.10-2 provides recommended dimensions road spacing.

<table>
<thead>
<tr>
<th>Context</th>
<th>Arterial</th>
<th>Major Collector</th>
<th>Minor Collector</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Centre</td>
<td>Min</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>1500</td>
<td>500</td>
</tr>
<tr>
<td>Sub Regional Centre</td>
<td>Min</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>1000</td>
<td>500</td>
</tr>
<tr>
<td>Industrial Centre</td>
<td>Min</td>
<td>400</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>750</td>
<td>500</td>
</tr>
<tr>
<td>Commercial Centre</td>
<td>Min</td>
<td>400</td>
<td>250</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>750</td>
<td>450</td>
</tr>
<tr>
<td>Residential Centre</td>
<td>Min</td>
<td>500</td>
<td>300</td>
</tr>
<tr>
<td></td>
<td>Max</td>
<td>1500</td>
<td>500</td>
</tr>
</tbody>
</table>

6.10.5 Control Measures

General highlights of the types of operation control for junctions are described in Table 6.10-3 as follow:
Table 6.10-3: Junction Control Matrix

<table>
<thead>
<tr>
<th></th>
<th>Arterial - Arterial</th>
<th>Arterial - Major Collector</th>
<th>Arterial - Minor Collector</th>
<th>Arterial - Local Road</th>
<th>Major Collector - Major Collector</th>
<th>Major Collector - Minor Collector</th>
<th>Major Collector - Local Road</th>
<th>Minor Collector - Major Collector</th>
<th>Minor Collector - Minor Collector</th>
<th>Minor Collector - Local Road</th>
<th>Local Road - Local Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>Signalised Roundabout</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Not Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>1-Lane Roundabout</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>2-Lane Roundabout</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>Mini- Roundabout</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>All-Way Stop</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>Way Stop or Yield</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
<td>Preferred</td>
</tr>
<tr>
<td>All-Way Yield</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
<td>Not Preferred</td>
</tr>
</tbody>
</table>

6.10.6 Sight Distances at Junction

The achievement of sight distance criteria needs to be thoroughly checked as it is essential to avoid conflict between road users. Sight distance requirements include the following:
- Provide kerb extensions and restrict parking near crossings to improve visibility between motorists and pedestrians.
- Lower vehicle speeds.
- Restrict turning movements.
- Clear visual obstacles from the pedestrian realm.

There are several sight distance criteria applicable at junctions, each needs to be checked and the audit should identify any situations where a deficiency is proven, as follow:
- Approach Sight Distance (ASD).
- Entering or Crossing Sight Distance (ESD).
- Safe Intersection Sight Distance (SISD).
- Sight Distance to Queued Vehicles.

6.10.7 Design Vehicle

Junction design required consideration of at least four design vehicles:
- Speed control vehicle.
- Design vehicle.
- Control vehicle.
- Non-motorised vehicles.
Table 6.10-4: Design Vehicles for Intersection Design

<table>
<thead>
<tr>
<th>Area</th>
<th>Design Vehicle</th>
<th>Dimension in Meters</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type</td>
<td>Symbol</td>
</tr>
<tr>
<td>Urban</td>
<td>Passenger Car</td>
<td>P</td>
</tr>
<tr>
<td></td>
<td>Single Unit Track</td>
<td>SU</td>
</tr>
<tr>
<td></td>
<td>Truck Combination</td>
<td>WB – 1S</td>
</tr>
</tbody>
</table>

Source: A Guide to the Design of at-Grade Intersections, Arahan Teknik Jalan 8/86.

6.10.8 Turning Radius

Turning design deserved special consideration as it directly impacts crossing distances and vehicle turning speeds. Turning radius is the actual dimension of the kerb and motor vehicle turn.

6.10.9 Right Turn Lanes

- Right turn lanes shall be at least 3.0 m wide and a minimum of 24 m long. Tapers shall be 1:2.
- A minimum 1.8 m pedestrian refuge must be provided in the median when introducing right turn lanes on Arterial and Major Collector.
- It is recommended that double right turns are only used to reduce delay at a signal, not to increase capacity.

6.10.10 Left Turn Lanes

Left turn lanes shall be at least 3.0 m wide and a minimum of 24 m long. There are four alternatives for left turns as follow:

- Option 1: No dedicated left turn lane.
- Option 2: Dedicated left turn lane.
- Option 3: Signalised left turn slip lane with raised pedestrian crossing.
- Option 4: Yield-controlled left turn slip lane raised pedestrian crossing (15km/h design speed).

6.10.11 Roundabouts

Modern roundabouts may be used according to the Junction Control Matrix in Table 6.10-3 provided in Section 6.10.5. Roundabouts shall be designed following the guidelines which include:

- One-lane roundabouts shall have raised marked crossings.
- Two-lane roundabouts may have raised crossings across entry and exit areas.
- Roundabouts with more than two lanes are not recommended.
- Pedestrian crossing distances shall be as short as possible, with a maximum of two lanes to cross.
- Bicycle lanes are not striped within a roundabout. Lanes should end a minimum of 20 meters ahead of the roundabout pedestrian crossings. A bicycle ramp should be provided to allow bicyclists to ride up onto the pedestrian realm and either travel through or dismount to cross. The pedestrian realm shall have ample width in these areas to accommodate bicyclists and pedestrians.
- Splitter islands serve as pedestrian refuges, and a minimum width of 3.0m is required at pedestrian crossing locations.
- Marked crosswalks and bicycle lanes are not required within mini-roundabouts, but may be needed on adjoining roads depending upon road type.
6.10.12 Grade Separations

Pedestrian bridges and tunnels (underpasses) shall not be used on roads except as permitted by the Authority and Iskandar Malaysia. They may be considered only in the following situations:

• To traverse a major obstacle.
• To provide a direct pedestrian route.
• Where there are extensive pedestrian flows.

For approval, the following must be demonstrated:

• The bridge or tunnel will add no more than 50% to the time it would take a person to cross the road at grade.
• The bridge or tunnel will positively affect the identity of the area.

6.11 Traffic Calming Measures

This section covers traffic calming techniques that may be applied throughout Iskandar Malaysia. Designing roads to mitigate the negative impacts of motor vehicle traffic by ensuring safety for all road users is known as ‘traffic calming’.

6.11.1 Traffic Calming Principles

• Traffic calming devices affect one or more of the following:
  o Vehicle Speed.
  o Exposure Risk
  o Legibility and Predictability
  o Traffic Volume
• Traffic calming must function at all times of the day.
• Traffic calming measures are usually physical because of their proven effectiveness in reducing speeds, cut-through volumes or collisions.
• Traffic calming can be either proactive or reactive.

6.11.2 Traffic Calming Approaches

The following describes selected traffic calming devices:

• Speed Tables
• Speed Cushions
• Raised Crossings
• A Lateral Shift
• Chicane
• A Chocker
• A Centre Island Narrowing

6.11.3 Application

As designed by local authority, some devices of traffic calming are speed breaker, speed hump, speed bump, speed table, raised crosswalks, raised intersections, textures pavement, traffic circles and roundabout. All these have been implemented on the roads in Malaysia.
7 ROAD LAYOUT DESIGN BLUEPRINT BASED ON ADJACENT USE

This chapter will discuss about design of the road layout based on adjacent use and demonstrate some options for road layout design considering the context within the adjacent use at the both side road.

7.1 Residential Context

Residential road layout is influenced by the type, hierarchy, reserve and capacity of its road. The functions of roads in residential area are:

- Access to residences.
- Parking for visitor vehicles and overspill of resident vehicles.
- Social and activity space for neighbours to interact and children to play.
- Setting and approach for residences located on it, desirably with high aesthetic and amenity quality.
- Storm water drainage path.
- Service location for utility to residences.

Planning for road within residential area shall aim to establish a road network that provides convenient linkages to activity centre and local facilities. The sign of industrial road shall aim for the following:

- Fulfil their designated functions within the road network and hierarchy.
- Accommodate public utility services and drainage system.
- Provide acceptable level of safety and convenience for all state users in residential area.
- Minimising the negative impact of through-traffic.

The typical section of residential road can be divided into five types:

- Major collector road with BRT – 40 m ROW.
- Minor collector road – 30 m ROW.
- Minor collector road – 20 m ROW.
- Local road – 15 m ROW.
- Local road – 12 m ROW.

Road layout should be based on differentiation of adjacent used and function of the road. There are different types of road in residential area as below (Type R of the road means road in residential area):

- Type R1: Access road between residential buildings with main travel road.
- Type R2: Access road in residential area.

7.2 Commercial Context

Commercial road layout is influenced by the type, hierarchy, reserve and capacity of its road. The functions of roads in industrial area are:

- Access to commercial areas.
- Parking for visitors and workers vehicles.
- Social and activity space for customer and dealer to interact and doing business.
- Storm water drainage path.
- Service location for utility.

Planning for road within commercial area shall aim to establish a road network that provides convenient linkages to activity centre and local facilities. The design of commercial road shall aim for the following:

- Fulfil their designated functions within the road network and hierarchy.
- Accommodate public utility services and drainage system.
- Provide acceptable level of safety and convenience for all road users in commercial area.
- Minimising the negative impact of through-traffic.
The typical section of commercial road can be divided into four types:
- Major collector road with BRT – 40 m ROW.
- Minor collector road – 30 m ROW.
- Minor collector road – 20 m ROW.
- Local road – 15 m ROW.

Road layout should be based on differentiation of adjacent used and function of the road. There are different types of road in commercial area as below (Type C of the road means road in commercial area):
- Type C1: Service road with 15m ROW one side parking.
- Type C2: Service road with 20 m ROW two side parking.
- Type C3: Service road with 15 m TOW two side parking (one way lane).

7.3 Industrial Context

Industrial road layout is influenced by the type, hierarchy and capacity of its road. The functions of roads in industrial area are:
- Access to industrial areas.
- Parking for visitors and workers vehicles.
- Social and activity space for customer and dealer to interact and doing business.
- Storm water drainage path.
- Service location for utility.

Planning for road within industrial area shall aim to establish a road network that provides convenient linkages to industrial centre and local facilities. The sign of industrial road shall aim for the following:
- Fulfil their designated functions within the road network and hierarchy.
- Accommodate public utility services and drainage system.
- Provide acceptable level of safety and convenience for all road users in industrial area.
- Minimising the negative impact of through-traffic.
- On-street parking or centralised must be provided to avoid illegal parking on road lane.
- Lane width for industrial road must 3.5 m or above.
- On-street parking at travel lane side for side is 3.0 m.

The typical section of industrial road can be divided into four types:
- Major collector road with BRT – 40 m ROW.
- Major collector road without BRT – 40 m ROW.
- Minor collector road with BRT – 30 m ROW.
- Local road – 20 m ROW.

Road layout should be based on differentiation of adjacent used and function of the road. There are different types of road in industrial area as below (Type D of the road means road in industrial area.):
- Type D1: Main road at industrial area.
- Type D2: Access road in industrial area.
- Type D3: Share main road within industrial and commercial area (Please refer section 7.2 for type of service road at commercial area).
8 INTRODUCTION

The Road Layout Design Blueprint has listed that the safety is the main consideration in providing road and all streetscape design for all users, especially for pedestrian and cyclist. Road safety shall focus on different elements which are based on type and land use zoning. These elements categories are National Regional Centre, Sub Regional Centre, Industrial, Commercial and Residential.

8.1 Road Kerbs

Road kerbs used in Iskandar Malaysia are used for drainage control, pavement edge delineation and aesthetics depend on road usage and location of kerb. Any design of kerb should conform to “A Guide on Geometric Design of Roads” by Road Engineering Association of Malaysia, REAM.

8.2 Road Signage

Road signage’s can be divided into following types:
- Regulatory sign: It informs road users of traffic laws or regulations.
- Warning sign: It is necessary to warn traffic conditions, or adjacent to road.
- Guide sign: It is necessary to guide road user to the specific locations.
- Route marker: It shall be used to identify roads and guide the users.
- Street name signage: It shall be provided at each location of junction to identify collector and local roads.

Minimum clearance for traffic signs vertically, 2.2 m and horizontally, 0.6 m at roadside and must not less than 5.4 m for traffic signs. All signage design except street name signage shall be referred according to “Arahan Teknik Jalan 2A/85 – Standard Traffic Signs”, while road sign application shall be referred according to “AArahan Teknik Jalan 2B/85 – Traffic Sign Application.”

8.3 Street Lighting

Due to safety matters, location of street lighting and type of material has a great influence to avoid any accidents and all their materials shall be approved by SIRIM Malaysia. There are different decorations of lighting as follow:
- Decorative double arm street lighting: It shall be used at median of roads.
- Decorative single arm street lighting: It shall be used at roadside of roads.
- Decorative pole lighting: It shall be provided at pedestrian and cycle lane.

8.4 Road Barrier

Road barrier is designed to minimize the severity accidents by redirecting a vehicle away from embankment slopes or hazard objects and dissipating the energy from the vehicle. All barrier designs, location and layout shall comply with REAM –GL 9/2006 – Guidelines on Design and Selection of Longitudinal Traffic Safety Barrier.

Semi-rigid barrier was designed to cater energy during collisions and distributed by beam action and to moderate deflection. It shall be used at median and roadside which have minimum 0.6 m clear distance.
8.5 Landscape

Landscaping has significant influence on the safety performance of roadway. It can be divided into two types:

- Soft landscape (planting trees). The criteria of good soft landscape are:
  - Not obstruct all sight lines in the roadside.
  - Landscape tree size of the trunk shall not more than 100 mm.
  - Can be used as barrier to headlight glare from opposing traffic.
  - Shall have minimum 1.0 m clear distance from edge of road. Requirement for planting trees shall be referred according to “Garis Panduan Landskap Negara” published by Jabatan perancangan Bandar dan Desa Semenanjung Malaysia.

- Hard landscape (bollard).
  - Bollard shall be from concrete type and 1.0 m of height.
  - Bollard design for development within Iskandar Malaysia shall be as Figure 8.5-3.

![Figure 8.5-1: Landscaping Tree Pattern at Intersection](image1)

![Figure 8.5-2: Landscaping Tree Pattern at Roundabout](image2)
8.6 Drainage

Drainage is one of the most important aspects on designing road layout, which comprising several components based on 'Manual Saliran Mesra Alam' (MaSMA). The components are:

- Roadside drain.
- Median drain.
- Water inlet. Two types of water inlet used in IM:
  - Type A: Precast concrete water inlet.
  - Type B: Combination of kerb opening and grating.
- Sump/manhole.

8.7 Road Delineator

- It is designed to outline the edge of roadway and to indicate the roadway alignment especially at night time.
- It consists of reflector units (glass, plastic, or reflective sheets) mounted on suitable supports.
- Its characteristics shall comply according to 'Arahan Teknik Jalan 2D/85’ – Manual on Traffic Control Devices Road Marking and Delineation.
- It shall be placed around 0.6 m up to 1.8 m from the edge of roadway on straight condition.

8.8 Fencing/Railing

- It acts as separator and can be located at median under overhead pedestrian crossing.
- It also can be used as separator between motorcyclist and pedestrian lane.
- It shall be made from galvanized iron for hard standing in the rainy condition.
- It shall be 1.5 m height from ground level.

9 INITIATIVES

The initiatives for The Road Layout Design Blueprint shall be addressed the technical as well as public awareness. The details of initiatives and programs could be referred to the completed blueprint.