Patong Municipality Office

Phuket

A Study on Increasing Efficiency of Transport and Traffic Infrastructure of Patong Municipality

Executive Summary Report

Faculty of Engineering

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1. Introduction

This document presents an executive summary of the study on efficiency enhancement of Patong Municipality's transport and traffic infrastructure. It explains the findings of a survey of existing transport and traffic related issues; analysis of prevailing patterns and users' behaviour, as well as offering approaches for resolving the issues uncovered during the study.

1.1 Rationale for the study

Current government policy is placing greater emphasis on the need for more effective planning of the country's economic infrastructure including better management of transport and traffic facilities. The Ministry of Transport (MOT) has accordingly directed increasing effort towards the development of Thailand's transport networks to help support our social and economic growth with a focus on cost reduction, energy saving and protection of the environment. Preparation of MOT's infrastructure development plans are prepared to match the potential and requirements of the areas being developed – local, sub-regional, regional and inter-regional.

Strategies for Phuket's transport development have been formulated covering a wide range of sectors, in particular for aspects relating to tourism development and facilitation, safe and convenient access to tourist sites. The transport insfrastructure of the Patong Municipality – its road networks, footpaths and bicycle lanes – has been found to require a measure of upgrading. This study therefore aims to identify any existing issues and to propose solutions in order to enhance Patong's transport efficiency as well as road safety. At the same time, the study should serve as a guideline for the municipality's planned future growth in line with its physical and socio-economic settings.

1.2 Objectives

1) To encourage development of Patong's transport and traffic infrastructure in terms of safety and efficiency for resident users and tourists, matching the municiplaity's growth potential.
2) To maximize the benefit of land use via proper transport and traffic arrangements.

1.3 Scope of the study

1.3.1 Study area

- Some 16.4 sq.km. of Patong's designated municipality focusing on areas with existing transport/traffic issues including key commercial and tourist localities.
- Accident vulnerable areas – black spots and risk spots on main and supporting road networks to and from the municipality.
- Areas or corridors with existing transport facilities for pedestrians and/or tourists.

1.3.2 Project tasks

- Plan for development of Patong's infrastructure.
- Propose potential projects for efficiency upgrades of existing infrastructure.
- Propose guidelines for safety enhancement to benefit the road users including pedestrians and cyclists.

2. Existing situation

Situation survey of the existing facilities has identified issues as listed below:

2.1 Traffic volumes at intersections and road segments

2.1.1 Traffic volumes at intersections

Figure 1 below are results of all-day traffic counts at major intersections. The morning peak was from 7:30 – 8:30 hrs, having a volume of 28,492 PCU/hr. And the evening peak was from 17:30 – 18:30 hrs. with a volume of 28,447 PCU/hr. Inaddition, Figure 2 comprehensively shows the volumes and directions of traffic at the intersections during the morning and evening peak hours.

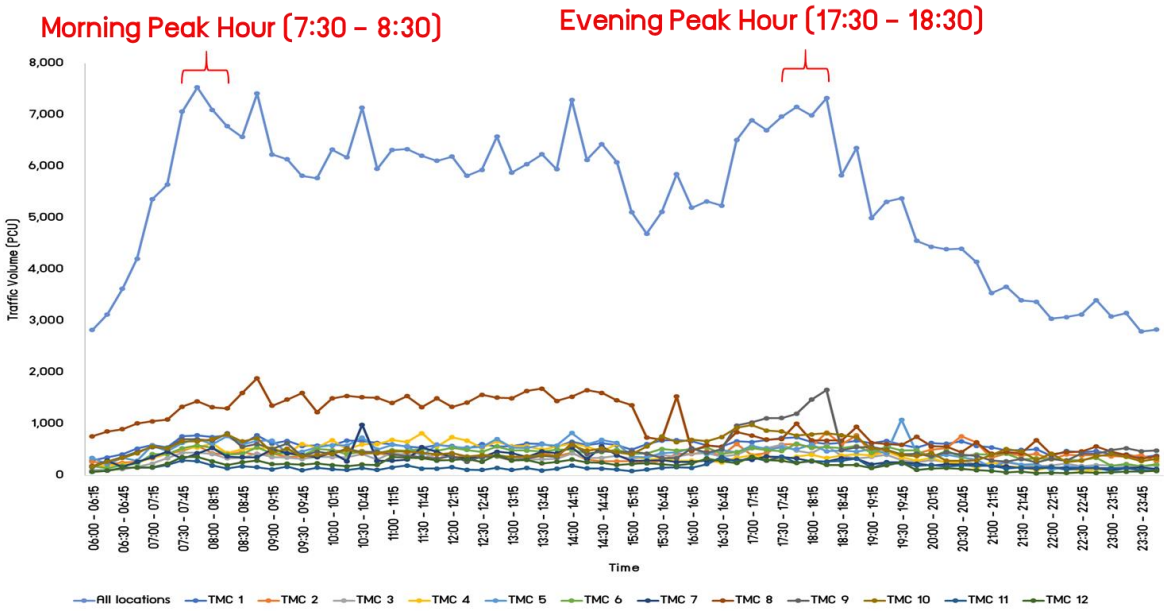


Figure 1 Intersection traffic counts for Patong Municipality.

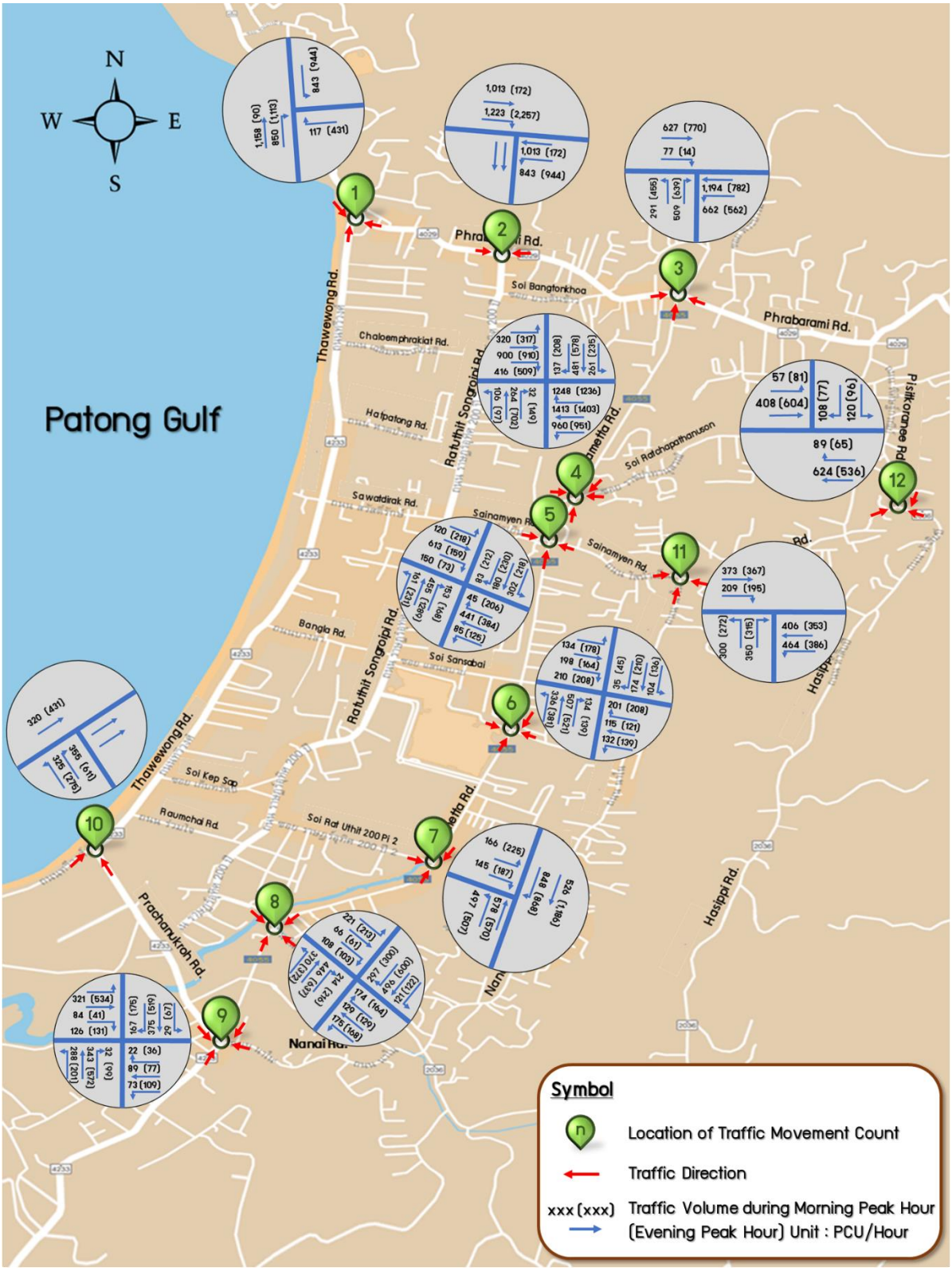


Figure 2 Traffic volumes at the intersections during the morning and evening peak hours.

2.1.2 Traffic volumes on road segments

Volumes of traffic on major road segments are shown in Figure 3 and Figure 4. These are summarized below:

On major access roads to and from Patong, the volumes during the morning peak (7:00 – 8:00 hrs) amounted to 4,577 PCU/hr; while the evening peak was observed to fall at 17:45 – 18:45 hrs, with a count of 4,4421 PCU/hr.

Traffic on major roads within the municipality boundaries had a morning peak at 7:30 – 8:30 hrs with a count of 4,085 PCU/hr. The evening peak occurred at 17:30 – 18:30 hrs. having a volume of 5,137 PCU/hr.

In terms of vehicle types on major access roads to Patong (Figure 5), motorcycles were found to make up the highest concentration (47.85%). This was followed by private cars at 44.85%.

For vehicle types on key urban roads (Figure 6), the motorcycle again showed the highest volume, at 65.78% of the total. This was trailed by the private cars, which made up some 28.60%.

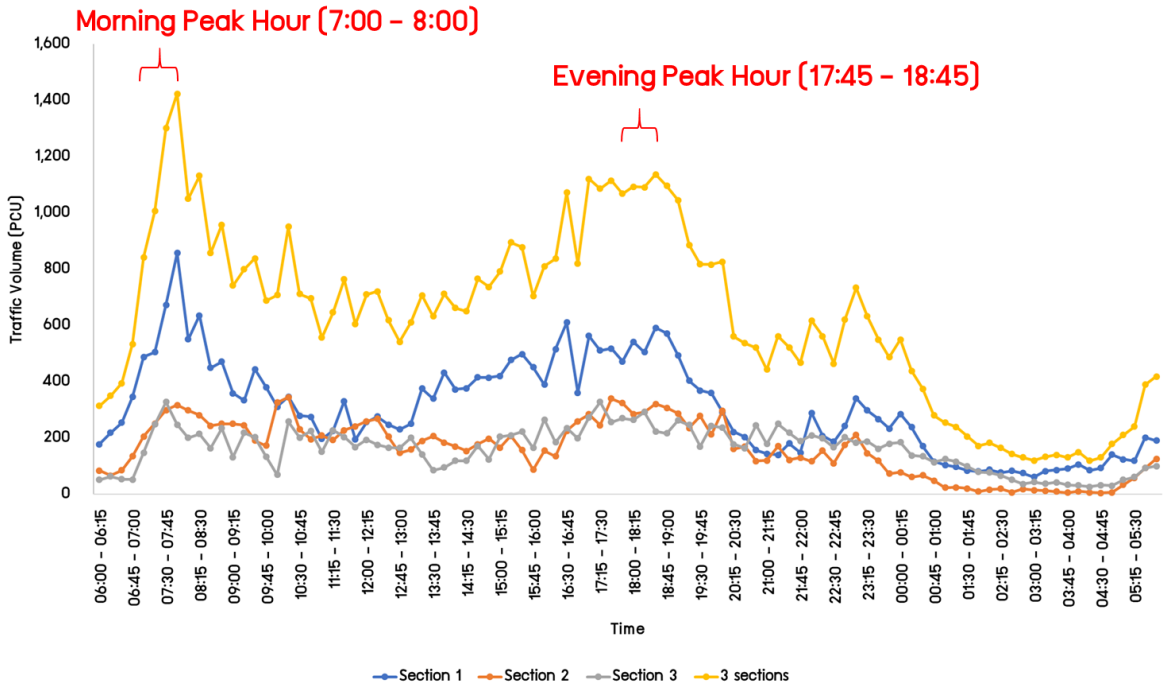


Figure 3 Traffic volumes on the access roads to Patong.

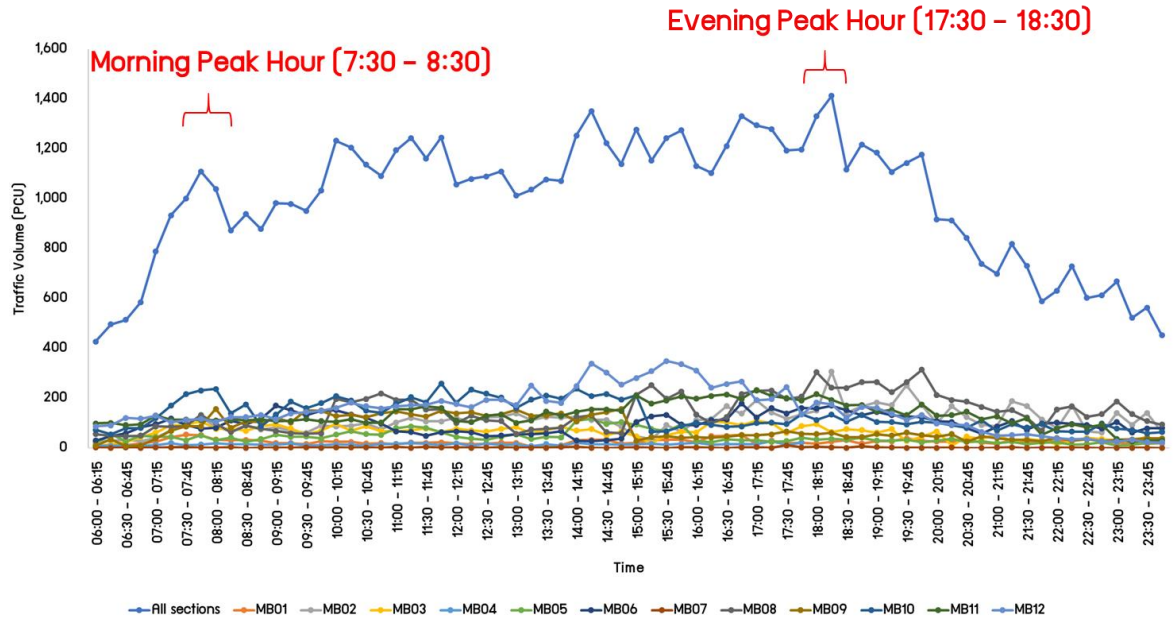


Figure 4 Traffic volumes on Patong urban roads.

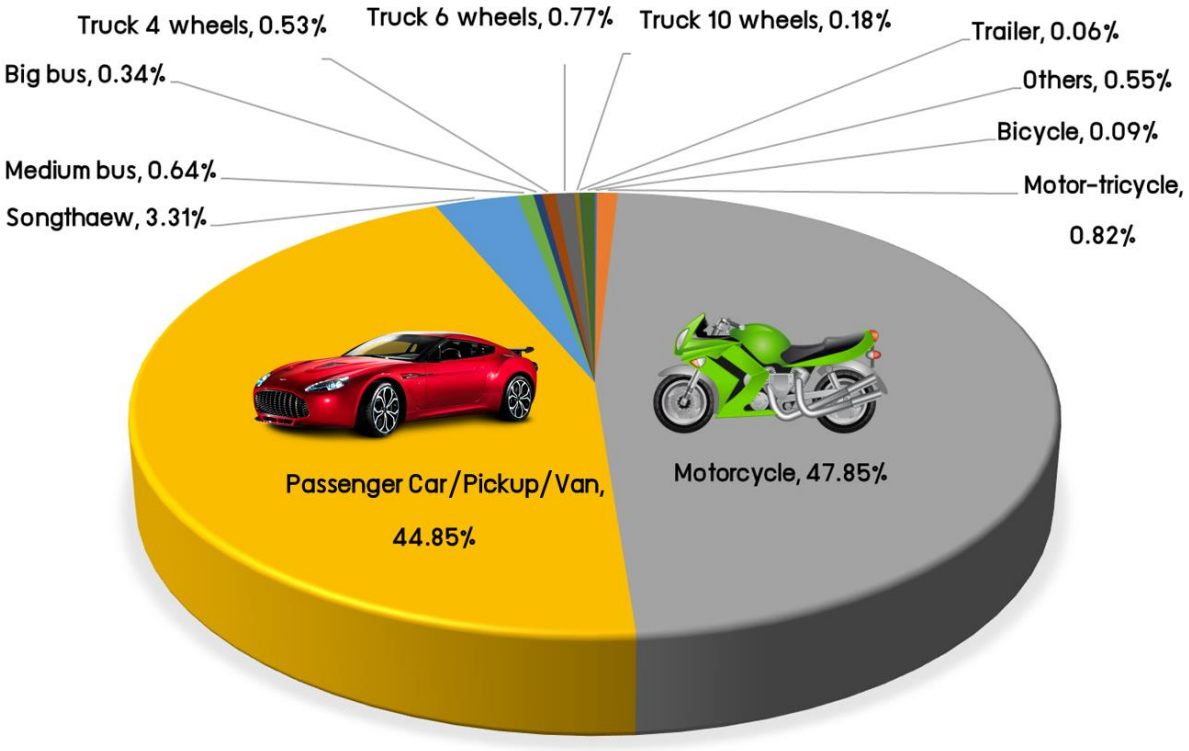


Figure 5 Vehicle types observed on access roads to Patong.

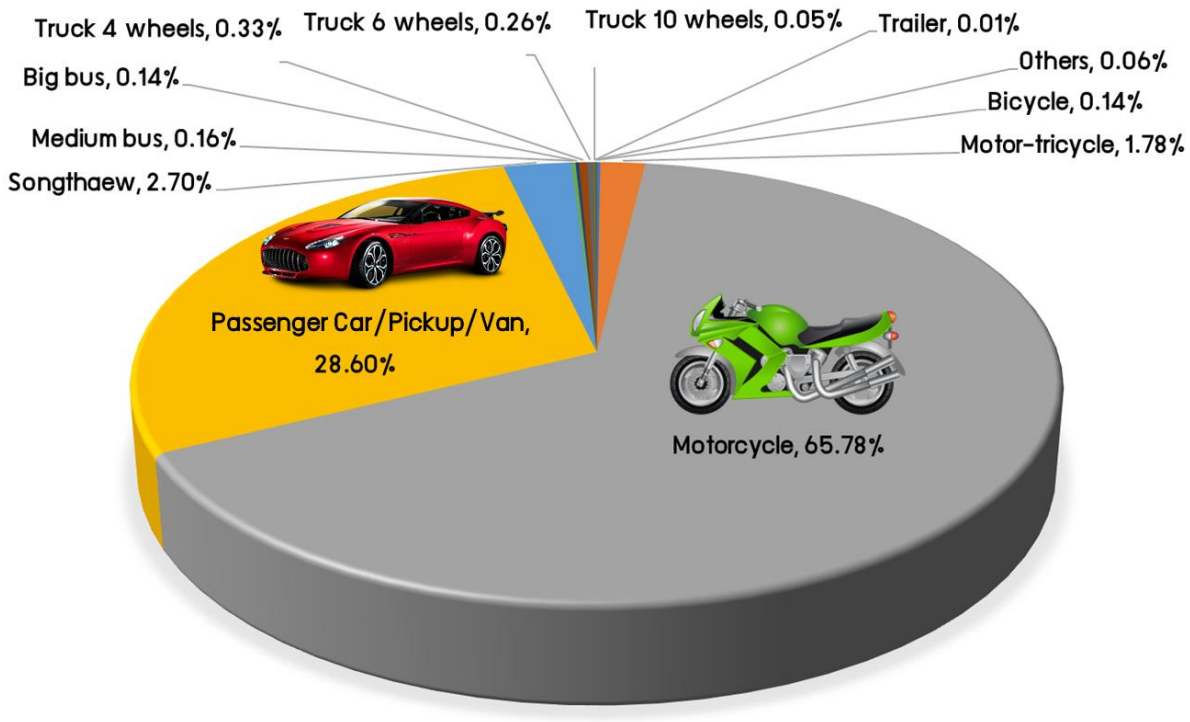


Figure 6 Vehicle types found on Patong urban roads.

Figure 7 shows the results of traffic surveys on various road segments. During the morning peak, traffic in the Patong-bound direction were found to have higher volumes than those in other directions. The reverse was observed during the evening peak with outbound traffic from Patong showing predominantly higher volumes.

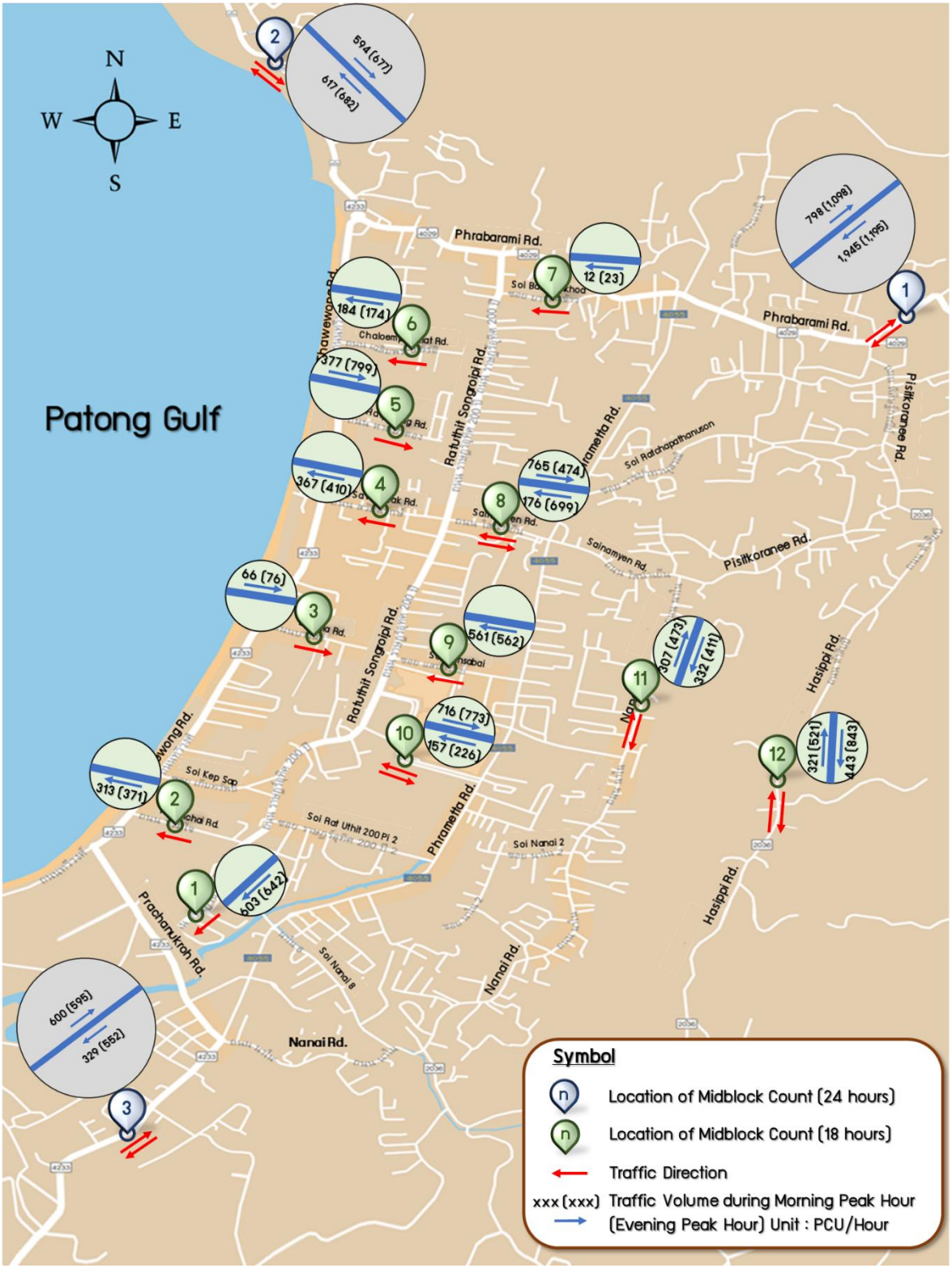


Figure 7 Traffic volumes on major access roads during the morning and evening peak hours.

2.2 Average travel speeds on road segments

Figure 8 shows the averge speed of traffic during the morning peak hours from 07:00 to 10:00 hrs. with most of the speeds on municipal roads within the range 40 to 49 km/hr, except on Phra Barami Road where speeds were found to be lower: 20 to 29 Km/hr. Speeds during the off-peak hours from 11:00 to 14:00 hrs. were found to be relatively low, particularly on Phra Metta and Sai Namyen Roads where speeds ranged from 15 – 19 km/hr. (See Figure 9). For the evening peak hours, from 15:00 to 18:00 hrs, speeds on most arteries were found to range from 20 to 29 km/hr, except that on Phra Barami Road, which is an out-bound corridor, traffic was moving at considerably slower speeds being in the range 15 to 19 km/hr. (See Figure 10).

Figure 8 Average road speed during morning peak, 07:00-10:00 hrs.

Figure 9 Average speed during off-peak, 11:00-13:00 hrs.

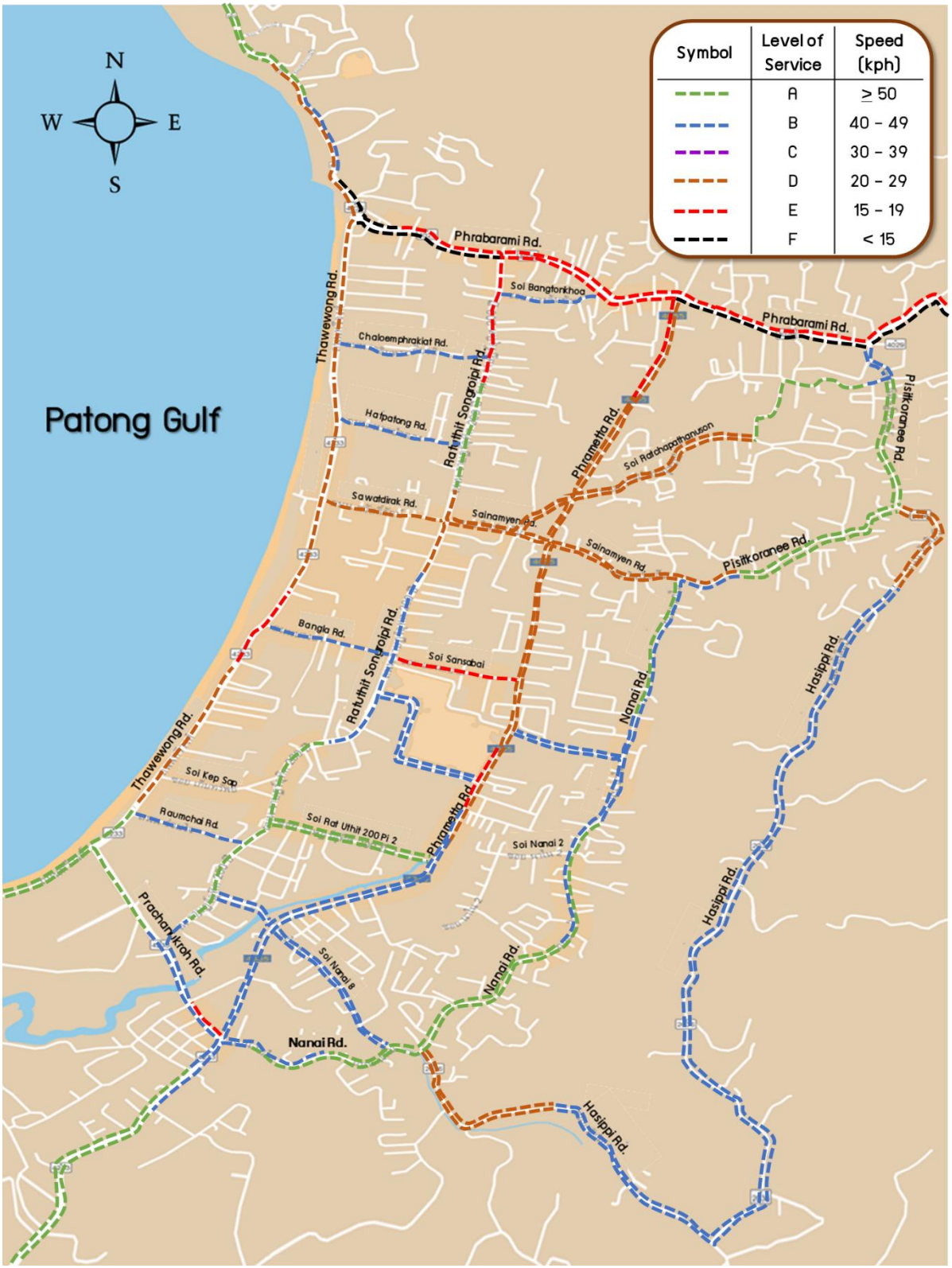


Figure 10 Average speed during evening peak, 15:00-18:00 hrs.

2.3 Efficiency of traffic signaling system

There are currently six intersections within the municipality that have been installed with traffic signaling systems, but only three of these are operational (See Figure 11). Consultant has employed the SIDRA program to appraise the efficiency of the three operating signaling devices, and recommendations were offered regarding proper adjustment of signal cycle times in order to improve their operating efficiency.

Figure 11 Locations of signalized intersections within Patong

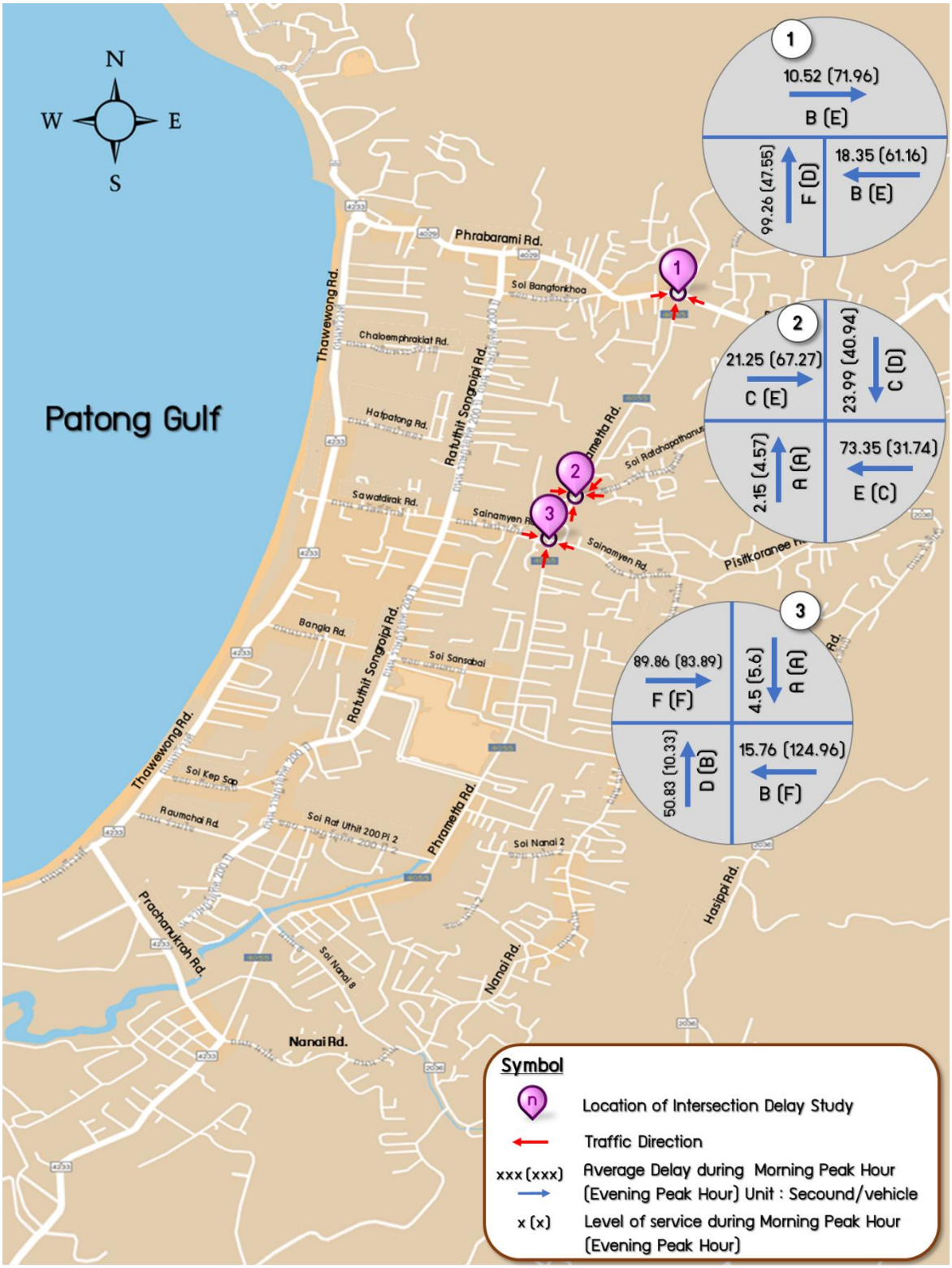


Figure 12 Delays and levels of service at the signalized intersections

From Figure 12, delays in traversing the intersections were identified. These were caused by inconsistencies between the cycle times and traffic volumes. To remedy the situation, it is necessary to adjust the cycle times to match traffic streams at each intersection.

2.4 Black spots and risk spots

Data obtained from crash sites, together with records of the local police precinct, the Patong General Hospital and other related agencies pointed to the existence of five black spots and ten risk spots on the road network under study (See Figure 13 and Figure 14).

The black spots are identified at these locations:

1) Road segment in front of Kalima Hotel (Hwy.4030)
2) Intersection of Phra Barami (Hwy.4029) and Phisit Koranee Road (At Suvarn Kiriwong Temple).
3) Intersection of Phra Barami (Hwy.4029) and Soi Khuan Yang Rd.
4) On Vichit Songkhram Rd. (Hwy.4029) close to the racing circuit.
5) The curved section in front of Dewana Hotel (on Ratuthit 200 Road).

The risk spots are identified at these locations:

1) Prachanukhroh T-junction (Hwy.4030 intersecting Thawewong Rd.)
2) Ratuthit 200 T-junction (Hwy.4030 intersecting Ratuthit 200 Rd.)
3) Siriraj Intersection (Hwy.4030 intersecting Hwy.4055 and Na Nai Rd.)
4) Laem Petch T-junction (Hwy.4029 intersecting Hwy.4030)
5) Na Nai Ruam Jai Intersection (Route 4055 intersecting Na Nai 8 Road)
6) Uphill curve of Ha Sib Pi Rd. (Hwy.2036) connecting Phisit Koranee Rd
7) Up/down hill segment of Ha Sib Pi Road connecting Na Nai Road
8) Up/down hill segment of Ha Sib Pi Road (Hwy.2036) connecting Ha Sib Pi T-junction.
9) T-junction in front of Amari Hotel (intersection of Thawewong and Muen Nguen Roads)
10) Narrowed segment on Soi 2 of Ratuthit 200 Road.

Figure 13 The five black spots identified in the study

Figure 14 The ten risk spots identified in the study

2.5 Efficiency of traffic and transport networks

2.5.1 Pedestrian footpaths

Existing footpath infrastructure of Patong was investigated and a number of issues were identified. These are summarized in Table 1 below, and guidelines for their rectification given in Figure 15.

Table 1 Safety issues on existing footpaths and proposed remedies.

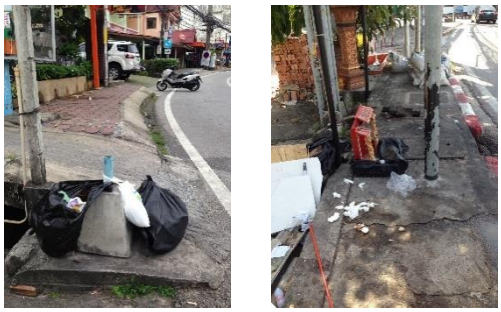
Problem and proposed remedy	
1) Garbage left on path  **Proposed remedy** - Regular cleaning of path - Install garbage bins at strategic locations.	**2) Discontinuity of path**  **Proposed remedy** - Install paths of standardized width throughout the municipality.
3) Gutter covers broken off or not flush with path.  **Proposed remedy** - Replace broken covers and ensure their being level with path.	**4) Fixed obstacles on path**  **Proposed remedy** - Relocate obstacles (e.g. poles) to allow sufficient clear path for safe walking. - Install reflectors on fixed poles or unmoveable structures on path to make them conspicuous to pedestrians.

Table 1 Safety issues on existing footpaths and proposed remedies (Cont.).

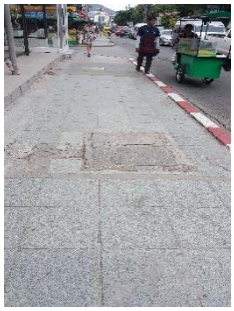
Problem and proposed remedy	
5) Absence of handicap tactile strip   **Proposed remedy** - Install handicap tactile strip to standard width, with down ramps, for convenience and safety of the visually impaired.	**6) Rough, uneven pavements**   **Proposed remedy** - Repair or rebuild the damaged pavements.
7) Rough, uneven handicap tactile strip on path   **Proposed remedy** - Repair the damaged spots.	**8) Crosswalk markings fading off**   **Proposed remedy** - Regular maintenance of the markings.

Table 1 Safety issues on existing footpaths and proposed remedies (Cont.).

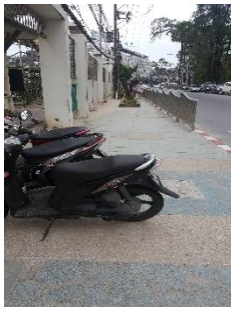
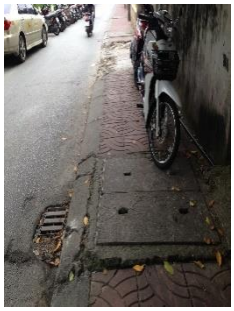
Problem and proposed remedy	
9) Illegal parking of vehicles on path   **Proposed remedy** - Heighten police enforcement on illegal parking.	**10) Absence of pedestrian crossing signals**   **Proposed remedy** - Install crossing signals, especially at locations of busy pedestrian crossing.
11) Hawkers encroachment on path   **Proposed remedy** - Upgrade city ordinance and control of footpath uses. - Management of hawkers/stalls to create clear width on path for the comfort and safety of pedestrians.	**12) Discontinuity of handicap tactile strip**   **Proposed remedy** - Ensure continuity and standard features of the strip.

Table 1 Safety issues on existing footpaths and proposed remedies (Cont.).

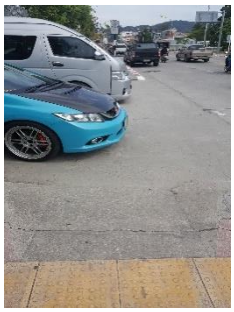
Problem and proposed remedy	
13) Water pooling on path   **Proposed remedy** - Install pavement with proper drainage inclines.	**14) Crossing signals not functioning**   **Proposed remedy** - Repair or reinstall signals to ensure functioning.
15) Sand or dirt on path   **Proposed remedy** - Regular cleaning of the pavement.	**16) Illegal motorcycle riding on path**   **Proposed remedy** - Stricter police enforcement against such violation.

Figure 15 Phasing of pedestrian footpath development for Patong.

2.5.2 Bicycle lanes

The infrastructure for bicycle lanes in Patong Municiplity was investigated, and seven issues were identified, as follows:

1) No bike lane marking.
2) Vehicles parked along kurb (across bike lane).
3) Gutter covers not flush with road pavement, or having grill slots in the direction of bike travel.
4) Sand and dirts on road pavement.
5) Fixed obstacles on road pavement.
6) Damaged or uneven pavement.
7) Water pooling on pavement.

Figure 16 and Figure 17 below exemplify the range of issues identified on Patong's bicycle lanes, and guidelines for remedy of the problems.

Figure 16 Some issues found regarding existing bicycle lanes in Patong.

Figure 17 Possible upgrades for Patong's bicycle lanes.

3. Traffic and transport master plan

3.1 Overview of the master plan

The Patong traffic and transport master plan is prepared to present a range of approaches in rectifying prevailing traffic and transport issues affecting the municipality. From Consultant's situation survey, five aspects have been formulated for the preparation of the Master Plan, as described below.

1) Urban traffic and transport development plan.
2) Road safety impravement plan.
3) Tourism-related transport development plan.
4) Public transport development plan.
5) Urban liveability and attractions development plan.

The above-metioned plans and related projects are summarized in Figure 18. The details are as follows.

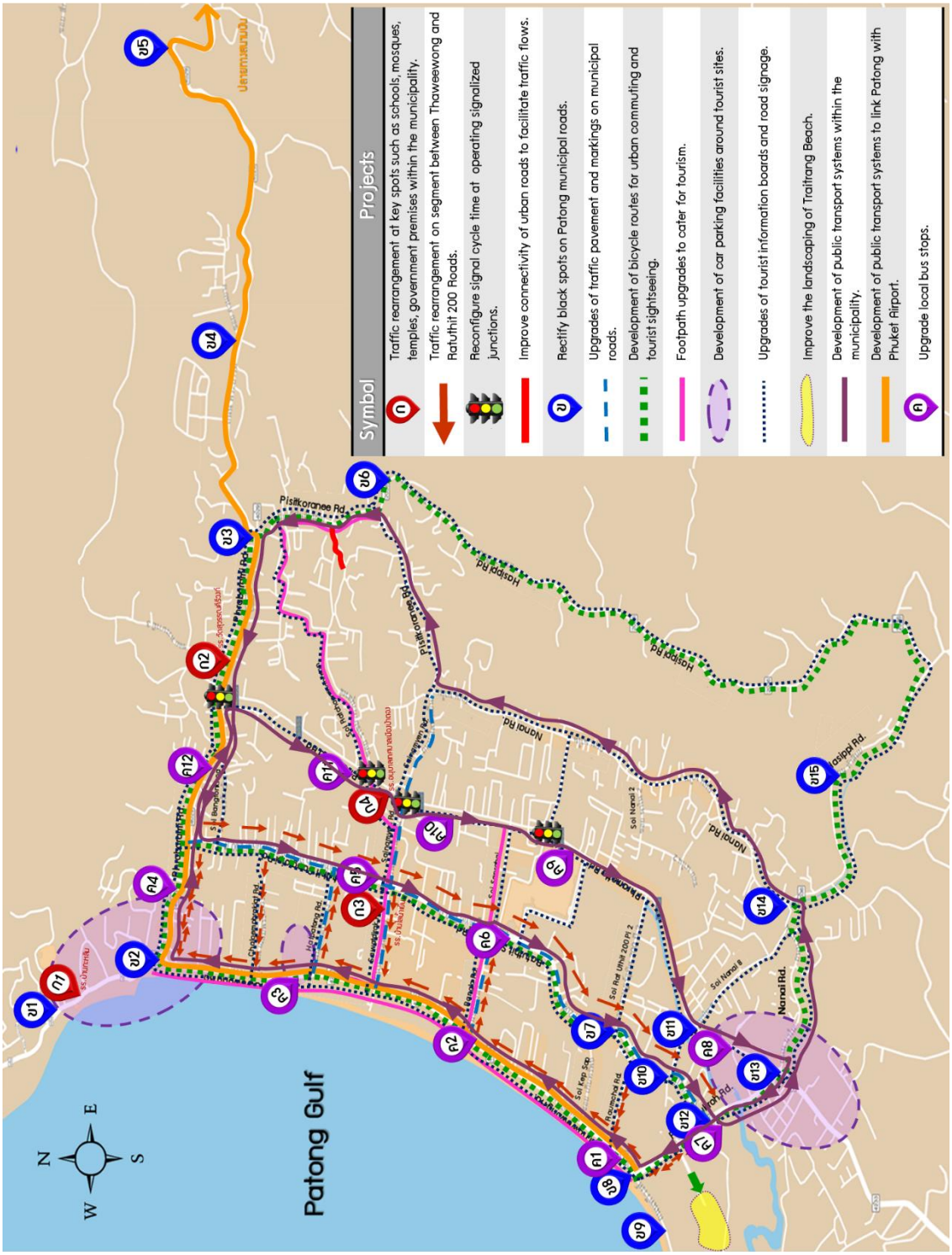


Figure 18 Traffic and Tranport Master Plan for Patong Municiplity

3.2 Urban traffic and transport development plan

Rationale

Convenient and safe traffic and transport networks will aid in the development of Patong's economy as well as residents' quality of life.

According to government policy, emphasis for the development of provincial infrastrure is on ensuring quality, efficiency and transparency for all traffic and transport projects, and at the same time striving for cost reduction, energy saving, and protection of the environment.

Purpose

To minimize traffic congestion thereby enabling smooth and efficient traffic flows within the study area.

Strategic planning

Plans to enhance overall efficiency of Patong's traffic and transport networks.

Approaches

- Upgrade road networks and traffic management to maximize system efficiency.
- Designate road categories based on vehicular use and roadside land use.
- Upgrade intersection signaling systems to match traffic flows.

Programs to implement

- Traffic rearrangement at key spots such as schools, mosques, temples, government premises within the municipality.
- Traffic rearrangement on segment between Thawewong and Ratuthit 200 Roads.
- Reconfigure signal cycle time at three operating signalized junctions.
- Improve connectivity of urban roads to facilitate traffic flows.

Figure 19 illustrates some of the tasks:

a) Traffic rearrangement in front of schools within Patong.

b) Upgrades of urban road connectivity to facilitate traffic flows.

Figure 19 Samples of urban traffic development programs.

3.3 Road safety impravement plan

Rationale

This program is about employing engineering measures to rectify black spots and risk spots, as well as using legal and educational approaches to instill traffic discipline and awareness of road safety.

Purpose

- To improve safety, reduce number and severity of road accidents for all road users.
- To upgrade, acquire and maintain traffic devices and safety equipment of high standards and functional efficiency.
- To promote equal opportunity in road use among cars, motorcycles, bicycles and pedestrians (young and old, and people with disabilities).
- To mitigate the impact on the environment resulting from urban traffic, e.g. noise and air pollution.

Strategic planning

- Increase travel safety; reduce crash risk and severity.
- Rectify black spots in the municipality.
- Disseminate road safety knowledge and encourage safe practices and road discipline.
- Prepare policies and plans on road safety and maintenance of related traffic devices for concerned agencies.

Approaches

- Black Spot Treatment.
- Road Safety Audit (RSA).
- Reduction of vehicular speeds in the traffic stream.
- Reduction of risk to road-crossing pedestrians.
- Use of traffic-calming devices to match road categories and associated land use.
- Control traffic stream (volume, speed, truck loading) to match road category and land use.

Programs to implement

- Rectify black spots on Patong municipal roads.
- Upgrades of traffic pavement and markings on municipal roads.
- Impose time and route restrictions on certain vehicle types.
- Rectify the issue of unsafe drivig practices by non-Thai tourists.

Figure 20 and Figure 21 show examples of the programs:

Figure 20 Road pavement and marking improvement program

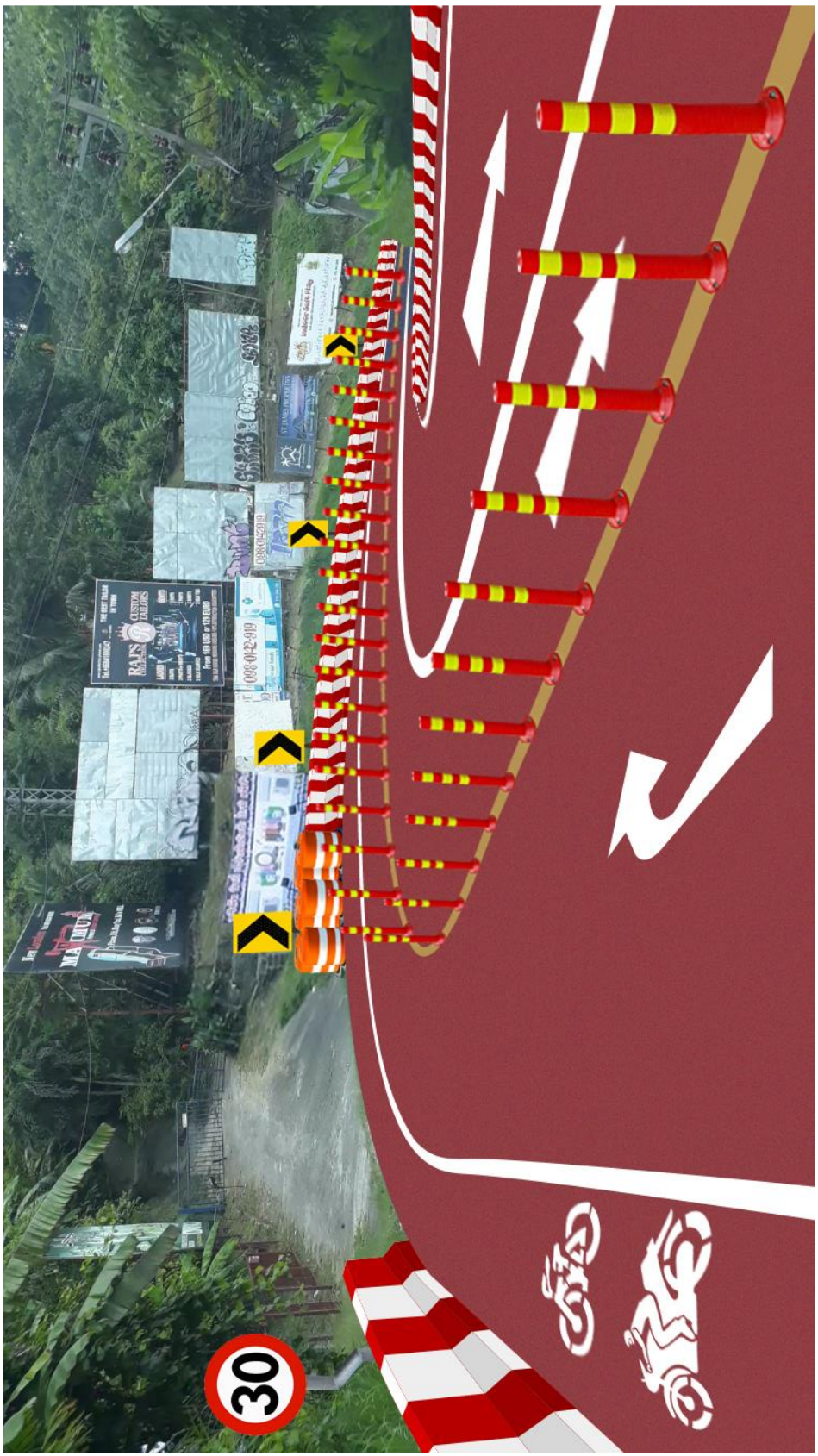


Figure 21 Rectification of traffic black spots program

3.4 Tourism-related transport development plan

Rationale

Having a road network that serves the daily communication needs within Patong as well as connecting it with nearby tourist sites should be of a great benefit to the areas' economic growth. In addition, development of new routes to connect with historically important locales should help to attract an increasing number of visitors to the area in much the same way as the provision of routes for hiking or bicycling.

Purpose

- To upgrade the convenience and safety for travels to key tourist attractions.
- To attract an increasing number of tourists to the area.

Strategic planning

- Increased safety for tourists to Patong.
- Reduction in road accidents.
- Promote eco-tourism and culture tourism.
- Promote travel on foot and/or bicycling along suitable routes.
- As a means to publicize tourist attractions in the area.

Approaches

- Upgrade public transport systems to offer convenient and safe travels for tourists.
- Upgrade tourist walking and bicycling routes within Patong.
- Encourage local efforts in publicizing tourist attractions, route information and available modes of travel to domestic and foreign tourists.

Programs to implement

- Development of bicycle routes for urban commuting and tourist sightseeing.
- Footpath upgrades to cater for tourism.
- Development of car parking facilities around tourist sites.
- Upgrades of tourist information boards and road signage.

Figure 22 and Figure 23 illustrate some of the planed programs.

Figure 22 Development of bike lanes for commuting and sightseeing.

Figure 23 Upgrades of existing street to cater for tourism (walking street).

3.5 Public transport development plan

Rationale

Traffic volumes in Patong Municipality during the peak hours have seen rapid increases due to the uptrend in the local use of motorized vehicles. Severe congestion is being experienced particularly along Thawewong Road and Ratunthit 200 Road.

A potential approach that should help to alleviate the above problem is the development of more public transport routes within the municipality as well as new alignments linking Patong with surrounding destinations such as Phuket city and Phuket Airport. Not only will such increased connectivity help to improve traffic flows, but it also will reduce fuel use, lessen air pollution, and at the same time make Patong a more liveable place.

Purpose

To develop an efficient public transport network so as to reduce use of private vehicles, lessen traffic-induced air pollution, and enhance the liveability of Patong.

Strategic Planning

- Identify suitable public transport systems to match local requirements.
- Upgrade public transport facilities to support intra-municiplity travels as well as to link with destinations outside of Patong.
- Encourage use of public transport for intra-municiplity travels as well as to destinations outside.
- Regulate use of private motorized vehicles within the Patong urban area.

Approaches

- Develop public transport systems of good quality and efficiency.
- Encourage the residents to switch from using private vehicles to public transport.

Programs to implement

- Development of public transport systems within the municipality.
- Development of public transport systems to link Patong with Phuket Airport.
- Upgrade local bus terminals, stops, timetables and routes.

Figure 24 and Figure 25 below illustrate some of the programs mentioned.

Figure 24 Conceptual routes for public transport development within Patong.

Figure 25 Conceptual alignment for public transport development connecting Patong and Phuket International Airport.

3.6 Urban liveability and attractions development plan

Rationale

Developing the liveability of a bustling urban environment amounts to quite a challenge, especially where there exist large numbers of residents and commercial activities, such as Patong. A likely approach towards accomplishing this objective is in enhacing the potential for development of available public spaces through planned improvements in architectural landscaping and built environment, giving priorities to remodeling areas that have become urban eye-sores. With proper rehabilitation, such areas can become new venues for commerce, urban recreation, or new attractions for tourism having acceptable degrees of safety and convenience for residents and tourists alike.

Purpose

- Upgrade architectural landscaping and physical infrastructure of public areas for better appearance.
- Promote increases in green areas which will serve as spaces for public recreation and social activities.

Strategic Planning

Promote development and remodeling of public spaces in Patong for increased convenience and safety to users.

Approaches

- Promote travel by foot for all categories of people (including adults, children, the elderly, the physically disabled) in order to reduce use of motorized vehicles.
- Encourage use of spaces to enhance the liveability and attractiveness of Patong.

Programs to implement

- Upgrade pedestrian footpaths and crossings for the convenience and safety of all user types.
- Improve the landscaping of Traitrang Beach.

Figure 26 illustrates one of the programs.

Figure 26 Upgrading local footpaths and crosswalks for all user types.

Table 2 Summary of budgets, plans and programs on traffic and transport development for Patong Municipality.

Plan	Program	Indicator	Budget (baht)
1. Urban traffic and transport development plan	1. rearrangement at key spots such as schools, mosques, temples, government premises within the municipality.	· Improved flow of traffic in the vicinity.	5,000,000
	2. Traffic rearrangement on segment between Thawewong and Ratuthit 200 Roads.	· Reductions in travel time	500,000
	3. Reconfigure signal cycle time at three operating signalized junctions.	· Reduction of traffic congestion at intersections.	500,000
	4. Improve connectivity of urban roads to facilitate traffic flows.	· Increased convenience and reduction of traffic congestion.	3,000,000
	Subtotal		**9,000,000**
2. Road safety impravement plan	1. Rectify black spots on Patong municipal roads.	· Reductions in road accidents.	29,490,000
	2. Upgrades of traffic pavement and markings on municipal roads.	· Safer road travels.	78,764,000
	3. Impose time and route restrictions on certain vehicle types.	· Increased safety and reduction of congestion during peak traffic periods.	300,000
	4. Rectify the issue of unsafe drivig practices by non-Thai tourists.	· Reductions in number of foreign crash sufferers.	100,000
	Subtotal		**108,654,000**
3. Tourism-related transport development plan	1. Development of bicycle routes for urban commuting and tourist sightseeing.	· Increases in commuters switching to bicycle mode.	5,923,750
	2. Footpath upgrades to cater for tourism.	· Increases in number of pedestrians.	22,650,000
	3. Development of car parking facilities around tourist sites.	· Increases in number of tourists	2,500,000
	4. Upgrades of tourist information boards and road signage.	· Increased tourist satisfaction.	500,000
	Subtotal		**31,573,750**

Table 2 Summary of budgets, plans and programs on traffic and transport development for Patong Municipality (Cont.)

Plan	Program	Indicator	Budget (baht)
4. Public transport development plan	1. Development of public transport systems within the municipality.	- Increases in in volume of public transport users.	750,000
	2. Development of public transport systems to link Patong with Phuket Airport.	- Reductions in cost, and increases in traveling convenience.	400,000
	3. Upgrade local bus terminals, stops, timetables and routes.	- Increased satisfaction and convenience to public transport users.	12,000,000
	Subtotal		**13,150,000**
5. Urban liveability and attractions development plan	1. Upgrade pedestrian footpaths and crossings for the convenience and safety of all user types.	- Reductions in accidents to pedestrians.	52,800,000
	2. Improve the landscaping of Traitrang Beach.	- Increased tourist satisfaction.	4,300,000
	Subtotal		**57,100,000**
	Grand Total		**219,477,750**